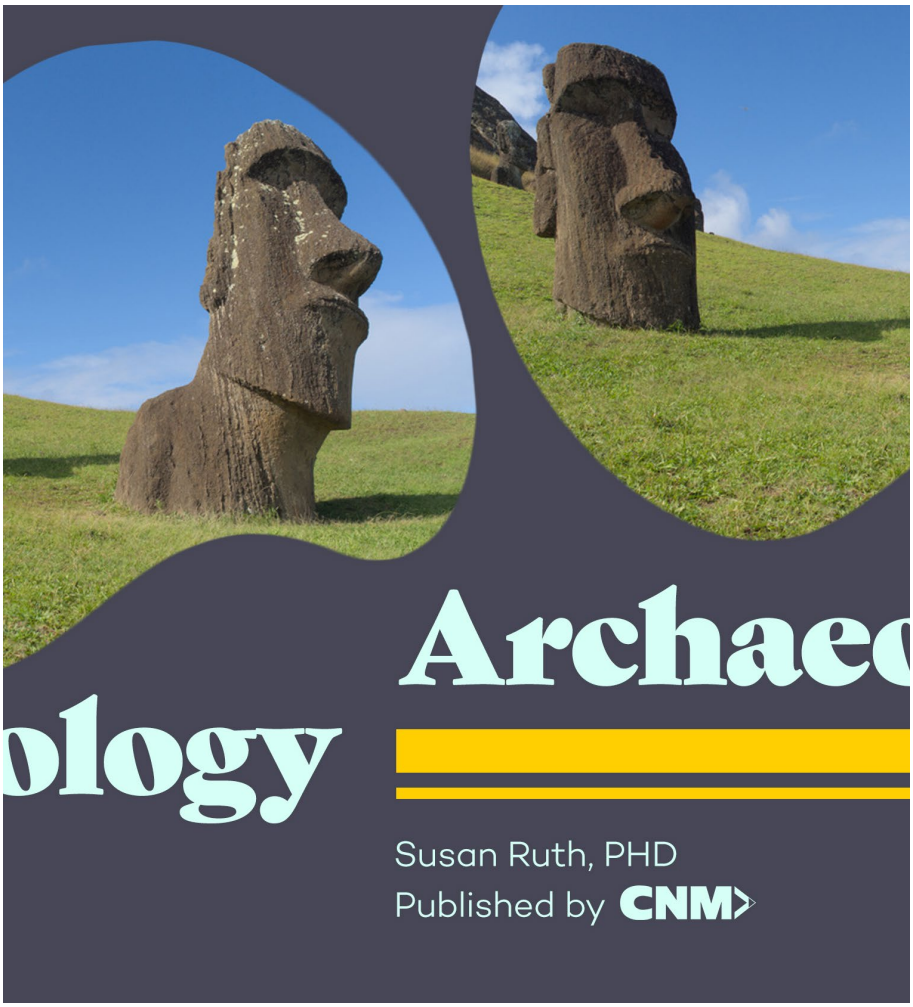
Archaeology



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Chapter 1: Portals to the Past ⟶

Chapter 1: Portals to the Past

Archaeology is only partly about discovering things; for me, archaeology is about thinking about things. —Stephen Lekson

Taking a noon-day break from excavating on Albuquerque's windswept West Mesa in the summer of 2002, we stretched our legs, cramped from kneeling in a small square pit since six that morning. Someone started a game of hacky sack. Reaching down to retrieve the hack, I saw something black and shiny in the sand. "Gotta be cultural," I thought. The crew gathered around, and we soon realized that I held in my hand an obsidian Folsom point, a kind of spear tip made of volcanic glass. The person who last touched the point lived more than 10,000 years ago, at the close of the last ice age. The artifact and its maker belonged to a different geological epoch—the Pleistocene—also known as the ice ages. Ultimately, our excavation would show that a small band of people was hunting a species of giant bison at the edge of a small lake. The point, along with other artifacts recovered at the site and the context in which they were found, is a portal to the past. Within 10 years, the area would be transformed into a modern neighborhood on Albuquerque's Westside.

Who hasn't thought about traveling in time to the distant future or the remote past? I would love to spend one day hanging out with ice-age humans, witnessing the Easter island moai being carved and moved, or simply stand on the same sands as the Egyptian Sphinx and pyramids in their heyday. While we can't blast back in time through a wormhole or in a tricked-out DeLorean, we humans can go anywhere in our minds, free of charge. This mental time travel may not be unique to humans, but certainly, no other animal is obsessed with the past and future like human beings. We are captivated by stories of galactic wars of long ago, a future planet ruled by apes, and the daring deeds and misdeeds of our ancestors. These are not mere stories, but shared narratives that bind us together and shape how we view the world. Archaeology is a kind of story-making, but one grounded in the physical facts, and important to understanding who we are as a species.

Our interest in the past is not just a modern obsession. The ancient Maya, who were fanatics for calendars and tracking time, inscribed dates well into the 5th millennium A.D.—the 4,000s. In this course, we'll take a journey to our planet's human past, visiting those who have come before us and stood where

we now stand, whether it's the West Mesa of Albuquerque or the Valley of the Kings in Egypt. We'll examine who these people were, what were their lives like, and how have they shaped who we are today. We will also consider the ethical questions of who gets to tell these stories, who gets to visit sites, what kinds of artifacts should be displayed, and whether some things are better left in the ground or reburied.

Writing and Material Culture

Short of a time machine, one way to know the past is to read what people have put down in writing. Of course, spoken language and oral traditions are much older than writing, which has only existed for around five thousand years. Even when writing systems were in place, many of the stories of the ancient world were not written down, but instead recited orally as poems, songs, and narratives. German fairy tales were terrifying children long before they were put to paper by the Brothers Grimm. Even though Homer's the *Iliad* and *Odyssey* were immortalized in writing, they continued as oral traditions alongside their written counterparts. Religious stories of the Bible, Torah, and Vedas were originally orally transmitted. For indigenous people of North America oral traditions were and continue to be important ways of passing along histories and cultural values. Today, oral traditions are even used to connect archaeological remains to modern-day tribes.

The term "history" is often defined as the study of written documents. Early writing did not emerge everywhere, but rather only in a few areas like the Middle East, China, Egypt, India, and Mesoamerica. The written word can have a powerful, almost magical quality. The ancient Maya revered the writings of their ancestors and believed that reading ancient texts literally brought their ancestors back to this plane of existence, a literal portal. Not so differently, the astronomer Carl Sagan wrote of the magical quality of books in *Cosmos*,

"One glance at it and you hear the voice of another person, perhaps someone dead for thousands of years. Across the millennia, the author is speaking, clearly and silently, inside your head, directly to you. Writing is perhaps the

greatest of human inventions, binding together people, citizens of distant epochs, who never knew one another. Books break the shackles of time—proof that humans can work magic."

Despite its power, writing is also a fragile medium. The ambition of the Library of Alexandria, built more than 2,000 years ago, was to collect all the written knowledge in the world and house it under one grand roof. Hundreds of thousands of papyrus scrolls are thought to have been curated there. Portions of the library were infamously burned by Julius Caesar in 48 B.C. But equally devastating was the neglect the library received with changes in ruling parties. As different leaders came to rule the city under the influence of various religious ideologies, the knowledge contained within the library came to be viewed as a threat, and the once-thriving library deteriorated due to lack of funding and neglect.

In perhaps an even more drastic example, Catholic bishop Diego de Landa intentionally burned nearly all the Maya codices (books), regarding them as blasphemous texts. More recently, ISIS burned thousands of books and manuscripts in the libraries of Mosul, Iraq. As writer Robin Wright (2017) put it, "ISIS sought to kill the ideas within its walls—or at least the access to them." Written documents continue to be susceptible to loss today. One prevailing concern is how will we store the unprecedented amount of data we generate today. Our storage devices will likely be obsolete just a few years from now, making storage of information as tenuous as ever. In a surprising twist, scientists are considering using DNA to store data indefinitely, with the benefit of being able to store huge amounts of data, circumventing the problem of picking and choosing the information to save. Some suggest we have the potential to save all of it (Zielinski 2017).

"Sumerian Cuneiform Clay Tablet" by Gary Todd is licensed under the public domain.

Prehistory is the term often used to describe the study of times and places that did not have written records. Most of "history" is in fact prehistory, because, for most of human existence, there was no form of writing. The term "prehistory" is a bit loaded because it makes writing a kind of benchmark of success and casts writing as a hallmark of human progress. In reality, not every culture needed written records, which had its origins in the ignominious task of keeping track of debts and taxes. What's more, it was not uncommon for only the wealthy elite to be educated in reading and writing, while peasants remained illiterate. We see this today in some societies where certain people, like girls, are denied an education and are illiterate, whereas boys and men can read and write. From this perspective, a culture can be simultaneously historic and prehistoric.

Since we are unable to read documents from cultures that lack writing systems, we must instead rely on something called material culture, or physical things

that people left behind. Archaeologists specialize in understanding the past through these material residues. Material culture has some advantages over written documents. First, it tends to be more durable than written records. Sometimes, the durability of material culture is quite surprising. Archaeologist Bill Rathje's famous garbology project unearthed a 1940s-era hotdog from the "Fresh Kills" landfill on Staten Island (Rathje and Murphy 2003). While more durable, material culture is not invulnerable, as when the National Museum of Brazil burned in 2018 as a result of underfunding, neglect, and the absence of a sprinkler system. Second, everyone leaves behind traces of their existence, so archaeologists are not limited to studying just the kings and queens and their great conquests and accomplishments. Through material culture, archaeology can investigate everyday people's existence, not merely the pharaohs and priest-kings who actively tried to preserve their legacy through writing.

Another disadvantage of written records (and oral accounts) is that they are often biased, inaccurate, and sometimes outright fabrications. As *New York Times* writer Witold Rybczinski (1992) put it, "Garbage doesn't lie. The evidence of junk-food wrappers, liquor bottles, and girlie magazines often flies in the face of what we tell ourselves—and what we tell others—about what we do." If we relied solely on self-reporting and written accounts of history, we'd have a warped and overly flattering understanding of current and past human behavior. Imagine if we only had our social media posts and images from which to reconstruct past lives and events.

Dresden Codex by Chris Protopapas is licensed under the public domain

In the United States, archaeology is often classified as a subfield of anthropology. Anthropology is the study of people from a holistic perspective, considering all aspects of their humanity—culture, language, biology, as well as their past. Holistic simply means that anthropologists are interested in humanity as a whole, and not just one aspect of our species. Anthropologists want to understand how entire past societies operated. As mentioned, anthropology, and therefore, archaeology, is interested in everyone—peasants, merchants, artisans, scribes, soldiers, priests, slaves—not just the glamorous, high-profile celebrities of the past. In other countries like Great Britain, archaeology is considered a division of history. Wherever archaeology is situated from an academic point of view, the boundaries between archaeology and other areas of inquiry are largely artificial. Archaeology draws on many disciplines—biology, history, political science, economics, psychology, geography, and sociology. Truth be told, archaeologists routinely use both written documents and material culture to investigate what our human ancestors were up to.

In addition to being concerned about the human past, archaeology is

increasingly interested in how the past has shaped the present and how it will impact the future. Subjects like environmental destruction, plant and animal extinction, and the concentration of political power are recurring themes in archaeology. A cursory look at ancient civilizations reveals that we are not the first to modify our landscape beyond recognition, use resources unsustainably, or concentrate power in the hands of a few. The empty ancient ruins of the Americas, the Middle East, Egypt, Europe, Africa, and Asia should give us pause to reflect on our own civilization and what the future will bring.

Every discipline has a foundation and methods with which they seek to build knowledge. Knowing is especially challenging in archaeology because of the time elapsed since the events occurred. The verb "to know" is one of those rare words that is universal, found in all languages. Knowing is the cornerstone to understanding. Epistemology is a very useful term that refers to *how* we know what we know. You can think of it as "knowledge-ology", the study of how we know things. What constitutes a good method, good evidence, and reasonable inferences? These are questions that are debated in every discipline, not just archaeology. Archaeologists generally try to test hypotheses, which are informed guesses that can be tested. A theory, in contrast, is a well-tested idea that has stood up to rigorous attempts to disprove it. Since scientists are in the business of proving each other wrong, when an idea gets elevated to the theory level, it's a big deal. Examples of theories include the germ theory of disease, atomic theory, the theory of relativity, and evolutionary theory.

Archaeologists are interested in both large- and small-scale questions. Small-scale questions are straightforward such as What was in this pot? Where did this stone come from? What did this person eat before he died? Large-scale questions that interest archaeologists include things like: Why did the domestication of animals and plants emerge? Why did some areas develop cities while others did not? Why do civilizations collapse and disappear? Archaeology considers these types of questions and everything in between. Often there are different levels of confidence when investigating the past. We can generally be more confident about things like diet, trade, tool use, and construction techniques than we are about the large-scale "why questions" of

the past. Additionally, understanding the values and symbols systems of past societies is quite challenging, and yet is one of the most interesting aspects of archaeology and targets what we often think of as human culture—that complex web of shared meaning that underpins how we see the world.

While hypothesis testing is common in archaeology, there are different methods to test those hypotheses. Some archaeologists collect quantitative data. Quantitative data is measurable information. An archaeologist, for instance, might measure the length of projectile points, count the number of pollen grains in a soil sample, or record the quantity of animal bone on a site. Other archaeologists are more interested in qualitative information, that is, descriptive information. Archaeologists interested in art and the use of symbols might be more interested in describing the nature of the artwork and its context. Of course, this is a simplified dichotomy, and archaeological studies routinely consider both quantitative and qualitative data simultaneously. Indeed, archaeologists regularly use many different types of data and lines of evidence to investigate a question.

Archaeology draws heavily on sciences including biology, genetics, chemistry, and physics. These applications of scientific techniques are collectively called archaeological science. For example, archaeologist Patty Crown at the University of New Mexico along with Jeffrey Hurst of the Hershey Corporation, discovered the chemical signature for cacao in ancient cylindrical vessels at Chaco Canyon, New Mexico using a technique in chemistry called chromatography (Crown and Hurst 2009). Not only does this research show that liquid chocolate was in the ceramic vessels, but also because cacao does not grow in New Mexico today, we know there must have been extensive trade to the south. The research sets the stage for archaeologists to further develop and test questions of trade and exchange between the American Southwest and other regions.

Another approach that archaeologists have used to gain insight into past behavior and to test hypotheses is experimental archaeology. Experimental archaeology replicates ancient objects and activities to gain insight into the

past. The usefulness of reconstructing the conditions of the past is that the reveals whether a particular activity or solution was possible. Unlike archaeological science, experimental archaeology is not the “white lab coat” kind of investigation. For instance, archaeologist Bruce Huckell at UNM wanted to know if a certain type of stone spear point could penetrate the hide of a mammoth. When an elephant at the local zoo died, Huckell (1982) showed that stone points could penetrate the elephant skin, which had similar quality and thickness as mammoth skin. By reconstructing the conditions of the past, Huckell demonstrated that the spear points in question could have been used to hunt mammoths. Recreating the stone tools themselves is another example of experimental archaeology. In my face-to-face courses, I often invite Ron Fields, an archaeologist at Salinas Pueblo Missions National Monument in New Mexico and an expert in stone tools, to show students the basics of making stone tools, also known as flint knapping. By attempting to make stone tools for themselves, students can experience first-hand the challenges people faced when making stone tools.

CNM Students learn the basics of stone tool manufacture. Photo: Sue Ruth

Archaeology, like many disciplines, has different schools of thought or paradigms. Some archaeologists are more interested in how ecological factors like climate, population size, and access to resources influence human behavior. Others are more interested in the values, symbolic systems, and power structures of the past. When learning about archaeological research, it is useful to think about how an archaeologist is approaching a problem and the lines of evidence used to answer questions about the past. Archaeologists interested in different aspects of the past typically collect different types of information, use different techniques, and make different kinds of inferences. Some questions to ask yourself when you read about archaeological studies are: Is this a small or large-scale question? What kind of techniques is the archaeologist using? Does the archaeologist use quantitative or qualitative information? What evidence is

presented? What is the archaeologist's general approach? Answering these kinds of questions will be useful in both understanding and evaluating archaeological claims.

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Chapter 2: Down to Earth →

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Chapter 2: Down to Earth

I'm holding a silver and turquoise necklace of Bastet, the Egyptian cat-headed goddess in my hands. It belonged to my mother, and even though she is now passed, the necklace remains a connection to her. Objects, especially personal ones, have a quality beyond their simple materiality. In World War II, Nazis collected the eyeglasses, shoes, and other personal effects of Jews killed in gas chambers. Witnessing these piles of personal effects is deeply moving and disturbing, as they seem to still house the essence of living, breathing people. The notion that objects have spiritual qualities is not uncommon. Some cultures, for instance, ritually "kill" personal items of the deceased to release the spirit within. Artifacts hold a similar allure, providing a connection to real people who lived hundreds or even thousands of years before. The idea that old objects contain special qualities is not just a modern one. The Inka of the Andes collected the much earlier Moche pottery and Romans displayed ancient Egyptian artifacts in their homes. "Pot drops"–piles of pottery found on sites in the American Southwest–are thought to be offerings to much earlier sites as a means of connecting with and honoring the ancestors. In short, artifacts are not just objects, they are meaningful to the observers and are potential conduits to the past.

Eyeglass of victims, 1945 by Bundesarchiv Bild is licensed under CC-BY-SA 3.0

Before Archaeology

Given the power and beauty of ancient objects, it is not too surprising that the initial European interest in ancient objects was for their aesthetic quality and not so much for their ability to provide information about the past. Before there was archaeology, there was something called "antiquarianism." In the Age of Antiquarianism (roughly 1600-the 1800s), aristocrats in Europe were interested in spectacular ancient art objects, with little concern for their method of procurement, what they were used for, or in many instances the context they came from. Museums often competitively sought beautiful objects to foster national pride and sometimes, ethnic supremacy. Excavations were conducted on a grand scale, and in worse-case scenarios, anything not museum-worthy was ignored or discarded. Beautiful ancient works of art were routinely removed from their countries of origin to be displayed in the galleries of

Europe. Italian engineer Giovanna Belzoni (1778–1820) pilfered the colossal head of the famous "Young Memnon" (Ramesses II) from Egypt and it still today resides in the British Museum. The "Elgin Marbles," sculptures from the Parthenon in Athens, Greece, were infamously taken by nobleman Thomas Bruce, a.k.a. Lord Elgin, to the British Museum, where they remain the subject of a debate over ownership. Artifacts were also political currency. Egyptian collections were regularly gifted by the Egyptian government to European countries to establish diplomatic relations.

In contrast to his contemporaries who acquired artwork on dubious terms, Egyptologist Sir William Flinders Petrie (1853–1942) was more interested in understanding the past. He was a pioneer in recognizing that even mundane artifacts and sites are worthy of consideration and can provide information about the past. He was also a big believer in recording the location of artifacts, a practice which today is routine. Petrie's work initiated the shift away from antiquarianism and toward modern archaeology, where mundane objects were recognized to have value in terms of the insight they could bring to the human past. Petrie's other claim to fame is that he sometimes appears as a character in Barbara Mertz's Amelia Peabody series of mystery novels set in Victorian-era Egypt.

Elves and Fairies

For the field of modern archaeology to arise, at least two basic realities had to be recognized. The first seems obvious now; Artifacts had to be recognized as objects made by people. In Europe, it was not uncommon for people to ascribe artifacts to the work of mythical beings like Thor or even elves. In Scotland, arrowheads were called "elf-arrows," and could be worn to protect against "elf-shot" (Jones and Fellow 1731:58). Gradually, people began pointing out that these mystical curiosities of Europe were not much different from the everyday tools used by people encountered during the colonization of Africa, Australia, and the Americas by European powers. In 1699, Edward Lhuyd, Keeper of Ashmolean Museum in Oxford concluded that mysterious objects found in Scotland were not the work of elves, but were just plain old arrowheads (James

and Fellow 1731:124):

I doubt not but you have often seen of those Arrow-heads they ascribe to elves or fairies, they are just the same as the chip'd flints the natives of New England head their arrows with at this day: and there are also several stone hachets (sic) found in this kingdom, not unlike those of the Americans.

The second realization that paved the way for modern archaeology is the recognition of the long period that humans have occupied the Earth. Many scholars attempted to calculate the age of the Earth and/or people on the Earth using the available texts. Archbishop James Ussher's calculation used, in part, the genealogies and reigns outlined in the Bible along with known dates of rulers. Ussher calculated the beginning of creation (as in Genesis) to 6004 BP (Sunday, October 23 in the Julian calendar; BP means "before present"). Calculating the age of creation was a serious matter of the day, as virtually everyone in Europe was a creationist at the time. Even Sir Isaac Newton attempted an estimate.

While Ussher's estimate was extremely influential, the physical evidence was not aligning well with this relatively short time frame of human existence of just 6,000 years. In the 1790s, John Frere, great-great-grandfather of famous paleoanthropologist Mary Leakey, excavated stone tools four meters (that's about 12 feet) below the ground surface in ancient lake deposits in Suffolk, England. How did these artifacts get to be so deep in the ground? Going against conventional thought, Frere concluded somewhat tentatively, "The situation in which these weapons were found may tempt us to refer them to a very ancient period indeed." A similar situation was coming to light in France. In the 1840s, a customs official named Jacques Boucher de Perthes uncovered stone tools associated with extinct elephant remains (mammoth) deep in ancient Somme River gravels in France. Like Frere, he concluded that the human presence in Europe had to be older than what the Biblical and historical accounts implied. Boucher de Perthes' other claim to fame is that he shows up in Jules Verne's 1871 *Journey to the Center of the Earth*. Today, thanks to these early observers and thousands of subsequent archaeological and geological investigations, the

deep age of the earth and human existence presence are overwhelmingly clear. Humans have been in Europe for at least 40,000 years and other related species like Neanderthals were there for hundreds of thousands of years. Chapter 3 goes into more detail about the earliest human sites.

The Three Principles

Both Frere and Perthes were using a concept basic to geology, paleontology, and archaeology, called the Principle of Superposition. The Principle of Superposition is the straightforward observation that lower rock or soil deposits are older than the deposits found higher up. More formally, the Principle of Superposition states that in a sequence of undisturbed strata (layers of cultural and natural deposits) the overlying layer is younger than the one below it. At the Murray Springs Site in Arizona, the strata, or layers, can be seen in a stream channel. Just below the thin black "mat-like" deposit, mammoth bones and evidence of early people were found. Above the black line, the mammoth and most other large-bodied ice-age animals are gone and the tool tradition changes.

The Black Mat at the Murray Springs site, Arizona. by Sue Ruth

The second principle that Frere and Perthes used was the Principle of Association. The Principle of Association states that when remains of the past are near each other, they date to the same time period. Finding stone tools associated with mammoths at numerous sites indicates that humans were living alongside these now-extinct creatures. In the case of the Folsom site in New Mexico, a spear point was found in and around the bones of an extinct form of giant bison (*Bison antiquus*) that we know lived more than 10,000 years ago. This direct association with ice-age mammals and human tools led to the discovery that people were here in New Mexico during the last ice age.

Archaeology and other disciplines interested in the past rely strongly on the Principle of Uniformitarianism. Paleontologists and geologists also make use of this principle. Very simply put, the uniformitarian principle is the idea that the Earth and its life forms developed by the same natural processes in the past as in the present. That is the processes of mountain building, erosion, and basic chemistry and physics are the same as they were in the past. To use some very simple examples, archaeologists assume that stone tools will produce similar marks on bone today as they did in the past or that clay must be fired to the same temperature as it did in the past to become chemically altered into ceramic.

Based on what we see in the archaeological record and in genetic makeup, it is clear that people of the past were in every respect human, with the same intellectual capabilities, artistic impulses, and capacities for violence. While it may entertaining to consider the role of outside influences like aliens, lost races, or mythical beings like elves and fairies as contributing to our past, these claims have not stood up to the critical evaluation that extraordinary claims require. Often, people making these arguments have something to gain, especially fame and money. Erich von Daniken, for instance, who popularized his ideas of aliens interacting with ancient cultures in his wildly popular book *Chariots of the Gods,* was later convicted of fraud, forgery, and embezzlement and served time in jail. Ancient people are routinely underestimated and their achievements are sometimes assumed to be the work of a more intelligent society, extra-terrestrials, or even more perniciously a superior race of humans. Sometimes this assumption of ancient inferiority is overtly racist as in the case of the Great Moundbuilder debate which we will discuss in a later chapter.

The Three Great Questions: When? Where? What?

Question 1: When

Three essential questions are important to investigate the past. These can be

distilled down to When? Where? and What? There are several dating techniques used in archaeology to understand when something occurred. Two general categories of dating are relative and absolute dating. Relative dates refer to the age of something compared with something else but do not provide a specific calendar date. The Principle of Superposition is an example of a simple relative dating technique. A relative date tells you whether something happened before or after something else. Absolute dates are an estimate of an actual calendar date. It is important to keep in mind that absolute dates are estimates of an actual date and are not necessarily perfectly precise. Two common methods of absolute dating are radiocarbon dating and tree-ring dating. These two are often used in tandem with each other. Radiocarbon dating works only on samples that were once living and is based on how much radioactive carbon has been lost after the death of the organism. We will discuss this method in more detail in a later chapter.

Tree-ring dating or dendrochronology is another absolute dating technique. Dendrochronology relies on the fact that trees add a ring of growth annually. The pattern of tree rings over time varies due to increases or decreases in rainfall and other factors. By overlapping and matching the pattern in tree rings of living trees with that of archaeological samples, we can date when a tree was cut in the past by counting rings from the rings from the present to the past. If you visit the New Mexico Museum of Natural History in Albuquerque, you can see an example of a long series of tree rings going back to the First Crusades around 1,000 years ago, also the period in which the famous Mimbres pottery was made in the American Southwest.

Sometimes events can be dated using absolute dating techniques, but their archaeological signatures can be used for relative dating. The Sunset Crater eruption is a good example. From alterations in the pattern of tree ring growth, we know that the volcano Sunset Crater in Arizona erupted between 1060 and 1080. Because the rings provide an estimate of a particular date in time for the eruption, it is an example of absolute dating. The eruption also left a visible ash deposit on many pueblo village sites in the area. Archaeological remains above the ash date to sometime after the volcanic explosion, and artifacts below the

ash date to before the eruption. Using the layer of ash to determine the date of archaeological remains is a good example of relative dating.

Example of tree rings from the New Mexico Museum of Natural History in Albuquerque. Photo: Sue Ruth.

Archaeologists use several different types of dating conventions to refer to time. Typically, for very old sites on the order of thousands of years old, archaeologists will use B.P. meaning "before present." For more recent sites and artifacts, archaeologists tend to use BC/AD or BCE/CE. The terms BC and AD (Anno Domini) stand for "before the birth" of Christ and "in the year of our lord" or after Christ's birth, respectively. The terms BCE and CE stand for "Before Current Era" and "Current Era" (also called Common Era). In short, BCE and CE are equivalent to BC and AD. The abbreviation for circa (ca.) meaning "approximately" is commonly used in archaeology because dates tend to be estimates and not exact dates, especially for very old sites not affiliated with written records. The shorthand "kya" stands for thousands of years ago and "mya" stands for millions of years ago.

Notations for Time

B.P. Before present time

B.C. Before Christ

A.D. After Christ's birth (Anno Domini)

B.C.E. Before Current Era

Question 2: Where?

Context is critical to making inferences about the human past. Together, the provenience, matrix, and associated material culture make up an artifact's context. The term matrix is used to refer to the surrounding soil or sediments. Provenience refers to an artifact's actual physical coordinates, both horizontally and vertically—where is it on a map and how far down is it in the soil? An archaeologist is also interested in how an artifact relates to other artifacts, features, and structures. Without context, artifacts lose their ability to inform archaeologists about the past. Spatial context is why archaeologists dig square holes. Square holes or "units" are a way of knowing how much volume of the matrix has been removed with a little simple geometry. Archaeologists also dig in "levels," removing one layer at a time in each square hole. Every artifact from that layer is bagged and labeled with the provenience, as in "Unit 1, Level 1." In the lab, archaeologists can get a better sense of the overall site by analyzing the spatial location of artifacts using spreadsheets and mapping programs. This is a very far cry from the antiquarian days of old.

Recording with a GPS unit the spatial context of basalt grinding stone at

Petroglyph National Monument. Photo Sue Ruth.

When people think of archaeology, they typically think of people who excavate ancient remains. A lot of archaeological work does not involve excavation at all. Survey occurs when surface remains are recorded. A survey is typically conducted to ascertain where archaeological sites are and to provide a plan for avoiding them when planning development projects. People are sometimes surprised to hear that after archaeologists record artifacts on a field survey, most of the time they leave them in place, or in situ. When CNM students surveyed part of the Petroglyph National Monument, no artifacts were collected; rather, everything was mapped using a GPS unit. There are at least three reasons for this. First, it is not feasible to collect everything and curate (store and protect) them in museums indefinitely. Secondly, archaeologists are more interested in what artifacts can tell us about the past than in amassing a collection of interesting objects like the antiquarians of old. And thirdly, and very importantly, the cultures affiliated with the artifacts often prefer to have them remain where they are.

Question 3: What?

The final basic question in archaeology deals with the remains themselves. This category is vast because it can cover shape, size, color, texture, hardness, and physical and chemical characteristics. Form, also called morphology, is especially important. The morphology of a spear point, ceramic vessel, or building can suggest function—how it was used in the past. The style of pottery or architecture can inform archaeologists about what culture it was affiliated with. The composition of an artifact can indicate where the object ultimately originated. For instance, the chemical composition of the bluestones at Stonehenge was used to identify their sources in the Preseli Hills, 140 miles from Stonehenge itself.

The bodies at Pompeii were in situ. The bodies were vaporized instantaneously following the volcanic blast and pyroclastic flow of Mount Vesuvius. The cavities left by their bodies were then filled in with plaster by early investigators. "Body shapes in the Garden of the Fugitives, Pompeii" by Andy Hay is licensed under CC BY 2.0

Type of Artifacts: A Few Common Terms

Archaeologists classify material culture into a few useful categories to discuss them quickly and easily. Artifacts are defined as portable objects made or modified by humans. The famous "Venus figurines" or woman figures of Europe's Upper Paleolithic are good examples of artifacts. Archaeologists often use the word assemblage to refer to a group of related or spatially associated artifacts, as in the "ceramic assemblage" at a site. Ecofacts are organic and environmental remains resulting from human activity such as charcoal, pollen,

and animal bones. Often, ecofacts are called by more specific names, for instance, animal bone, pollen samples, charcoal remains, soil samples, and so on. Features are non-portable objects modified or made by humans, such as hearths (fireplaces), pits, and ovens. Structures are simply the remains of houses, ceremonial chambers, shelters, temples, and other examples of architecture. Often only a portion of the structure remains as in the Roman house pictured below.

Remains of a structure at the Villa of Livia, Prima Porta, Italy. Photo: Sue Ruth

Human remains include human bones, teeth, and other tissues, and are typically studied by specialists in humans called osteologists. Finally, the term site (not sight) refers to spatial clusters of artifacts, ecofacts, features, human remains, and structures.

What's Left to Observe?

Only a small fraction of the material culture that was in use survives today. Organic remains, those made from once-living things, like plant fibers, wood, and animal hide are the most fragile and prone to decay. The most resistant materials include stone, ceramics (fired clay), and glass. In an intermediate category are carbonized remains and metals. The matrix within which an artifact is located impacts its preservation. Bone, for instance, preserves well in alkaline soil environments but disintegrates in acidic ones. In cases like the ancient Maya of Mesoamerica, preservation of bone is very rare because of the highly acidic soils. Factors that promote decay include:

Because oxygen increases the speed of any chemical reaction, including decay, its absence helps preserve archaeological remains. An illustrative example of how freezing conditions can promote preservation is Özti, the Iceman of the Italian Alps. The Iceman was found eroding out of a glacier in 1991 by hikers and was originally thought to be a forensic case of a hiker who had gotten lost and perished on the glacier. After a few missteps, the investigators eventually realized, based on examination of the artifacts, that this was not a modern corpse at all. The Iceman dates back 5,300 years (ca. 3,300 BCE) and is the oldest example of a natural mummy in Europe. The Iceman also had with him wonderful examples of the technology of his day including a stone knife, a quiver of arrows, a longbow, and a

ARCHAEOLOGY

DECAY

1. Exposure to oxygen
2. Exposure to sunlight
3. Warm moist conditions
4. Acidic oils
5. Movement by wind and water
6. Bioturbation such as trampling, burrowing animals and root action

PRESERVATION

1. Rapid Burial
2. Freezing Conditions
3. Dry Conditions
4. Anaerobic conditions that contain little oxygen

copper ax. The ancient corpse was remarkably well preserved with the skin intact because it had been frozen in the ice.

Another remarkable story of preservation is the bog bodies of northern Europe, mainly Denmark, the Netherlands, England, and Ireland. The bog bodies are preserved in peat bogs. The bogs were low in oxygen because the rotting plant matter takes up the oxygen and the acidic peat naturally tans the skin. Sphagnum moss in the bogs also acts as an anti-bacterial agent further preserving the remains. While the

skin and internal organs tend to preserve, bones dissolve in the acid matrix. Tollund Man of Denmark (ca. 2100–2200 BP) is the most famous bog bodies because of his astonishing preservation and serene countenance. The truth seems more grisly, however. Tollund Man had a rope around his neck and was likely intentionally killed. Most of the bog bodies date between 2500 BP (500 BCE) and 1500 BP (500 AD) and many were likely human sacrifices. Similarly, but not as disturbing, charred loaves of bread and other organic objects have been preserved under the ash at Herculaneum after the eruption of Mount Vesuvius in 79 AD because of the lack of oxygen.

Excellent preservation also occurs in landfills. William Rathje, the "garbologist" mentioned earlier, found that landfills, being deprived of oxygen are remarkably stable. Nothing decays in a landfill beyond a certain point. That's good news for archaeologists interested in old trash, but bad for the current problem of where to put all our modern trash. Excellent preservation also occurs when sites are sealed by volcanic ash like Pompeii in Italy (A.D. 79) or Akrotiri on the Greek island of Santorini (ca. 1627 B.C.). Both these sites have remarkably well-preserved wall frescoes. The ash is sealed in the sites, preventing decay via oxygen, water, and wind. Organic material is also often preserved in arid locations. The American Southwest has excellent preservation, especially in dry caves. Arrows, baskets, sandals, seeds, and cordage (rope) are all preserved in dry caves. At McEuen Cave in Arizona, ancient pumpkin seeds look exactly like pumpkin seeds do today.

How Do You Find Sites?

Probably the number one question that archaeologists get asked is "How do you find sites?" One truthful response is that we don't. People who are curious and observant, like Boucher de Perthes, typically find the most interesting sites. Kids, with their natural curiosity and general lack of responsibilities, are especially good at finding sites. Plus, they're closer to the ground. The history of archaeology is filled with intelligent avocational archaeologists who read everything they can about archaeology and know where to look and what to look for. Also, non-professional archaeologists tend to think outside the

prevailing paradigms of the day.

Another possible truthful response is that we look for them systematically and only when we have to. Federal agencies or projects that are supported with federal money are required to determine if the project will impact significant archaeological sites. In these situations, archaeologists systematically walk the landscape looking at the ground. Archaeologists train their eyes to spot stone tools, ceramics, and tell-tale stone alignments. Finding things becomes second nature like riding a bike. It is typical for an archaeologist, myself included, to see the tiny bead in the sand, but miss the rattlesnake.

When artifacts, features, ecofacts, or sites are encountered, they are recorded and the data are entered into a database. This is required because of legislation called the National Historic Preservation Act of 1966 (NHPA), which seeks to protect and preserve important archaeological and historical sites. If nothing is deemed significant enough to be added to the National Register of Historic Places, then the archaeologists' work is done and the bulldozers and backhoes come in and development continues. If the site is deemed to have information potential, then portions of the site are excavated, the data are recorded, a report is written, the artifacts are curated, and then the development proceeds. In very rare instances, a site is found that is so significant that the project is redesigned or canceled. Most archaeologists are involved in conserving and managing sites, a profession called cultural resource management or CRM. When CNM students participated in a survey at the Petroglyph National Monument on federal lands, they were acting under the NHPA because the Monument had plans to refurbish the trail which could impact archaeological sites.

Sometimes sites are found accidentally during development. For example, when the Jeanette Stromberg building on CNM's Main campus was renovated in 2011, a portion of a historic cemetery dating to the late 19th and early 20th centuries was encountered (The TVI Cemetery Site). The cemetery was previously excavated in 1984 when the building was first constructed. Archaeologists from the Office of Contract Archaeology excavated the three burials, and osteologists at the Human Osteology Laboratory at UNM analyzed

them. Once the burials were analyzed and a report was completed, renovation continued. (Pro-Tip: Google search “Jeanette Stromberg” and “ghost”).

In addition to protection on federal land, archaeological sites are subject to state laws on state-owned and private land. For example, burials, marked or unmarked, are protected in New Mexico on both private and public land under the New Mexico Cultural Properties Act of 1978. Under this same legislation, it is unlawful to excavate an archaeological site with heavy machinery on private land. Excavation on state land requires a special permit.

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Chapter 3: Becoming Modern →

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Chapter 3: Becoming Modern

"Lascaux Cave" by Jack Versloot is licensed under CC BY 2.0

If you have taken a biological anthropology class or perhaps seen a NOVA documentary, you know that there were species that looked like hearty modern humans from the neck down, but from the neck up, had a much smaller brain. Homo erectus lived around 2 million years ago and made and

used stone tools, like the handaxe, which was a multi-purpose tool. Tools like the handaxe are examples of material culture and therefore fall under the umbrella of archaeology. An even earlier species called Homo habilis is also thought to have used somewhat less impressive stone tools dating to around 2.5 million years ago. Thus, archaeology covers millions of years and overlaps with paleoanthropology, the study of fossil ancestors. There are even non-human artifacts because chimps and capuchin monkeys sometimes create broken rocks in the course of cracking nuts (Calloway 2016; Mercader et al. 2007).

In this course, we will concern ourselves mainly with fully modern humans or *Homo sapiens*. When archaeologists or biological anthropologists talk about modern humans, they are not referring to people with high-tech equipment living a fast-paced urban lifestyle, as the term is used in casual conversations. Rather, they are talking about an essentially modern mind. Though anatomically (physically) modern humans with human-like faces and domed skulls begin to appear in the fossil record around 200 to 300 thousand years ago (Hublin et al. 2017; Gibbons 2018), the hallmarks of the modern *mind* don't appear with any consistency until around 40,000 years ago. By modern mind, I mean the human propensity for creativity, ritual, music, art, trade, and so forth. The reason for the lag between physical modernity and cognitive modernity is likely in part due to problems of preservation. Also, because populations were small groups of hunter-gatherers living off wild resources, innovations in technology and art disappeared more easily than they do now in our global economy and dense urban centers. We know, for instance, that hunter-gatherer bands in the recent past lost the knowledge of how to make fire, and it is apparent that skills like wood carving, sewing, cooking, or even language, can vanish after a few generations if not practiced and cultivated. One of the lessons of archaeology is just how swiftly and completely cultural traditions can change even in dense urban centers with high population densities. One only need look to tremendous centers like Teotihuacan in Mexico or Angkor Wat in Cambodia to see that this is true. In any event, people were doing very human things—art, ritual, music, trade — for at least 40,000 years and almost certainly for much longer than that.

The Upper Paleolithic

The very earliest indications of modern human behavior, or mind, emerged in Africa. Fittingly, one of the first examples of modern behavior is something of a crayon, made from a mineral pigment called red ocher. This decorated block dates to ca. 75,000 years ago and was discovered at Blombos Cave in South Africa. More recently, abalone shells filled with red ocher, crushed bone, and charcoal, perhaps representing an early artist's palette, have been found at Blombos dating to ca. 100,000 years ago. While the full suite of modern behavior like music, art, sewn clothing, and ritual doesn't appear until tens of thousands of years later, people were likely decorating objects and their bodies long before we find evidence for it in the archaeological record. When archaeologists find the oldest example of something, they assume the general tradition is much older.

While the earliest sparks of modern behavior have been discovered in Africa, some of the most spectacular preservation of early modern humans occurs during a period called the Upper Paleolithic (ca. 40 kya-12 kya), or Upper Old Stone Age, in Europe. Several innovations become apparent in the archaeological record that reflects modern cognition during the Upper Paleolithic. These include art, elaborate burial, sewn clothing, complex tool making, jewelry, and organized settlements. These features indicate that people living during this time were like us, not only in their physical appearance but intellectually and emotionally. Early people living in Europe were inhabiting the mouths of caves, which promoted the preservation of artifacts. Secondly, archaeology as a discipline began in Europe, and thus European prehistory has been intensively studied and we know more about it than other regions.

All people living before 12,000 years ago were hunter-gatherers, living off wild, non-domesticated foods. No one was farming during this time, as far as we know, perhaps because natural resources were plentiful. Some people still today make their living as hunter-gatherers, but this lifestyle is becoming increasingly rare. Today hunter-gathers or part-time hunter-gatherers live in places like Botswana, Amazonia, the Arctic, the Sentinelese islands, and Asia rainforests.

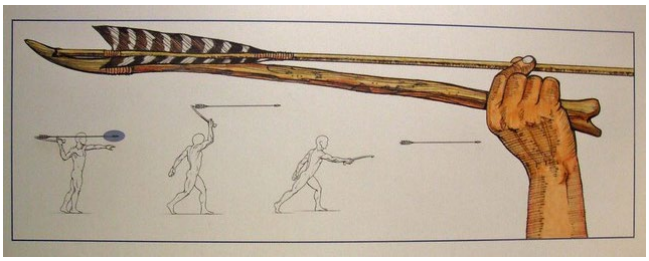
People of the Upper Paleolithic of Europe were living near the tail end of the Pleistocene (ca. 2.7 mya–12 kya), the geological epoch marked by a series of ice ages and fluctuation in the Earth's climate. The Pleistocene ice ages consisted of a series of glacial periods, periods of long-term reduction in the temperature of the Earth's surface and atmosphere, resulting in the presence or expansion of continental and polar ice sheets and alpine glaciers. During glacial periods, ocean levels were at one point 330 feet lower than present levels because so much water was locked up in ice. During the Pleistocene, Europe was inhabited by very large animals, or megafauna, including mammoths, wooly rhinos, giant cave bears, and bison, along with wild horses, caribou, cattle, and lions. Upper Paleolithic people were hunting these animals, though plants were likely also on the menu.

Glacials were interrupted periodically by warmer interglacials. This cold-warm pattern alternated on fairly regular cycles of around 100,000 years. The world's configuration of continents was the same as today, but some landmasses were exposed during glacials because much of the world's water was bound up in enormous ice sheets, more than 2 miles thick in places. In fact, the ice sheets were so thick and heavy that the Earth continues to rebound from its weight even today, called isostatic rebound. The effect is gradual but has had documented effects. Lakes Superior, Huron, and Michigan, for instance, were once a single "really great lake," but separated around 2,000 years ago due to isostatic rebound. In addition, over the last few hundred years, inlets have been cut off from the sea due to the land slowly rising. In Finland, the port town of Tornio had to be relocated several times because it was repeatedly cut off from the sea. In some cases, coastal archaeological sites are now inland sites.

Technological Innovations

An innovation that became prevalent in the Upper Paleolithic was the atlatl or spear thrower. This weapon is essentially a stick that propels a long dart. This technology allowed humans to increase the speed of their throws as well as get some distance between their prey. The atlatls of the Upper Paleolithic were

sometimes beautifully decorated with Pleistocene megafauna. The atlatl proved to be a useful weapon and its use lasted into the modern age. Spanish conquistadors, for example, encountered Aztecs equipped with obsidian-edged atlatl darts. Indeed, "atlatl" is a Nahuatl word, the language of the Aztecs. Today, you see the same principles used in hand-held dog ball launchers, for the most serious of ball fetchers.



"Cave people" are often depicted wearing crude animal skins and furs. However, bone and ivory needles found on Upper Paleolithic sites indicate that people wore tailored clothing. Having to live and survive in the colder temperatures of the Pleistocene, people were by necessity highly skilled at making clothing from animal skin. Some figurines that date to this time also suggest sewn clothing. A series of burials at Sunghir (ca. 24,000 B.P.) in Russia were covered in thousands of mammoth ivory beads. these beads were likely sewn onto garments that did not survive, suggesting a concern with aesthetics. As writer Judith Thurman (2015) puts it, "Fashion predates the wheel." Like people today, Upper Paleolithic people were concerned about their appearance, and perhaps used symbolic markings, body decoration, and clothing to differentiate between people of different groups, just as we do today.

Elaborate Burial

Another hallmark of the modern mind is elaborate burial. Before modern humans, there is little evidence of ritualized burial. Neanderthals some 60,000 years ago buried their dead at Shanidar Cave in Iraq, but there are no grave goods, red ocher, or other indications of ritual. Again, it may be that the record simply hasn't preserved the material traces of grave goods and that it only becomes evident later as populations become larger and more stable.

Burial in the Upper Paleolithic becomes a far more elaborate affair. At Sunghir, burials include one adult male and two children, who are buried head-to-head. The site dates to ca. 24,000 years ago, and the three burials include more than ten thousand ivory beads, along with mammoth ivory bracelets, beaded caps, decorated belts, ivory pendants, an ivory lance made from a straightened wooly mammoth tusk, and an animal pedant among other grave goods. Each bead, based on experimental archaeology, is thought to have taken an hour to make. Of two children who were buried head to head, one appears to have had deformed limbs. There are cases of elaborate burials of people with skeletal pathologies, suggesting these weren't typical Upper Paleolithic burials and may indicate special treatment or human sacrifice.

Another set of burials at a site called Dolni Vestonice in the Czech Republic, like Sunghir, indicates an interest in ritual and the afterlife. Three young people, two males and perhaps one female were buried together with careful positioning. The men on either side of the central figure both met violent deaths, with one having a wooden pole through his pelvis. His hands were placed on the central figure's pelvis. The male on the right was lying on his stomach. The skeletons were covered in red ocher and fire lit atop the trio. As with the cave art and Venus figurines, several attempts have been made to interpret the meaning of this careful positioning—a birth gone wrong, human sacrifice for wrongdoing, and even evidence for homosexuality (known among some modern hunter-gatherers today). Though we cannot say specifically what the burial positioning represents, it suggests an interest in what happens after death and possibly a belief in the afterlife. This behavior shows that Upper Paleolithic people were like us cognitively (mentally) and emotionally, fully capable of pondering the mysteries of life and death and acting on those beliefs with symbolic gestures.

Music: The Oldies

Music is important to humans, and we often associate songs with memories and emotions and use music for motivation. One student explained that as a child

when they woke up to music on Saturday, they knew it was time to clean the house. Einstein said "I often think in music. I live my daydreams in music. I see my life in terms of music." Philosopher and composer Leonard Meyer proposed that humans enjoy music because our brain anticipates a pattern of sound, and it receives a psychological payoff when we are correct and pleasantly surprised when we hear a note or beat that is unanticipated. The instinct to think and express oneself musically is very old. Early bone and ivory flutes have been found in European caves dating to 30,000 BP. Recently, a replica of one of these flutes was made, giving us a sense of what these instruments might have sounded like. Considering that these instruments were found in caves, the sound of the flutes would have been amplified by sound waves bouncing off the cave walls. Bullroarers have also been discovered in Upper Paleolithic contexts. These are instruments consisting of a thick piece of shaped wood attached to a cord. When swung in a circle, the bullroarer makes a bizarre low-pitched sound that can travel long distances. Historically bullroarers have been used around the world—in Australia, Ireland, North America, and elsewhere—for both ceremonies and entertainment. The Dine (Navajo), for instance, used a *tsin ndi'ni'* or "groaning stick" to drive away evil.

Aurignacian flute made from an animal bone, Geissenklösterle (Swabia) by José-Manuel Benito Álvarez is licensed under CC BY-SA 2.5

Visual Art of the Upper Paleolithic

While the first indications of decorative art occur much earlier and there are even a few possible Neanderthal examples (Hoffmann et al. 2018), representational art becomes popular in the Upper Paleolithic and equivalent time periods in Asia. In contrast to purely decorative art, representational art

resembles something in the physical world. Caves of southern France and northern Spain contain images of Pleistocene horses, ibex, mammoth, rhinos, lions, bears, and even a penguin-like bird called a great auk. The most famous of these caves is Lascaux (pronounced Las-CO, kind of like Costco) in southern France dating to around 17,000 years ago. Like so many archaeological sites, Lascaux was not found by archaeologists but by curious teenagers exploring the countryside with a keen eye. With 600 paintings and 1,500 engravings, Lascaux is the largest collection of ice-age art anywhere. For that reason, and for the delicacy and beauty of the images, it was placed on the United Nations Educational, Scientific, and Cultural Organization (UNESCO) list of World Heritage Sites. These are 759 cultural sites around the world that are considered to have universal value for humanity.

Another famous site, Altamira, in Spain, was discovered by a young girl named Maria de Sautuola. Though Maria de Sautuola's father argued that the paintings were very old, the site wasn't accepted by the French establishment until French Upper Paleolithic cave art was discovered. Archaeology, as it turns out, is political. One of the panels at Altamira is 45 feet in length. These panels were not one-time paintings, but "touched up" and added to overtime, creating overlapping images. This layering effect is called a palimpsest. The term palimpsest is often used to refer to a paper that has been reused, a common practice in Medieval times. Some kind of lighting was needed to access the completely dark caves. Lascaux alone contained 150 animal fat lamps that were used to light the interior. Control of fire had occurred long before, at least by 350,000 B.P. in Europe by Neanderthals and likely much earlier elsewhere. Some think that the layered images coupled with the flickering lights of the cave would have created the sensation of movement–like a prehistoric cinema, giving life and motion to these ancient creatures.

Paintings are not just located on the walls of the caves, but also the ceilings. People would have had to build scaffolding, much like Michelangelo's work on the Sistine Chapel, such that the viewers would have been surrounded by the images and immersed in a world of their own making. This would have been more like an IMAX Dome theater than watching a screen. These spaces were

likely used to relate important stories that captured these early people's beliefs, values, and worldviews. Like music and visual art, stories are quintessentially human and even today we are surrounded by stories on social media, film, books, and song lyrics. Upper Paleolithic artists used the contrast between dark and light pigments (charcoal, ocher, and hematite) to create a sense of three-dimensionality. This effect is called chiaroscuro. The paintings are so surprisingly sophisticated for their time that when the Spanish artist Pablo Picasso examined the paintings at Lascaux he remarked, "We have invented nothing."

Both Lascaux and Altamira were opened to the public in the mid-1900s. Tourists, however, increased the temperature of the cave as their exhalations contained both water vapor and carbon dioxide. Carbon dioxide and water vapor are both greenhouse gases that trap heat and cause temperatures to rise. Trapped inside the cave, these gasses led to a kind of "caval warming," initiating the growth of mold, algae, and bacteria. These growths damaged and threatened to damage the ancient paintings. Consequently, both caves were closed to large numbers of visitors and they have since stabilized. Replicas of parts of both caves called Lascaux II and Altamira II have been created to give tourists a sense of this prehistoric space.

Upper Paleolithic cave art sites continue to be discovered. Chauvet Cave in France revealed in 1994 was the subject of Werner Herzog's film *Cave of Forgotten Dreams*, and may be the oldest example of an Upper Paleolithic cave dating to around 35,000 years. The subject matter of the cave is also unusual, depicting dangerous animals such as lions, bears, rhinos, and mammoths compared to the predominance of horses at Lascaux. Another cave called Cosquer has its

entrance beneath the waters of the Mediterranean. As the ice sheets of the Pleistocene melted, ocean levels rose, submerging the once-dry entrance. In the cave's submerged portion, only engravings remain because the paintings have been washed away. In the portion of the cave that is not submerged, there are paintings of horses, possible jellyfish, and a Great Auk, a species of penguin. Sadly, four divers died when they lost their way into the cave. It was this event that brought the cave to public attention.

Portable Art

In addition to cave art, portable art is abundant from the Upper Paleolithic. These qualify as artifacts, being transportable from place to place. Some atlatls, or spear throwers, were spectacularly decorated with mammoth, bison, and deer. Upper Paleolithic artists excelled at depicting animals in all their earthy glory. In one instance an herbivore (chamois) is either defecating or perhaps giving birth as a bird perches near its behind. Another very famous example of portable art is the lion-man/woman. The artifact combines both human elements (like bipedalism or walking on two legs) and lion elements. We will see that humans continue to associate themselves with dangerous feline creatures throughout history.

While portraits, or depictions of actual people, are uncommon, there are numerous "Venus figurines" or woman figures. Some of these are voluptuous female bodies made from clay, ivory, and soft stone. There is little attention paid to the face, head, and extremities. The interest is in the body—the breasts, buttocks, and belly. Several of these figurines appear to be pregnant with an everted navel. The earliest representational art in Europe is a Venus figurine from Hohle Fels in Germany dated to ca. 35–45 kya. There are also woman figures in cave art that use the natural topography of the cave to indicate the pregnant belly and vulva. Other figures do not exaggerate the body and some depict males.

But what do these figures mean? Despite their name (they were originally called immodest Venus), there is no solid evidence to indicate they were goddesses.

Some Venus figurines contain traces of red ocher, possibly suggesting a ritual rather than functional nature. Others have suggested that the figurines are an effort to cope with the dangers of childbirth or were a fertility fetish. Still, others suggest they depict an early European goddess. Venus figurines, however, span thousands of years and a huge geographic area from Western Europe to Siberia. Determining the meaning of something that spans that kind of time and space is challenging and falls within a more contextual approach, qualitatively using context to understand meaning. We know that symbols in our own culture can change in meaning over just a few generations, so imagine the possible varied meanings Venus figurines might have had over thousands of years.

Meaning of Upper Paleolithic Art

Some types of questions in archaeology are truly difficult to answer even with an abundance of remains. The nature of Upper Paleolithic art is one of them. There are some reasonable ideas though. Many have noticed that the horses at Lascaux are large-bodied and pregnant looking, not unlike Venus figurines, suggesting a concern with fertility or an interest in the origins of life. Several cultures have ideas about humans emerging from caves to this world, and it is possible that Upper Paleolithic people viewed caves in a similar light.

In addition to depictions of robust animals, there are also very clear indications of atlatl darts flying towards animals. Some have argued that this represents hunting magic, in which symbolically killing the animals or imitating the kill helps in the actual hunt. Other images suggest a keen interest in seasonal changes in the animal world. One bison appears to be shedding his wool for the summer. Another image at Lascaux shows just the head of a caribou, which some have argued represents annual migrations of caribou as they cross rivers. We know from excavating open-air sites, sites not in cave or rock shelter contexts, that Upper Paleolithic people targeted and killed caribou at vulnerable points along rivers, indicating that they would have seen these crossings. In an example of portable art on a long bone, one side of the bone depicts mating European vipers, while the other face depicts salmon, both events that occur in

the spring.

The refuse of everyday life does not occur in cave interiors, indicating that people did not live in cave interiors but rather at their openings. Some argue that the caves served as a kind of temple to induct members into the group through rites of passage. The images may have served as mnemonic devices for important stories which convey the values, identity, and ancestry of a culture.

Of course, some of the art might be "art for art's sake." If you have kids or nieces and nephews, you know that children love to paint and create for the sheer joy of creating and experimenting. Even chimpanzees have been known to paint in captivity. We know from measurements on finger traces on soft cave walls and footprints on ancient cave floors, that children were in the caves and also decorated the walls along with adults (Sharpe and Gelder 2015). Humans need to create, represent the world around them, and breathe meaning into objects as no other animal does. For thousands of years, we humans haven't just lived in the world, we have created it.

← Chapter 2: Down to Earth

Chapter 4: The Earliest New... →

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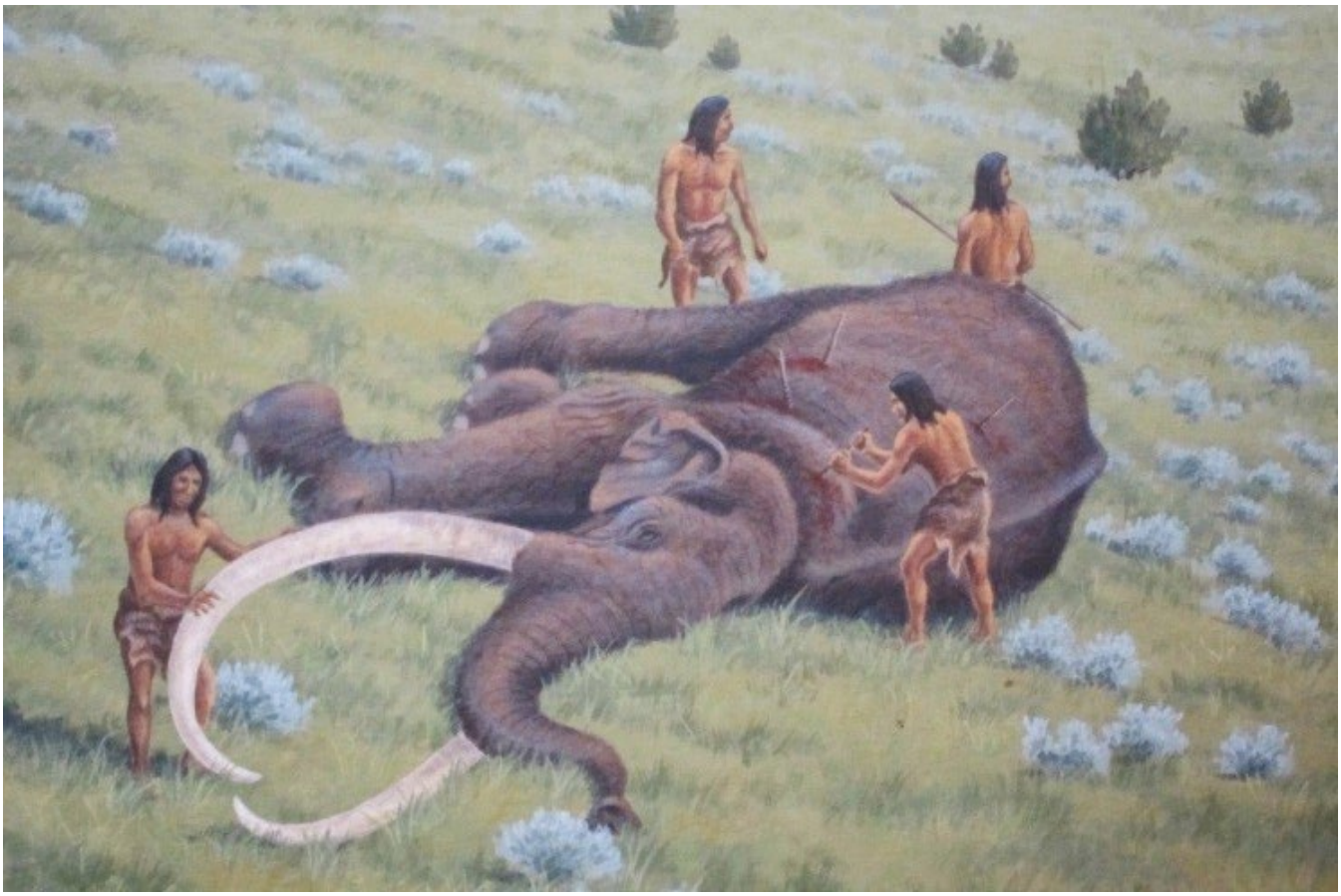
Chapter 4: The Earliest New Mexicans

We have seen that modern humans have been in Europe for at least 40,000 years and in Africa for even longer. Humans also occupied Asia, Siberia, and Australia during the Pleistocene as well. But what about North and South America— the "Americas"? Were people here in what is today New Mexico during the Pleistocene? The question of when and how people got to the Americas is not a new one and is the source of continued debate, in which the state of New Mexico figures prominently.

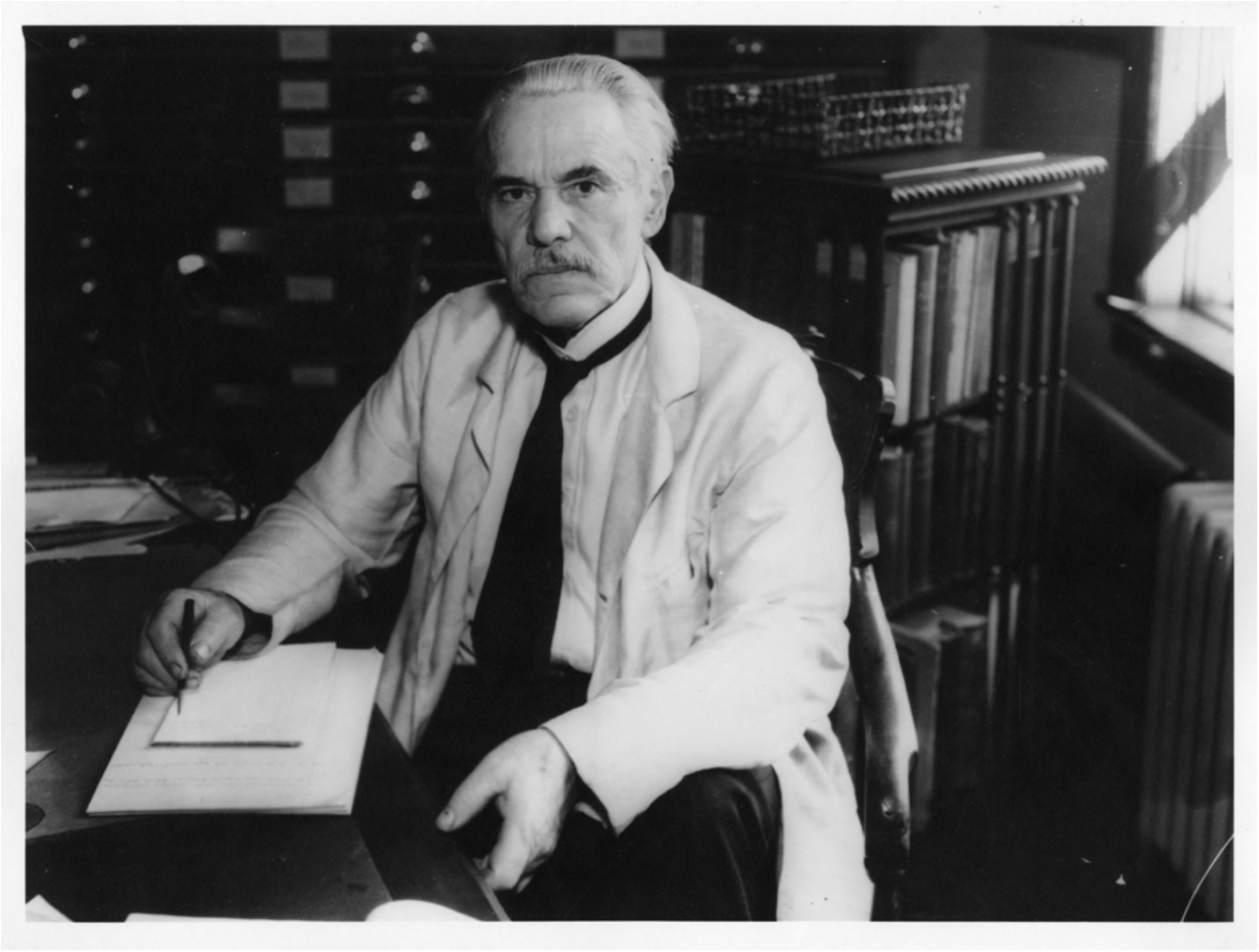
The Earliest People in New Mexico

New Mexico, as it turns out, is world-famous for its pivotal role in understanding how people got to the Americas—sometimes referred to as the "peopling of the Americas." Influential osteologist (human bone specialist) Aleš Hrdlička was certain that people had only been in the Americas for a few thousand years. This issue, like so many in archaeology, was not purely academic. In the 1800s, North American natives were often depicted by European colonizers as relative newcomers to the Americas. These presumed barbaric newcomers were thought to have cast out a former glorious "race," who had built the impressive monuments that archaeologists encountered. This view of native peoples as newcomers fit nicely with the drive to colonize the American West.



Mural at the New Mexico Museum of Natural History. Photo: Sue Ruth

The site that changed the face of American archaeology and contradicted Hrdlička's ideas is called the Folsom site. Like so many significant archaeological discoveries, the Folsom site was found not by a professional archaeologist. Cowboy George McJunkin was searching for lost cattle following a devastating 1906 flood near the town of Folsom in far-northeastern New Mexico when he discovered some odd-looking "cow" bones. These bones turned out to be the fossilized remain of an extinct form of bison called *Bison antiquus* that lived during the Pleistocene. Later, in the 1920s, excavation at the site revealed humanly made dart points in direct association with the bison. Using the Principle of Association, it was indisputable that people were in North America during the Pleistocene. Like Frere and de Perthes before him in Europe, McJunkin's find revealed a much deeper time depth to human occupation than was previously accepted.



"Aleš Hrdlička (1869-1943)" by unknown is licensed under public domain.

Radiocarbon Dating

Early archaeologists had to rely on the Principle of Association, the Principle of Superposition, and with an understanding of soil development rather than techniques like radiocarbon dating to determine how old sites were. Radiocarbon dating had yet to be invented. The technique was developed by Willard Libby and colleagues in 1949, for which he won a Nobel Prize in Chemistry in 1960. Radiocarbon dating takes advantage of isotopes or variants of elements that have different numbers of neutrons. All carbon has 6 protons, but the number of neutrons can vary. Carbon-14 is an isotope of carbon with 6 protons (like all carbon) and 8 neutrons. Adding the number of protons and neutrons (6+8) together yields 14, hence, carbon-14. Radiocarbon dating uses

the fact the radiocarbon or carbon-14 is radioactive and decays at a known rate called a half-life of 5,730 years. That known rate of decay is used to estimate how old things are.

So, how does radiocarbon dating work? All living things contain an abundance of carbon-12, a stable isotope that does not decay, and a tiny amount of carbon-14. You, for example, have a small amount of carbon-14 or radioactive carbon. You are slightly radioactive. Once an organism dies, the stable carbon-12 remains unchanged, but about half of the radiocarbon will decay to nitrogen in 5,730 years. Chemists can measure the carbon in an archaeological sample and use the ratio of carbon 12 to carbon 14 to estimate how old something is. The technique has been used effectively for decades and has been refined by comparing the dates to other dating techniques, especially tree-ring dates. Willard Libby, who championed the technique, radiocarbon dated objects of known ages including redwood trees, Egyptian funerary objects, charred bread from the Pompeii eruption, a linen wrap from the Dead Sea Scrolls, all objects with known historical dates to test the efficacy of the method. Libby's "Curve of Knowns" ushered in a new era in archaeology called the Radiocarbon Revolution. Libby won a Nobel Prize in chemistry for his work.

The Paleoindian Period

The term Paleoindian period is often used to refer to the human occupation of North America during the end of the last ice age. Unlike the Upper Paleolithic of Western Europe, the vast majority of Paleoindian sites are open-air sites, rather than cave sites. Because of this, the preservation of Paleoindian organic remains like shells and bone is scant. A few beads, needles, and other bone artifacts exist, though these are rare. As a consequence, Paleoindian archaeologists have a very little material culture with which to reconstruct the past. The Paleoindian Period is divided into periods based on changes in tools. Once Folsom sites were recognized for what they were, even older sites, called Clovis sites, began to emerge in the archaeological record. Clovis-aged sites are about 13,000 years old and Folsom-aged sites are around 11,500 years old. A "Clovis site" is short-hand for "Clovis-aged site" and refers to any site that dates

to the Clovis time period. During the Clovis period mammoth, horses, camels, dire wolves, and other Pleistocene animals roamed North America. Mammoth and bison, and to a lesser extent elk, were the primary targets of Clovis hunters, who likely used atlatls for hunting just like people did in Europe. If you visit the New Mexico Museum of Natural History in Albuquerque, you can see a reconstruction of a Columbian mammoth, a camel, a sabercat, and dire wolves —Pleistocene mammals that were here in New Mexico. The mural on the wall depicts Paleoindian hunters around a mammoth carcass.

A distinct Clovis technology consisted of stone points that are grooved or fluted partway up the point. (Doric Greek columns are also fluted if that helps you remember the term). This fluted technology, as it is called, is unique to the Americas, and occurs nowhere else in the world. Clovis points are diagnostic of the Clovis period, meaning they were unique to this time period. So, if you ever find a fluted point on a leaf-shaped point, it is on the order of 13,000 years old, a very rare and important find.

Another interesting feature of the Clovis period is caches (Kilby and Huckell 2013). Caches are deliberate deposits of artifacts for ritual or functional purposes. A functional cache is simply a cache for a practical purpose. Clovis people may have been placing stone and stone tools in pits in the ground with the idea of returning when they were low on stone and needed to replenish their supplies or raw material. (Stone is often referred to by archaeologists as raw material). Clovis people appear to have been highly mobile and engaged in long-distance trade, as evidenced by their raw material, which can be traced hundreds of miles from their source. Some Clovis caches were potentially ritual in nature, bearing traces of red ocher, the same mineral pigment found in 100,000-year-old caves in South Africa, on Upper Paleolithic Venus figurines, and in ice-age burials of Siberia and Eastern Europe. The Anzick Cache in Montana contained not only red ocher but infant human bones, suggesting the cache was part of a funerary rite and that red ocher had a ritual significance.

Extinction of Pleistocene Mammals

One of the most famous Clovis sites called the Blackwater Draw site is located near Portales, New Mexico. The site actually has many different Paleoindian occupations, or episodes of human use, and is open to the public. At the site, you can see the strata of earlier Paleoindian layers at the bottom and later ones at the top. The excavators have preserved a portion of the excavation in situ, so you can see the bones of Pleistocene megafauna in place.

The site of Blackwater Draw also has the earliest human-made wells anywhere, associated with a prolonged drought during the Clovis period. The same drought likely contributed to the demise of the mammoth and other Pleistocene megafaunas like horses, camels, and dire wolves. According to a study by scientists at UNM, the drought was so severe that nothing like it had occurred for at least 40,000 years that they examined. Some argue that drought caused vast habitats of the giant grazing mammals to shrink and fragment, leading to herds dwindling to extinction through lack of forage. During the extinction event, fully 3/4 of all mammalian genera (35 genera) in North America went extinct, including mammoths and mastodons, all camelids (camel species), and horses, all but one species of bison—all within 1000 years of each other. Some

larger Pleistocene mammals (including elephants in Africa and bison in North America) became smaller toward the end of the Pleistocene, which is one adaptive response to a reduced food supply.

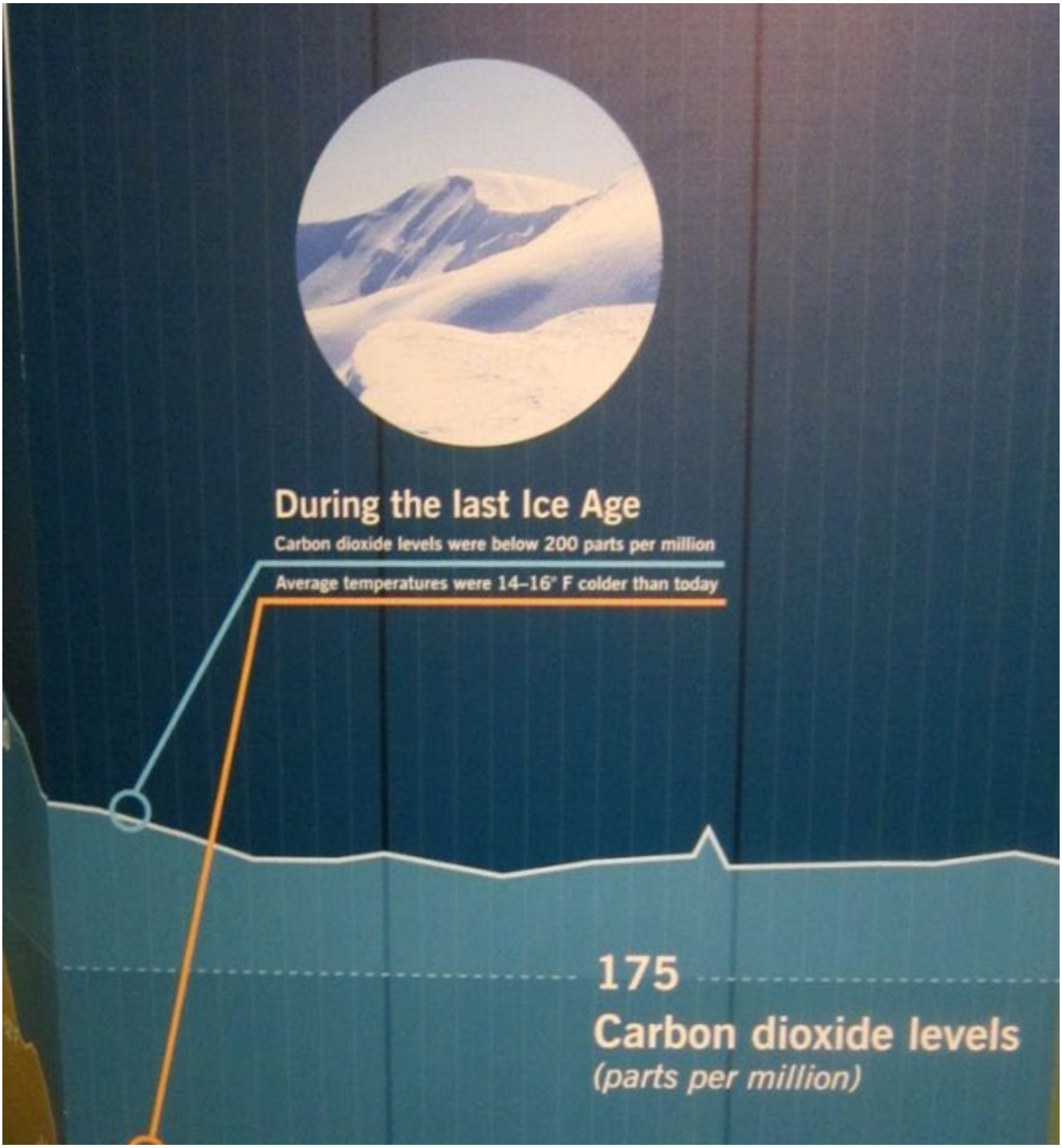
The stratigraphy at the Blackwater Draw Site. Photo: Sue Ruth

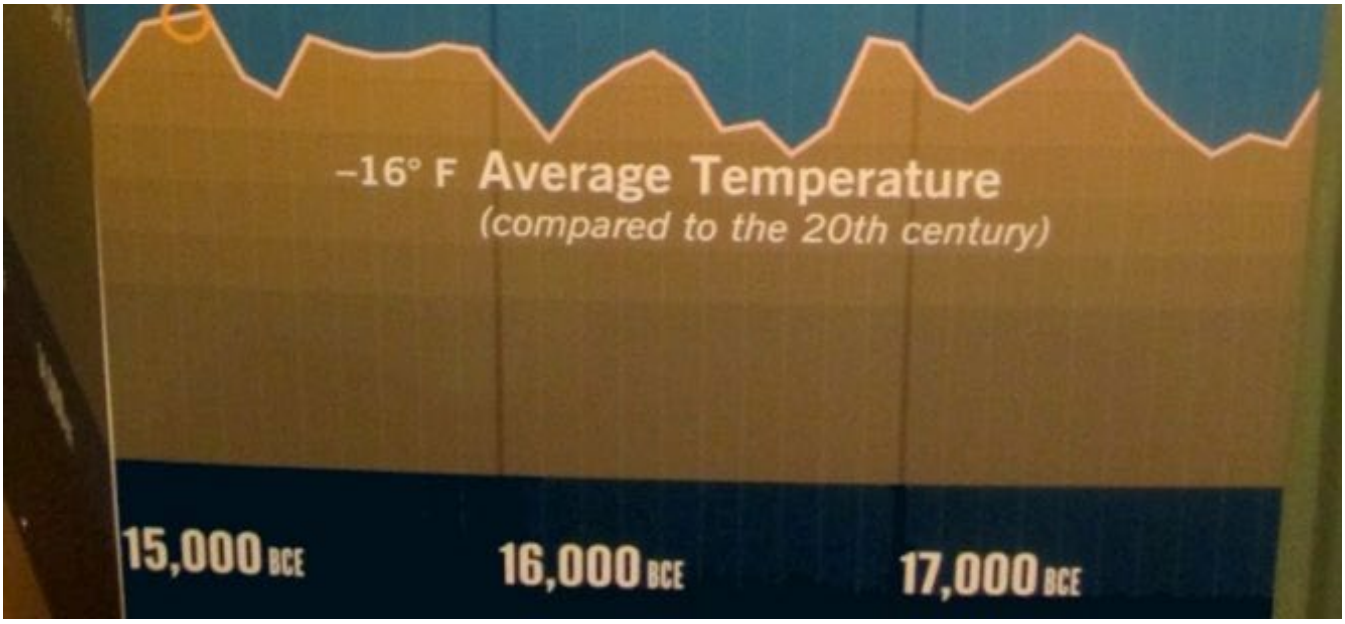
This massive drought in North America appears in the stratigraphy at Clovis sites and is called The Black Mat, which represents the mud at the bottom of a dried-out water source. You can see it clearly at the Murray Springs site in Arizona. Below the mat, there are mammoths, horses, and other Pleistocene megafauna, and above the mat, they do not appear. In fact, *Bison antiquus* survived the extinction event, but reduced in size in size over to become what we now know (erroneously) as "buffalo." The climate change hypothesis supporters also point to the fact that megafauna is not the only species of animals that went extinct after the Pleistocene. About 40 percent of small mammals like voles and other rodents, mink, martens, weasels went extinct, as did about 40 percent of mollusk species. Similar extinctions occurred in Europe, northern Asia, and Australia as well. Tropical areas like central Africa and south and Southeast Asia were much less affected—megafauna like elephants and rhinoceros still exist there, at least for the time being.

Another hypothesis for the Pleistocene extinction is the Overkill Hypothesis. The Overkill Hypothesis holds that Paleoindians colonized a continent with numerous mammals that were unfamiliar and unafraid of humans. Secondly, Paleoindians were hunting specialists that concentrated on a few large species which could provide a huge return in meat and fat, but also result in the demise of numerous species. Evidence for megafauna specialization includes, for example, the fact that of the 14 known Clovis kill sites in western and central North America, 11 contain the butchered bones of mammoth or mastodon. Archaeologists Todd Surovell and Nicole Waguespack argue that the number of Clovis elephant kill sites is exceptionally high if you look at elephant kill sites on a global scale. They also argue that human colonization tracks mammoth extinction throughout human prehistory.

Proponents of overkill also point to several other previously unoccupied landmasses of the world where megafauna disappeared simultaneously with the colonization of humans. Australia, for example, was populated with a series of giant species of kangaroos and grazing marsupials that went extinct when humans first colonized the island-continent sometime between 40-60 thousand years ago. On Madagascar, the giant lemur Archaeoindris, about the size of a

male gorilla, went extinct around the time that humans reached Madagascar more than 2,000 years ago. New Zealand is another case in point. Several species of giant flightless birds called moas (Dinornithiformes)—some stood up to 12 feet tall and weighed up to 500 pounds—existed in New Zealand before the arrival of the first humans from Polynesia around AD 1250-1300, then became extinct within 200 years of human occupation. One reason for the swift demise is that the native species had no defensive fear of humans and could be easily approached and killed.





Climate change display at the New Mexico Museum of Natural History. Photo: Sue Ruth

The principal weakness of the overkill hypothesis is that there is no direct material evidence for hunting camel, horses, giant beavers, ground sloth, and the like, which all went extinct near the end of the Pleistocene. It is not even clear when some species actually went extinct. Surovell argues that less abundant species, like the American cheetah, are less likely to be found in the fossil record and therefore might falsely appear to go extinct before human arrival.

A combination of the two factors contributing to the demise of megafauna—climate and human predation—is quite possible. Habitat loss due to climate change would have fragmented the large, interconnected populations of steppe animals. Indeed, we know that habitat fragmentation is a key factor in species extinction today. Human hunters could have delivered the final blow by overhunting the dwindling populations that remained.

Folsom

The Folsom period followed the Clovis period and the extinction event, beginning around 11,500 B.P. Folsom hunters focused on *Bison antiquus* as their main prey. Folsom points are diagnostic of the Folsom time period. Like Clovis points, Folsom points are fluted, but the flute travels the full length of the point. Folsom points also have tiny pressure flakes around the margins of the points and are very thin. These subtle distinctions are important because they indicate the time period of a site. No other points anywhere, at any other time, look like Folsom points. In fact, Folsom points reveal such astonishing craftsmanship, that modern archaeological experimenters, with all our technological improvements, have difficulty replicating them. Indeed, entire conferences have been devoted to understanding Folsom points alone.

Both Clovis and Folsom points are finely made artifacts crafted by skilled knappers. They used the most workable stone material and often chose raw materials with beautiful colors and patterns. In many cases, the raw material came from distant sources. For example, at the Boca Negra Wash Folsom site on Albuquerque's West Mesa, some of the obsidian (volcanic glass) has been sourced to the Jemez Mountains (Shackley 2016). The chemical procedure used to identify the source is called X-ray fluorescence. Other types of sourcing that involve identifying minerals can also be used to source the stone material.

Sandia Man

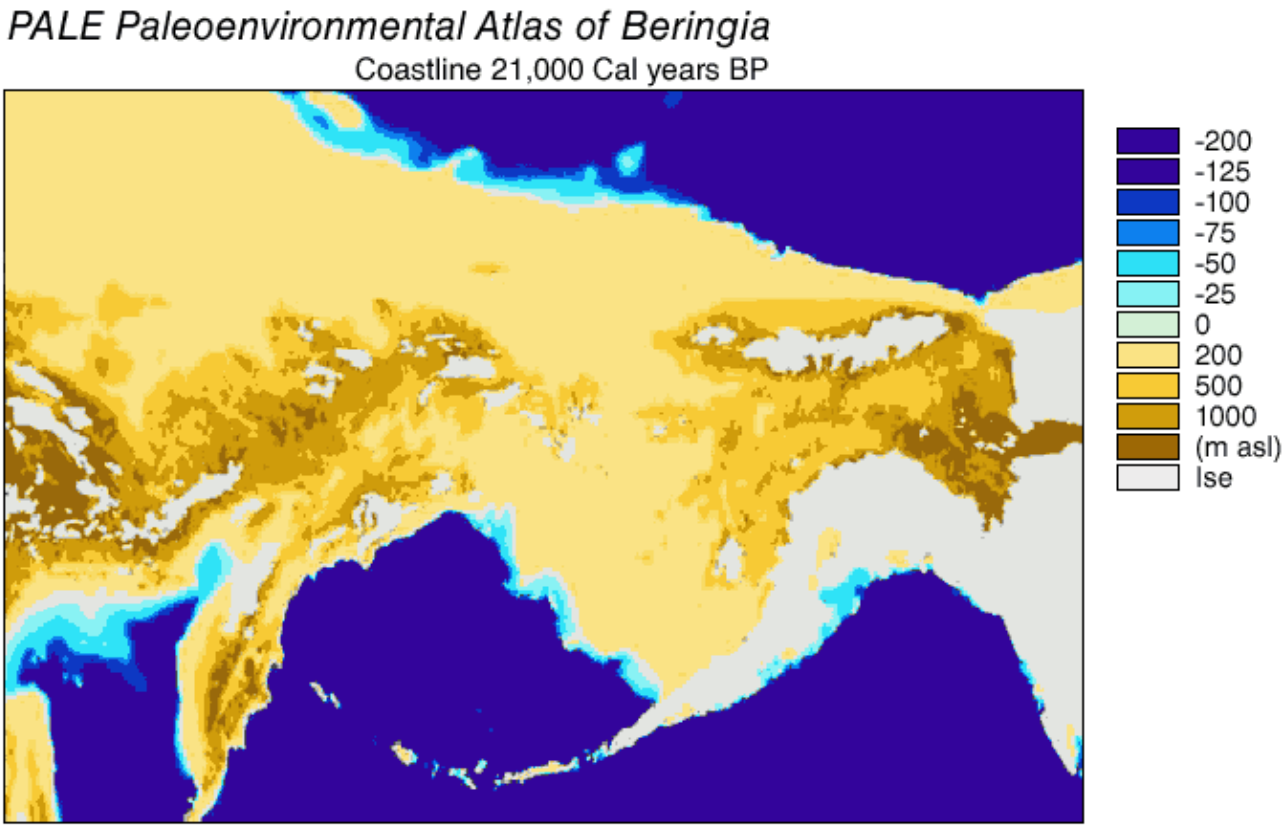
We now know that New Mexico has two world-famous Paleoindian sites, the Folsom site and Blackwater Draw (aka the Clovis site). Many people have also heard of another site called Sandia Man Cave located in the Sandia Mountains of Albuquerque. The site was investigated by Frank Hibben who taught anthropology for many years at the University of New Mexico. Hibben's team found the now-famous Sandia points and claimed that these were stratigraphically below a Folsom level and also older than Clovis. The only other site to produce Sandia points is the Lucy site, also in New Mexico. The site was visited by Hibben himself. Unfortunately, the stratigraphic context at Sandia Cave that Hibben thought was pre-Clovis in age turns out to be hundreds of thousands of years old—much too old for Clovis or Folsom and older even than

Blombos Cave in Africa—and not nearly as pristine as Hibben described. Since then, dating problems with all the Sandia point finds have emerged, and unlike Folsom and Clovis, only a handful of Sandia sites, all highly questionable, have been discovered. Today archaeologists universally do not accept the Sandia period or Sandia points.

Surf or Turf? The Peopling of the Americas

As early as the 1500s, speculation began about how people arrived in the Western Hemisphere. José de Acosta (ca. 1540–1600) proposed that there must have been a land bridge connecting the northern reaches of the New World and Siberia. At the time, the geography of this region was completely unknown and unmapped. Much later, it would become clear that a land bridge did indeed exist between Siberia and unglaciated Alaska during cold periods of the Pleistocene called glacials. During glacials, ocean levels dropped as ice sheets on land grew. Note that while the word “ice sheet” suggests a thin layer, ice sheets were as much as a mile thick during the Pleistocene.

This region of exposed land (now submerged and called the Bering Strait) is called Beringia or the Bering Land Bridge. The word “bridge” is also a bit misleading as it implies a narrow strip of land. The Bering Land Bridge was, however, about 1,000 miles north to south at its greatest extent. People could have walked across the Bering Land Bridge from Siberia into the New World following herds of mammoth and bison. Certainly, they wouldn’t have known that they were occupying a region completely uninhabited by people. The land bridge would have been exposed between ca. 30,000 B.P.–10,000 B.P. allowing people to enter during this time frame.



Changing Beringia, Wikimedia Commons. Public domain.

The entering immigrants could, however, go no further than Alaska, because standing in their way were two huge ice sheets, the Laurentide and Cordilleran, blocking entrance into what is today Canada and the lower United States. If people took the land route, they would have had to wait until a warming trend for the ice sheets to melt enough to pass. This warming trend occurred around 13,000–14,000 years ago, creating the Ice-Free Corridor. The opening of the corridor happens roughly at the same time that we see Clovis sites in the United States, around 13,000–13,500 BP.

The Land Bridge Hypothesis has several weaknesses. First, there are no Clovis remains or early fluted points in Alaska. However, a very recent find suggests that people may have been in Canada around 24,000 years ago, putting people in a position to later come down the corridor. Second, there are no early sites in the Ice-Free Corridor. Thirdly, the timing of the opening of the corridor is very close to the time when sites begin to show up in the lower U.S. They would have

to really "hustle" to get from Alaska to say, Montana. Finally, there are claims of Pre-Clovis sites that pre-date the opening of the corridor.

Because of these problems, archaeologists began to speculate that people may have come by sea from Siberia. In his book *Bones, Boats, and Bison*, archaeologist James Dixon proposes that people could have "island-hopped" down the coast of Canada and into the interior. This would help explain the absence of early interior sites as well as the presence of some early coastal sites. We know that people were using boats at this time, because Australia was colonized 50,000 years ago, but was never connected to the mainland by a land bridge—people *had* to get to Australia by boat. So, theoretically speaking, peopling of the Americas by boat is a possibility.

A third hypothesis suggests people boated across the Atlantic along the ice shelf to the coast of what is today the United States. Popularly called the Iberia, not Siberia Hypothesis, this idea points to similarities in morphology (form) and flint knapping techniques between Upper Paleolithic Solutrean points and Clovis points. This hypothesis suffers from a timing problem (the Solutrean points are 4,000 years earlier than Clovis). And the artwork that characterized the Upper Paleolithic in Europe, like Venus figurines, does not appear in the Americas.

DNA from ancient remains provides some evidence as to the origins of the Paleoindian people. Recently, the DNA of a Clovis child from the Anzick Cache in Montana—the only known Clovis burial—was analyzed. Two types of DNA were analyzed, mitochondrial and nuclear. Mitochondrial DNA is located within the mitochondria and is separate from nuclear DNA in the nucleus of cells. Mitochondrial DNA is passed along only through the mother and so provides a glimpse inside the maternal line of Anzick Boy. Nuclear DNA inside the cell nucleus, in contrast, is a combination of the mother's and father's DNA. The results of the DNA analysis reveal Anzick Boy to be most genetically similar to indigenous people of the Americas (especially in Central and South America) with other similarities with modern East Asians and western Eurasians (Rasmussen et al. 2014). The DNA of the Anzick boy, being linked to modern

Native Americans and extent Asian populations, does not support the Iberia not Siberia Hypothesis of colonization. After the study was completed, the remains of the child were reburied in Montana according to a ceremony attended by multiple tribes. Though the analysis revealed that Clovis people were related to modern natives peoples of the Americas, many were unhappy with the analysis on principle. Armand Minthorn of the Umatilla Confederated tribes stated, "These are our ancestors' remains, they are not artifacts. I hope that the people who come after us remember this as well" (Brett 2014). These types of analyses are often the center of ethical debates in archaeology about how to treat both human remains and artifacts. In the next chapter, we will discuss legislation called NAGPRA which addresses this very question.

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Chapter 5: Mesolithic, After the Ice

Reconstructed Mesolithic round-house

The survey crew was recording sites on the Fort Bliss military base near El Paso. We came upon a site with no pottery, but lots of debris from making stone tools along with ground stone for processing plants. I reached down and found a stone point, thick and made from a dull-gray basalt. "These Archaic Bajada points are so chunky and ugly compared to Paleo points." He took the point in his gnarled hands (he had lost two fingers in two separate accidents). "Do you know how hard it is to make a point out of this crappy material? The person who made this knew what they were doing." Well, that was a good point and I never forgot it. In general, people were not as mobile after the Pleistocene and did not have the same access to the best stone material. That, in turn, had consequences for their tools. Archaic folks weren't

getting dumber, they were just adapting to the dramatically new conditions of the Mesolithic/Archaic.

The end of the last Ice Age was a major turning point in the history of the human species. The Earth's climate became warmer, and the fluctuations in the average global temperature of the Pleistocene ceased. This warm, stable period is termed the Holocene epoch, in which we live today. Many of the large animals upon which Paleolithic hunters had built their lives disappeared. As a result, human foragers broadened the range of animal and plant foods they depended on for survival, and this in turn required major shifts in technology and settlement strategies (where people live and when they occupy those areas). The dramatic leveling out of climatic conditions would eventually lead to the domestication of plants and animals and the development of social inequality, urbanism, states, and empires. The shift in climate at the end of the Pleistocene changed the world forever. In this chapter, we will explore how these momentous changes manifested themselves in cultures around the world.

Quartz sandstone sculptures from 6300-5900 B.C.E. on display at the Museum Lepenski Vir.CreditCreditMickey Mystique, via Wikimedia Commons

The Mesolithic is not a uniform time period and goes by different names such as the Archaic period in North America and the Epipaleolithic in Southeast Asia. During this time, hunting and gathering continued, but human diets diversified to include more fish, shellfish, migratory birds, gazelles, deer, rabbits, tortoises, and many other small animals. In temperate zones, the most commonly used types of plant foods were the seeds of annual plants like wild cereals, beans, peas, lentils, squash, and tree nuts. In tropical zones, plant foods more commonly took the form of tree fruits and tubers, such as the wild forms of manioc, yams, sweet potatoes. The diversification in diet is called broad-spectrum foraging. Most noticeably, people made greater use of marine resources during the Mesolithic. The material remains from the use of marine foods are unmistakable. Huge piles of empty seashells called shell middens, along with wooden log boats 30 feet long, fishnets and traps, and bonefish hooks attest to this shift in dietary emphasis.

A closeup of a shell midden in Argentina by Mikelzubi – Mikel Zubimendi, CC BY-SA 4.0,

At the Mesolithic Ertebølle site in Jutland, in Denmark, the shell midden is 6.5 feet thick, 460 feet long, and 66 feet wide. Soils in shell middens tend to be a deep rich black to brown color from the decay of organic matter. Shellfish provided a highly reliable source of food in addition to other marine foods. At Lepenski Vir, a Mesolithic community along the Danube River in Serbia, the shift in food resources is reflected in unusual stone carvings of fish-like creatures.

In general, stone tools become smaller during this period. For example, microliths become a much more important flaked stone tool in the Mesolithic of Europe and Asia. Microliths are small pieces of sharp stone made from sections of longer blades and flakes and make more efficient use of stone. One way microliths were used was to set them into a wooden or bone/antler handle, to use as a sickle. High-quality stone became more difficult to procure due to more permanent settlements and microliths became a way to conserve stone. In other cases, as in the archaic of the American Southwest, people made do with lesser quality material.

Although the atlatl continued to be used, the bow and arrow came into common use in Europe during the Mesolithic. (Arrows were likely used much earlier in South Africa during the Pleistocene). In Europe, Mesolithic arrows with microliths affixed with resin have been recovered from bog deposits. Another important technology that becomes prevalent in the Mesolithic is ground stone. Ground stone tools were made by pecking and grinding and constituted a huge time investment. Ground stone was an essential technology for grinding seeds to make them digestible. Ground stone axes were made for cutting and clearing woods and forests. As people become increasingly sedentary, they had to intensify their efforts to get more resources out of the same area of land in

order to subsist, initially by starting to consume foods that were previously lower on the preference list—foods that required additional processing in order to make them edible. A good example is acorns. Acorns are shelled and contain tannins and phytic acids, and thus require processing to make them into an edible meal. Acorns need to be cracked up to remove the nut and then ground into flour. The tannins and phytic acids are removed by leaching them in water.

Mesolithic mortar and pestle by Gary Todd is licensed under public domain.

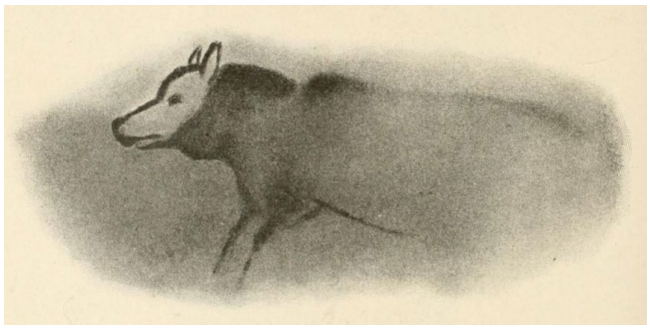
In many Mesolithic/Archaic cultures, pottery was not used at all. There are some are examples of pottery from Pleistocene contexts, most notably from China, which represents the earliest use of pottery (Wu et al. 2012). Jomon hunter-gatherers of Japan who lived some 16,000 years had a ceramic tradition that is well documented. Among more mobile foragers, however, pottery tends to be a liability. Pottery becomes far more prevalent when people begin to practice agriculture and live in more permanent villages. Mobile foragers are thought to have used basketry to transport and store items.

What People Ate

There are numerous ways to infer what people ate in the ancient past. Plant remains, animal bones, human stomach contents, and chemical residues on artifacts can all provide clues to diet. Another way is through bone chemistry analysis. From chemistry, we know that an isotope is a variant of an element that has the same number of protons, but the number of neutrons can vary. Examples of isotopes are carbon-12, carbon-13, and carbon-14. Different plants take up different ratios of isotopes. Marine plants and animals, for example, take up relatively more carbon-13 to carbon-12 than do terrestrial resources. By looking at human bone chemistry from Mesolithic coastal settlements and comparing them to later agriculturalists, archaeologists see a dramatic shift in the isotopic signatures. Mesolithic people had high concentrations of carbon-13, revealing that they were relying more on marine resources for food than their later agriculturally-based counterparts.

It is also possible to examine reliance on plants versus animal food using bone chemistry. As one moves up the food chain, nitrogen-15 becomes more concentrated in the body. If you eat more meat, the more nitrogen-15 enriched you will be. Archaeologists can look at the ratio of nitrogen-14 and nitrogen-15 in archaeological samples to get an idea of whether the diet was plant or animal-based.

The First Domesticated Animal



Watercolor tracing made by archaeologist Henri Breuil from a cave painting of a wolf-like canid, Font-de-Gaume, France dated 19,000 years ago.

Domestication refers to interfering with the reproduction of another species to produce favorable genetic changes. The earliest known domesticated animal species is the dog. While the dog becomes more common in the Mesolithic, they appear to have been domesticated in the Upper Paleolithic. In one recent discovery at Předmostí in Siberia, a dog was found with a possible mammoth bone in its mouth. A few other Upper Paleolithic sites with dogs are also known. Recent work on the dog genome suggests that dogs may have diverged from wolves in the Pleistocene perhaps 30,000-40,000 years ago. Biological Anthropologist Pat Shipman even argues in her book *Invaders* that dogs may have given modern humans the competitive edge to out-compete Neanderthals.

In post-Pleistocene Europe, Southeast Asia, and North America, there are dog burials in the same areas as human burials. In one famous example in the Middle East, a woman was buried with a puppy. At the 8,000-year-old Archaic Koster site in Illinois, archaeologists discovered the remains of four dog burials located in the same area as human burials.

Dogs appear to have been selected by foragers for docility or “tameness.” Some think that humans began to keep wolf pups, selecting for tamer traits which over time led to dogs. Hunter-gatherers are known to take in wild animals like monkeys, eagles, and armadillos, and care for them. The Ache of Paraguay and the Kichwa of Ecuador will sometimes adopt armadillos and monkeys, for example. Others think that dogs may have domesticated themselves in a sense. Human-tolerant dogs would be attracted to human settlements and trash dumps, and eventually, the offspring of these docile animals would be taken in

by humans. One very clear advantage that dogs provide is their sense of smell, which becomes useful in hunting. We've got good eyesight, great dexterity, but we're just not great smellers compared to dogs. In addition, dogs can pull loads, provide warmth, and of course, offer companionship. In a pinch, they can also be eaten.

“

“Girl with pet monkey at Pacayaku” by Heather Cowper is licensed under CC BY-NC-SA 2.0

Dogs, as opposed to the wolves they evolved from, are recognizable in the archaeological record by morphological changes. The snout becomes shorter, the face more indented at the rostrom, and the teeth are reduced. One way these morphological changes might have occurred is the selection for docility alone. In the famous “silver-fox experiments”, Dmitri Belyaev and Ludmilla Tutt demonstrated that breeding the most docile wild foxes resulted in very social foxes. But they also changed in form. These highly social foxes look a lot like dogs, some with patchy coats, wagging tails, shortened muzzles, and floppy ears. They even whine and bark, which wild foxes do not do. Selecting for docility alone, whether through human selection or natural selection, could have resulted in a fairly quick metamorphosis from wolf to dog.

Image by aalnik96 from Pixabay

Warfare and Violence

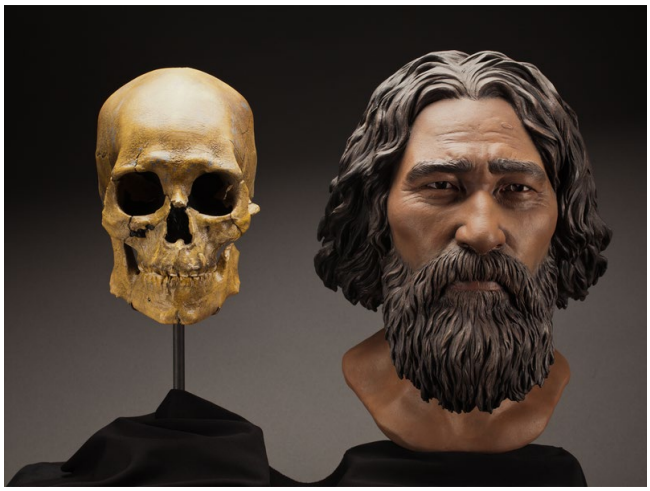
Humans can be remarkably cooperative, but we also have our dark side. Specialists in human bone called osteologists can examine ancient skeletal remains for signs of violent death. Evidence for lethal violence dates back more than 400,000 years in Neanderthals at Sima de Los Huesos in Spain. Skull 17 bears evidence of blunt force trauma to the front part of the skull (Sala et al. 2015). At some Mesolithic sites, there is clear evidence for violence as well. In some cases, violence is obvious. Arrowheads are found embedded in human skeletons at the Mesolithic sites of Téviec, France, and Skateholm, Sweden. At a site called Ofnet in Germany, two caches of skulls were found representing men, women, and children who all bore evidence of bludgeoning and

decapitation. Recent work at Nataruk in Kenya revealed a massacre of 27 individuals, dating to around 10,000 years ago. The skeletons revealed evidence for blunt-force trauma, stone points lodged in the skull and thorax, and bound wrists. Like modern humans, clearly, early foragers were not living in a garden of Eden oblivious to violence. And yet, at many other Mesolithic sites, there is no evidence for violence.

Mesolithic burials with evidence of violent death. Téviec, France. [CC-BY-SA-3.0 http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons, Photo: Didier Descouens

Kennewick Man

Kennewick Man, also known as The Ancient One, is one of the earliest skeletons found in the Americas and dates to ca. 8,500 years ago, at the end



By Erin Blakemore SMITHSONIAN.COM

of the Pleistocene and the beginning of the Holocene. Kennewick Man, like so many other remarkable finds, was found accidentally. Two college students found the skeletal remains while wading in the Columbia River in Washington on Army Corps of Engineer land (federal property) during a boat race. Thinking it was a forensic case, they called in the authorities. At first, he was thought to be an early European explorer, but radiocarbon dating quickly revealed the ancient age. Because it wasn't clear who Kennewick Man was, a controversy ensued over who had rights to his remains. The legislation called NAGPRA or Native American Graves Protection and Repatriation Act of 1990 stipulates that Native American tribes and Hawaiian organizations have a right to claim human remains and other culturally important items found on federal lands. When human remains or objects are returned to affiliated groups, it is called repatriation. Most repatriations are non-controversial, and there is an established link between ancient remains and modern people. With Kennewick Man, the link from past to present was so distant that some scientists questioned whether a legitimate claim could be made.

The Umatilla Tribe claimed Kennewick Man as their ancestor, asserting that the tribe had been in the area since the beginning of time. The Umatilla objected to the treatment of Kennewick because ancestors are of vital importance to their culture and disrespect for remains not only violates their religious beliefs but also could have serious real-world consequences. Initially, no DNA could be gotten from Kennewick Man and he went into legal limbo and was stored at the Burke Museum. In 2015, however, scientists managed to extract his DNA and compared it to modern people. Kennewick Man turned out to be most genetically similar to indigenous Americans. Following this research, he was

repatriated and reburied collectively by five different tribes in 2017.

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Chapter 6: Emergence of D…→

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Chapter 6: Emergence of Domestication

Egyptian hieroglyphic of people harvesting crops. “An early Ramesside Period mural painting from Deir el-Medina tomb depicts an Egyptian couple harvesting crops” is licensed under public domain.

'It's not what you find; it's what you find out."—attributed to archaeologist David Hurst Thomas

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Domestication refers to the genetic alteration of plants or animals as a result of human control of reproduction. Agriculture refers to the reliance on domesticated plants for food. The first domestication of plants and animals developed independently in several parts of the world within a narrow window of time in the early Holocene, between 10,000 and 5,000 years ago. The Holocene refers to the geological epoch following the Pleistocene and is marked by an increasingly stable climate. Domestication of plants did not begin until after the end of the Pleistocene, suggesting that the climate stabilization that happened in the Holocene might have made the domestication of plants possible. Domestication has rightfully been seen as a major turning point in the history of the human species. One of the big questions in archaeology is: why and how does domestication occur in some areas very early on and much later or never in others?

The Idea of Diffusion

The earliest theories about the origins of domestication were strongly tied to the idea of human progress—the idea that we are constantly getting smarter and improving the human condition. These early ideas invariably emphasized discovery and invention. Since "savages", as hunter-gatherers were referred to, did not have domestication, it must have been a difficult concept to master—kind of like prehistoric "rocket science". Domestication was thought to be such a complicated notion that it must have been invented only once or twice by "seed geniuses" and then diffused or spread out to the rest of the world from there. Secondly, early theories of domestication tended to assume that domestication is such an obviously beneficial innovation that anyone who saw it or learned about its practice would immediately drop whatever they were doing (i.e., hunting and gathering) and start farming and herding. Basically, it was thought of as an idea waiting to happen.

This idea of cultural diffusion was taken to ridiculous extremes in the early 20th century by Grafton Elliot Smith a British anatomist-turned-anthropologist who published The Egyptians and the Origins of Civilization in 1923. Noting that, for example, the practice of embalming was found earliest in Egypt, and was now found all over the world, he decided that it had been invented there and diffused out to the rest of the civilized world. From this simple starting point, he then concluded that all the early hallmarks of civilization—agriculture, calendars, monumental architecture, metallurgy, the idea of centralized government—had been invented first by the Egyptians and diffused to the rest of the world, across the Atlantic and the Pacific, from there. William J. Perry, a British anthropologist, published several books promoting this view of civilization origins including the popular Children of the Sun (1923), in which he argued that the Polynesian practice of building monumental stone temples called heiau reflected the diffusion of the Egyptian pyramid construction to the Pacific. He also argued that European megalithic monuments like Stonehenge were a case of the same process of diffusion from Egypt.

Hyper-diffusionists thought the trappings of civilization began in Egypt and traveled the globe. The view that Egypt was the source of all civilization was strongly influenced by the finding that the Egyptians had produced the earliest known form of writing (this is almost true: The Sumerian cuneiform script is probably a little earlier). Since everybody knew that writing was the sine qua non of civilization, the idea that everything else necessary for civilized life was invented first in Egypt just logically followed. The fact that Tutankhamun's undisturbed tomb had just been discovered in 1922 by Howard Carter and Lord Carnavon only contributed to the Egyptomania of the 1920s.

Archaeologist Glyn Daniels called this kind of "Egyptocentric" thinking hyper-diffusionism. Keep in mind that the diffusion of cultural traits does occur—there is nothing inherently wrong with the idea of diffusion as a mechanism for cultural change. But independent invention happens too. One of the most basic questions in considering any cultural innovation is whether the idea came from somewhere else, or whether it was invented or re-invented independently by chance or necessity. From what we know now, the practice of farming and

herding developed independently in six or so core areas of the world, and it did so several thousand years before the development of anything we would now call “civilization”. So the focus of explanation for domestication has shifted from “how and why agriculture diffused from the centers of civilization” to “how and why domestication developed in response to local environmental and social
conditions”.

Domestication: Where and Why?

The idea that the invention of agriculture actually needed an explanation is a relatively new one. According to the Old Testament, Cain was the first human born, and he was already a metals smith
and a tiller of the earth. Domestication just came with the human package. But with the discovery of the Upper Paleolithic and the recognition of the antiquity of the earth, the question of why people began to domesticate plants and animals emerged. V. Gordon Childe, one of the great early archaeologists, suggested that as the Pleistocene ended people began to closely observe plants and animals for the first time around oases, and discovering their true nature led to their domestication. We know from studying Upper Paleolithic cave art that early humans were quite familiar with animals and cognizant of seasonal changes and migrations. Moreover, hunter-gatherers, in general, must make their living by observing wild animals and plants and figuring out the best ways to turn them into food—their lives depend on it. While Childe was right about the timing of domestication, he was probably wrong that hunter-gatherers just didn’t have a clue about plant and animal reproduction.

Investigating the beginnings of agriculture in the mid-1900s, American archaeologist Robert Braidwood showed that plant domestication in the Near East began in the hilly flanks of the Fertile Crescent, the natural habitat of the wild progenitors of the first domesticated plants. These grasses were so abundant that experimental archaeology showed that hunter-gatherers could easily live off of them without even domesticating them. This period where wild grains were harvested before domestication is called the Natufian. This point

that grains could have been harvested by hunter-gatherers was brought home by a simple experiment carried out in the summer of 1967 by a member of Braidwood's archaeological team at the site of Çayonü in Turkey. Jack Harlan was an American crop scientist who had been hired by Braidwood to consult on the growth of wild cereals. Çayonü is an early Neolithic site located in the foothills of the Taurus Mountains in the prime habitat of a wild form of wheat called einkorn (You can still einkorn cookies in some stores. They are delicious).

Harlan noticed that dense stands of wild einkorn covered the hillsides of rich volcanic soil around the site, as they had back in the early Neolithic when the site was occupied. Acting on a hunch, Harlan reconstructed a Neolithic-style hand sickle using a wooden handle with microlith blades embedded in it, using archaeologically recovered examples for models. Using the hand sickle and some locally made baskets, Harlan was able to harvest up to 2 pounds of wild cereal grain per hour from the wild stands around the site. Furthermore, since the site was located on a hillside, Harlan found he could move up the hill and harvest more newly ripened grain as the summer season progressed to higher elevations. From these results, Harlan estimated that a family of four could harvest enough wild einkorn to feed themselves for a year in the space of only three weeks, by moving up the hillside. Once again, experiment archaeology showed what was possible, but raised further questions. Jack Harlan's wheat harvest raised the question: Why bother to
become a farmer when you can live as a hunter-gatherer off the land and let the wild plants sow themselves?

Neolithic sickle with microliths embedded. By Wolfgang Sauber (Own work). [GFDL (http://www.gnu.org/copyleft/fdl.html) or CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons

What's the advantage of domestication?

It is commonly thought that agriculture gives people more free time—that it is some kind of labor-saving device. It isn't. Ethnographic research (research on modern-day people) has shown that agriculturalists generally spend more

hours of work per week in subsistence activities than hunter-gatherers do. Agriculture requires clearing land, weeding, creating technology to harvest crops, hours of processing (grinding) seeds, and cooking not to mention the labor involved in making and maintaining permanent structures. This is why many archaeologists maintain that to explain why people began to domesticate animals and plants, it is first necessary to explain why people found it necessary to work harder to survive and reproduce, assuming that people will only work as hard as they have to do so. Domestication allows people to live off a smaller unit of land by putting more effort into food production. From this perspective, you can see that domestication could be a reasonable choice in the face of population growth and resource depletion, where one might have to get by on a smaller unit of land. The only option would be to intensify effort to get more out of less. In turn, sedentary life appears to promote increased population, or at least population densities. Rather than seeing domestication as a serendipitous discovery that freed humanity from the risks and privations of life as a hunter-gatherer "savage", domestication and subsistence intensification have come to be a grim necessity. In the long scheme of things, the history of "improvements" in subsistence practices is the history of declining individual work efficiency.

The Evidence for Domestication

During the Mesolithic, changes in diet with domestication brought about changes in settlement and technology. The archaeological tool tradition or suite of tools, associated with the domestication of plants and animals is called the Neolithic, or New Stone Age. Houses (domestic structures) required increased labor to construct as villages became increasingly permanent. There was an even greater emphasis on grinding stones with an increased need to process grains. Some grinding stones at the site of Abu Hureyra in Syria were gigantic, attesting to the amount of cereal processing going on at the site. Because agriculture is a seasonal activity, grains had to be stored for future consumption. During the Neolithic, pottery, grain bins, and storage pits become common. Because domestication involves the genetic alteration of plants by selective breeding, the morphology of seeds changed during the Neolithic. For starters, they become bigger as people favor plants that produce larger seeds.

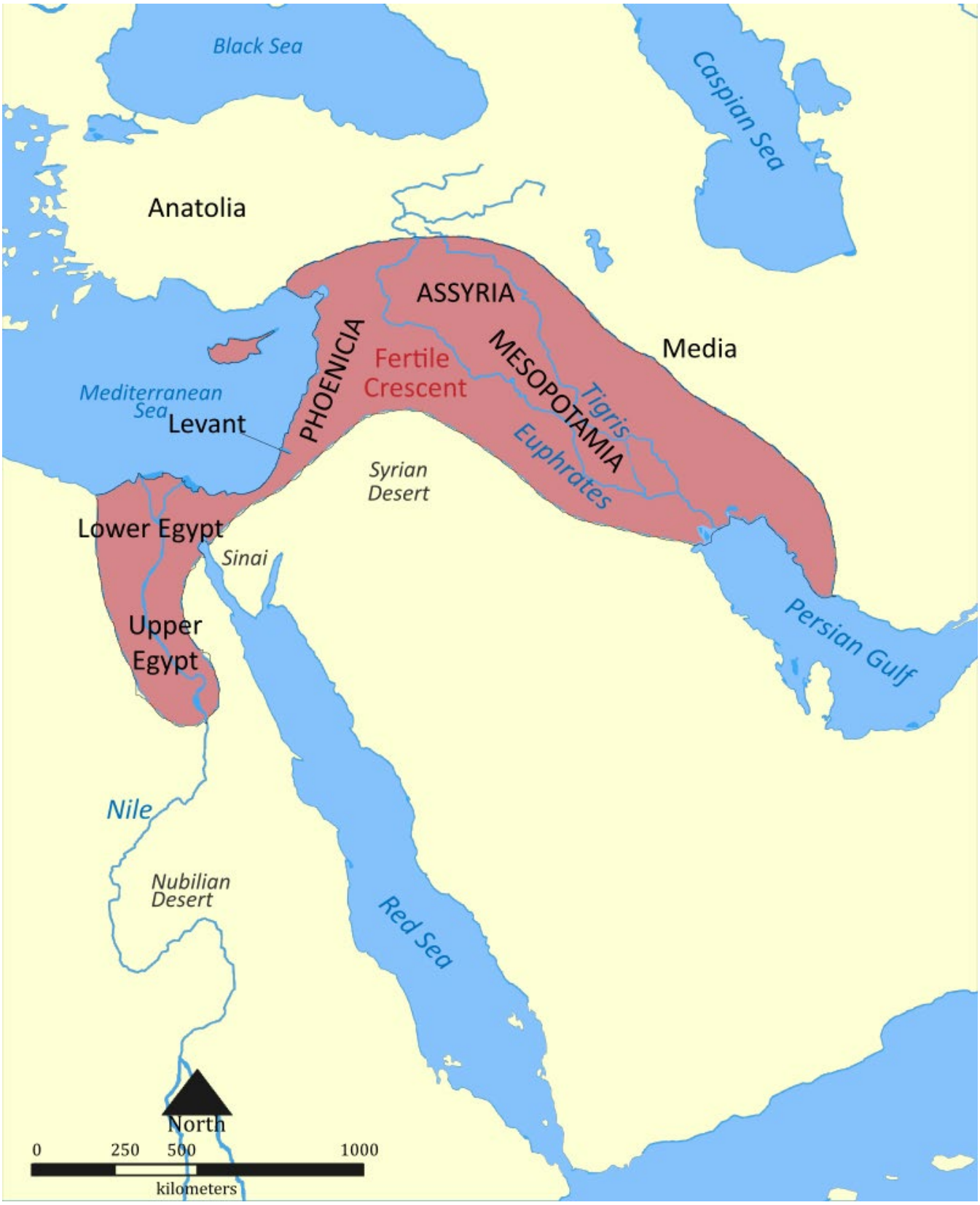
Secondly, they develop a stronger rachis, the part of the plant that holds the seed onto the plant. A stronger rachis prevents the seed from doing what it does naturally to reproduce—blow away in the wind. If you look at an ear of corn, you can easily see what we've done to this plant. The rachis is so strong, that it can no longer reproduce without the assistance of people. The same is true of wheat. Second, the glume or seed coat of domesticated grains is weaker. The weaker seed coat is good for humans because it makes the seed softer and therefore easier to process and digest.

Some of the earliest evidence for domesticated plants comes from the flanks of the Fertile Crescent on the margins of the Taurus and Zagros Mountains in the Near East in Iraq, Iran, Syria, and Turkey. The site of Abu Hureyra in Syria, excavated in 1974 by A.M.T. Moore, is a tell, or an accumulated mound created by the continuous occupation. The site now lies beneath the Lake Assad reservoir near the Syrian border with Turkey. The site dates to the late Mesolithic/early Neolithic, around 8,000–13,500 B.P. About 11,000 B.P. the village's inhabitants started growing cereal grains, rye being the first known domesticated grain. During the later occupation at Abu Hureyra, architecture consisted of mud-brick structures covered by mud plaster. Houses had plaster floors and were equipped with storerooms for keeping food and hearths for cooking.

Excavations at Abu Hureyra showed the expected change in morphology for seeds from wild to domesticated:
"What we expected to find from the hunter-gatherer levels at the site was lots of wild cereals. These are characteristically very skinny and we found plenty of them. But then, at higher and later levels, we found things that did not belong there. There were these whacking, great fat seeds, characteristic of cultivation. "(Gordon Hillman, University College, London, on Abu Hureyra excavations).

Another fascinating discovery for the Neolithic occupation of Abu Hureyra is that osteologist Theya Molleson could determine who was doing the laborious grinding of seeds based on skeletal abnormalities. She discovered a window into the sexual division of labor, and how people organized tasks by sex. A final

tell-tale sign of domestication, especially in the New World, is dental caries, or cavities. During the Archaic period (the Mesolithic of the New World), the incidence of cavities is low. Later in the New World when populations become supported largely by maize, which contains sugars, the incidence of cavities skyrockets. The domestication of wheat, rye, and barley spread out from the flanks of the Fertile Crescent to Cyprus, Crete, mainland Greece, and Europe. Domesticated animals also came with these domesticated plants. The conversion from hunting and gathering to farming in Europe did not all happen at the same time, and some populations remained foragers for longer periods than others. A major debate in archaeology is whether people migrated to these areas with their domesticated, or whether the domesticates diffused "down the line" as well as the route into Europe that migrants took. The genetic markers (male Y chromosome and SNPS) for southeast Europe and Greece indicate ties to the Near East, while in Germany, France, and northeastern Spain there is less evidence of eastern migrants. The study of ancient DNA, which is rapidly becoming more feasible, will hopefully further clarify how domesticates spread. It is clear though that migrations of people into Europe from the Near East is not just a modern phenomenon. So while Kennewick Man is connected to Native Americans, it is less clear how modern Europeans are related to people of the Upper Paleolithic.



Agriculture began along the flanks or hill slopes of the Fertile Crescent. By Nafsadh (Map of fertile cresent.png) [GFDL (http://www.gnu.org/copyleft/fdl.html) or CC BY-SA 4.0-3.0-2.5-2.0-1.0 (http://creativecommons.org/licenses/by-sa/4.0-3.0-2.5-2.0-1.0)], via

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Following the introduction of plant and animal domesticates to Europe, several different archaeological cultures sprang up. In western Europe, people began to build large stone monuments like menhirs, and large standing stones, in the 5th millennium B.C. (4000's B.C) along with earthen mounds called "long mounds". In the Balkans (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Republic of Macedonia, Montenegro, Slovenia, Romania), enormous villages, and even tells, formed. Copper and gold mining and the production of sumptuary goods can be found at the Bulgarian Neolithic site of Varna along the Black Sea. One male burial, 40-50 years old, contained gold beads, rings, bracelets, hair, and body ornaments (including a golden penis sheath). He also had copper axes and a stone ax scepter. Some scholars think that with the spread of domesticates to Europe came the Indo-European languages common in Europe today, including Germanic, Slavic, Italic, and Celtic languages (other Indo-European languages include Farsi, Urdu, Hindi, and Kurdish). Thus, the English in which this text is written may have had its roots in the spread of agriculture from the Near East. This debate continues to puzzle both linguists and archaeologists alike.

Domestication also began independently in China with millet and rice at around 9,000 BP. Settlements and pottery begin to become prevalent (though there is evidence for even earlier pottery in China). At the site of Banpo (ca. 6,000 BP) near Xi'an in China, houses are circular and excavated deeply into the earth. Pits were excavated into the structures for the storage of food. The Neolithic of China also contains evidence for the world's earliest alcohol dating to around 9,000 years ago. Patrick McGovern is a biomolecular archaeologist who specializes in ancient alcohol made from rice, fruits, and other ingredients. McGovern uses techniques like infrared spectrometry to analyze residues on pottery fragments to determine the ingredients of ancient alcohol. This technique bombards a sample with infrared light, and the absorption of the light reveals what kinds of bonds are present in the sample. Each organic compound will respond differently and can potentially be identified.

Domestication in the New World

The first New World domesticate was squash, ca. 8,000-10,000 B.P. in southern Mexico and South America. Domestication is marked by increased seed length, increased peduncle (stem) diameter, and changes in overall shape compared to wild species. While there were other domesticates, the big story of domestication in the New World revolves around maize. Among modern Pueblos, for example, corn is life, corn is mother. While the Old World has several cereal crops, maize was the New World's one major native grain. Other native grains, such as chenopodium and quinoa, were also domesticated, but are not as productive as maize. Guilá Naquitz, in the Valley of Oaxaca, Mexico, is the site of the earliest evidence of maize cobs dating to ca. 6,200 B.P. Other evidence on grinding stones from Xihuatoxtla Shelter in Mexico indicates an early form of maize around 8700 BP. These remains called phytoliths a kind of "plant fossil" made from silicon dioxide (SiO_2) provided direct evidence for maize. Plants take up SiO_2, which gets incorporated into their cell structures. Phytoliths are used extensively in archaeology to infer diet. (Phytoliths can be found in dental calculus as a direct index of what an individual ate). Most biologists agree that teosinte, a wild grass that grows in the vicinity of Guilá Naquitz today in the Balsas River Valley, is the wild ancestor of maize. To begin, maize was tiny, and artificial selection (traits selected by people, not nature) produced slow increases in maize productivity over time. Only around 4,000 B.P. was maize large enough to support village life.

Neolithic burial at Varna, Bulgaria Photo: Yelkrokoyade [GFDL (http://www.gnu.org/copyleft/fdl.html), CC-BY-SA-3.0 (http://creativecommons.org/licenses/by-sa/3.0/) or CC-BY- SA-2.5-2.0-

Maize spread from southern Mexico northward into what is today the U.S. and southward into South America. So, maize ultimately comes from

Mesoamerica, from central Mexico through Central America, an area we will discuss later in this book. This is a legitimate case of diffusion. It arrived first in the American Southwest ca. 3,000 B.P. reaching the eastern woodlands of the U.S. by around AD 1-200. Like the flanks of the Fertile Crescent, the Valley of Oaxaca was the source of a major domesticate that spread far and wide. Ultimately, maize became the basis for major civilizations throughout the Americas: Olmec, Maya, Aztec, Moché, Inca, Ancestral Pueblo, and Mississippian, which we will discuss in more detail in future chapters.

Ground stone

As we saw in the Mesolithic and Archaic, archaeologists use the term ground stone to refer to stones used in the processing of grains. In the Old World, the grinding slabs are called querns rather than metates. These slabs and stones become increasingly larger and more elaborate with the emergence of the domestication of cereals (the grains of grasses). The making of ground stone is labor-intensive and the grinding of cereals could take hours each day. Processing like this increases the number of calories that are available to humans to eat, which helps explain why someone might spend hours a day processing grains. Early in the domestication process, people were likely parching grains or even making popcorn rather than spending time making flour. In many cases around the world, there is evidence that women were largely responsible for this task, especially as the importance of domesticates in the diet increased.

Animal Domestication

Like plants, animals undergo morphological changes with domestication as well. We have already discussed some of the changes from wolf to dog. In addition to morphological changes, the population structure of animals can

change. Female animals may be kept for breeding purposes, while males might have been used for labor or food. Male cattle or oxen might show wear and tear on their skeletons from the plow. By identifying male and female animals and their ages from the skeletal record, along with wear skeletal abnormalities, archaeologists can see how animals were used. Of course, not every animal is conducive to domestication, which explains why some animals were originally domesticated and continue to be used as food today. The following outlines the factors influencing animal domestication:

- The animal's diet should not compete with the human diet.
- The animals' growth rate should be rapid (e.g., great apes have slow growth).
- The animal should not be too aggressive (e.g., bears, hippos, rhinos, African buffalo).
- The animal should not tend to panic (e.g., deer, antelope).
- The animal should live in permanent herds and have a well-developed dominance structure. Humans can then assume the top position in the hierarchy.

Cattle, pigs, goats, and sheep have qualities that make them amenable to domestication by humans. Grazing animals like cattle are especially productive domesticated animals because they digest cellulose and convert it to energy and protein "on the hoof". They can also eat the stalks and leaves of grasses, while humans harvest and use the seeds.

Today, domesticated animals have now reached epic proportions with around 1 billion cattle in the world. Beef production is a billion-dollar industry. Animal husbandry is not what it used to be in the Neolithic; they are now raised on a massive scale. Cattle take up a huge amount of land to raise along with a huge amount of water. In the U.S. they eat mostly soy and corn, which they are not built to eat, causing additional problems like the production of methane and the use of antibiotics. While wild (non-domesticated) animals grace the pages of children's books, in the real world wild animals pale in comparison to the number of domesticated animals. Domestication has changed not only how

humans eat and live, but affected all the earth's animals. F. Dalton prophesied in 1865 in "The First Steps Towards the Domestication of Animals":

It would appear that every wild animal has had its chance of being domesticated, that those few which fulfilled the above conditions were domesticated long ago, but that the large remainder, who fail sometimes in only one particular, are destined to perpetual wildness. As civilization extends they are doomed to be gradually destroyed off the face of the earth as useless consumers of cultivated produce.

Consequences of Domestication

We know one consequence of agriculture is the ability to live off a smaller area of land by increasing the energy put into production. Agriculture can support more people per unit of land, and so population size or density tends to increase. This has consequences. First, trash builds up and attracts vermin and bacteria, which are vectors for disease, and can also pollute water sources. Secondly, domesticating animals brings animal tissues and feces in contact with humans spreading zoonotic, or animal-born, diseases. Examples of zoonotic diseases include chickenpox, hantavirus, mad cow disease, swine flu, yellow fever, ebola, hantavirus, and many, many more. Another consequence of agriculture is that people become very concerned about land rights because even very small areas of land are a family's lifeline.

People become sedentary, investing more in houses and storage units. At Catalhoyuk in Turkey, people live near a source of plaster and become what Ian Hodder calls "plaster freaks", constantly refurbishing and remodeling their houses. As populations increase, there are few other options but to defend one's land rights or migrate to a completely new area. As people become more sedentary and reliant on one area of land, they begin formulating ways of justifying land rights, often through the establishment of ancestral ties to an area. At Abu Hureyra and other Neolithic sites in the Near East, the interesting phenomena of plastered skulls occur. These are actual skulls that were covered in plaster to resemble a face, not so different from a forensic reconstruction. A

combination of realistic and caricature-like modeling of facial features on the skulls suggests individual identities remained with the skulls of the deceased. The skulls may have been modeled and decorated in a manner that captured the essence of a personal trait or quality that reminded the living of the deceased. After burial or excarnation (removal of flesh), skulls were retrieved and used in other contexts. These plastered skulls have been found buried separately from bodies and sometimes they occur in "caches." The murals of vultures and heads at Catalhoyuk in Turkey may represent the defleshing process, following which the skull could be retrieved for use. The plastered skulls appear to represent a form of ancestor veneration a common phenomenon in agricultural societies. Modern people sometimes retain portions of dead individuals to retain an association with that individual, especially if he or she held power. Retaining the skulls of powerful ancestors may have legitimized and reinforced claims to land and other resources, particularly as populations grew and land became scarcer. In a way, this practice of displaying important social figures after death is not so removed from modern life. Vladimir Lenin's body is on display in a mausoleum in Moscow's Red Square. The mausoleum incorporates elements of ancient burial monuments such as the Temple of Inscriptions in Honduras (see Chapter ** The Classic Maya) and the Egyptian Step Pyramid (see chapter ** Dynastic Egypt). The preserved remains of Jeremy Bentham (1748-1832), for example, are on display at the University College in London at his own request. He has even "attended" council meetings where he is listed as "present," but not voting. Bentham serves as a kind of totemic ancestor for the university.

Neolithic skulls may have been on display or buried in homes. “The three plastered skulls in situ at Yiftahel” by Viviane Slon, Rachel Sarig, Israel Hershkovitz, Hamoudi Khalaily, Ianir Milevskiis licensed under CC BY 2.5

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Chapter 7: Rapa Nui

The fifteen moai of Ahu Tongariki. "Los 15 moais del 'Ahu Tongariki'" by Carlos Reusser Monsalvez is licensed under public domain.

Easter Island has been called the world's greatest open-air museum, and indeed the entire island can be seen as one huge archaeological site.

—John Flenley and Paul Bahn, *The Enigmas of Easter Island*

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veryone knows something about Easter Island, or Rapa Nui as it is called on the island. Rapa Nui National Park covers much of the island and is

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listed as a World Heritage Cultural Landscape. The island is remarkable just for the fact that it is inhabited at all. Easter Island, so named because it was encountered in 1722 by Dutch explorer Jacob Roggeveen on Easter Sunday, is located more than a thousand miles from any other landmass. What's more, it's one of the tiniest inhabited islands in the Pacific, a volcanic speck in the Pacific Ocean, just 66 square miles. The island contains more than 950 stone statues, called moai (mo-eye), about 50 of which were transported over long distances, and 150 ahu, the stone constructions that supported many of the moai. At least one moai has been exported from the island and others are likely buried and unknown to archaeologists.

The moai, which are thought to represent venerable ancestors, are massive heads with torsos made from volcanic tuff from the interior and exterior slopes of an ancient volcano called Ranu Raraku on the southeast side of the island. In their book, The Enigmas of Easter Island Flenley and Bahn write: "From the islander's testimony and other Polynesian ethnography it is virtually certain that the statues represented high-ranking ancestors." (p.109).

Standing moai range from 6 to 35 feet in height and weigh as much as 82 tons. The red top knots (pukao) that adorn some of the moai were made from red volcanic rock from Punapau Crater. The exteriors of the moai were originally smoothed, and sometimes carved, but are now mostly eroded. Some of the moai were installed on stone platforms called ahu. The moai were toppled for unknown reasons sometime after the initial European contact (post-1722), perhaps clan warfare, but re-installed in modern times.

Rapa Nui moai. Photo: Flickr. Creative Commons. Photo: Louis Vest.

Distribution of maoi statue sites on Rapa Nui. From Richards et al. 2011, p. 192 By Eric Gaba (Sting), translated by Bamse [CC-BY-SA-2.5 (http://creativecommons.org/licenses/by-sa/2.5)], via Wikimedia Commons

Where did they come from?

Norwegian adventurer Thor Heyerdahl (1914–2002) proposed an early idea about how Polynesia, in general, was colonized. Heyerdahl thought that the

Polynesian islands were colonized by the indigenous inhabitants of South America, based on perceived similarities in watercraft, architecture, and oral history. He demonstrated the feasibility of traveling from South America to Polynesia by piloting a balsa wood raft from Callao, Peru to the island of Raoria in 1947—some 4,000 miles—which he describes in fascinating detail in Kon-Tiki. This was perhaps the most ambitious experimental archaeology ever conducted. Today there is even a museum dedicated to the journey in Oslo, Norway. Heyerdahl was interested in a story told by Rapanui about two peoples, "Long Ears" (or slim people) and "Short Ears" (or stocky people). Heyerdahl thought the Long Ears represented the original inhabitants from South America who arrived around AD 400 according to radiocarbon dates; These people, he supposed, were the ones who built the remarkable stone monuments. The Short Ears, he argued, were Polynesian interlopers who came sometime later and clashed with the Long Ears, effectively killing them off around 1680 along with their spectacular culture based on the moai. Today, the genetic, linguistic, and archaeological evidence does not support large-scale South American colonization. Though a recent study suggests that modern Rapanui have genetic overlaps with South Americans, analysis of prehistoric skeletons would be necessary to make a solid claim for South American colonists because the Rapanui were known to have traveled as slaves to South America, but returned to the island later. Future genetics could reveal a very different story of Easter Island. Critics of Heyerdahl have pointed to the absence of South American domesticates (maize, beans, squash), the lack of pottery, and the absence of pressure flaking techniques so common in the Americas. Many have noted that sailing craft like the one used by Heyerdahl did not exist until after European contact and also his watercraft was towed out fifty nautical miles before setting sail, avoiding a northward current. Other critics have been more scathing in their critique. Writer Paul Theroux quipped that the Kon-Tiki expedition showed that "sexy middle-class Scandinavians could successfully crash-land their craft on a coral atoll in the middle of nowhere".

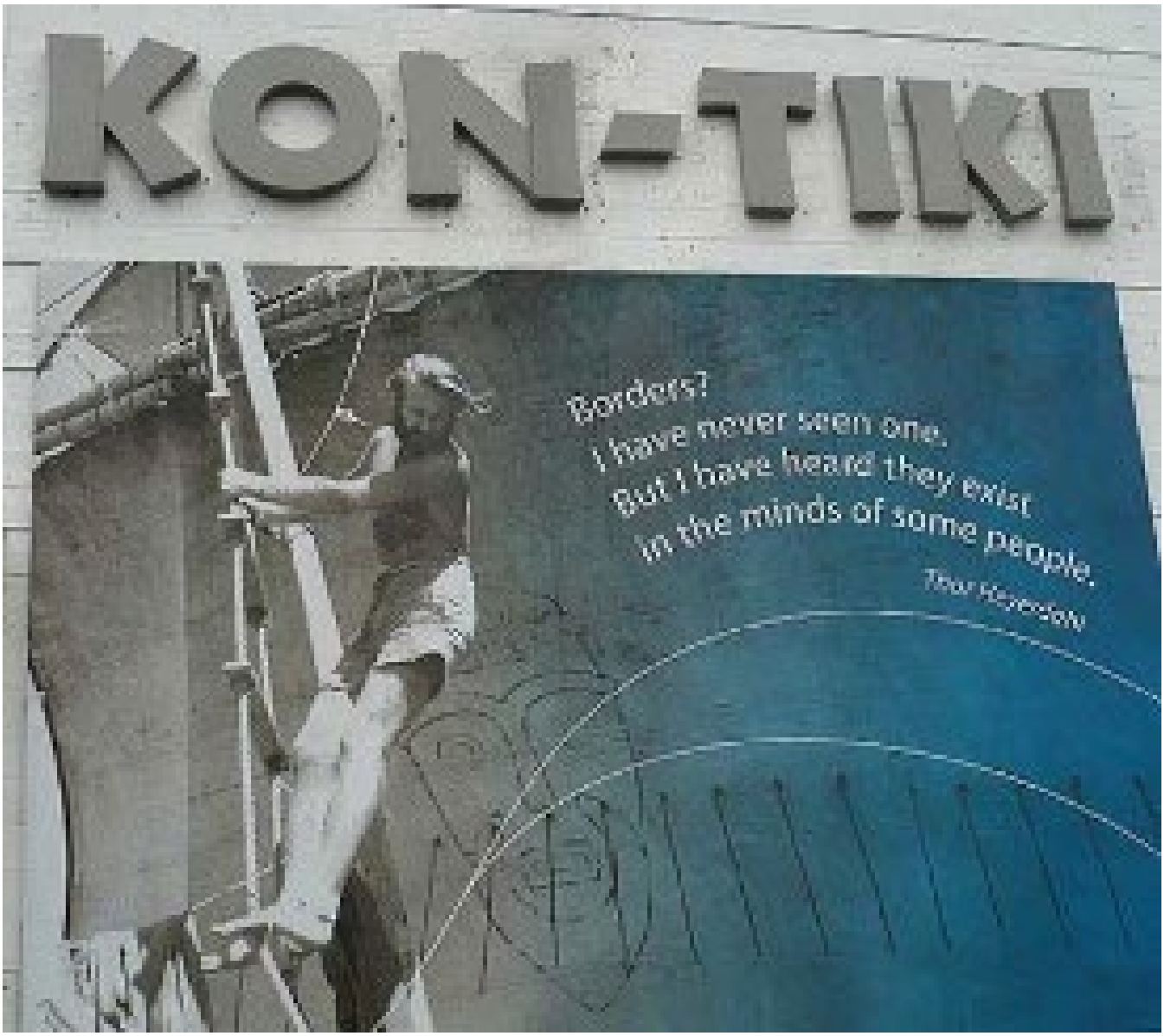


Image of Thor Heyerdahl at the Kon-Tiki Museum in Oslo, Norway. Flickr, Creative Commons. Photo: c Nilson

The island had the South American sweet potato and bottle gourd, so contact of some sort of contact is not out of the question, but certainly not demonstrated. There are parallels to Rapa Nui monuments elsewhere in the Pacific, so South American masons and hyper-diffusionism do not have to be invoked to explain the stone monuments on Rapa Nui. Shrines/ceremonial houses called marae on other Polynesian islands are similar to the ahu of Easter Island. Other Polynesian islands built monumental structures, such as the trilithon of Tonga or the Takaii of Hiva Oa. On nearby Pitcairn, the mutineers of the Bounty pushed stone statues installed on a platform off a cliff (the island was uninhabited when the mutineers landed there). Some have suggested that

Polynesians contacted South Americans and not the other way around. Whatever the exact history of the colonization of Rapa Nui, Heyerdahl's sailing exploits are legendary, though his ideas have not been substantiated.

Marae on Tahiti, an ancient temple. Flickr, Creative Commons. Photo: Pierre Lesage

Tonga trilithon made of coral blocks. "Ha'amonga trilithon" by Vilimaka Foliaki is licensed under CC-BY-SA 2.0

Ahu Nau Nau. Note the “long ears”. Flickr, Creative Commons. Photo: bmeabroad licensed under CC-BY 2.0.

Getting There

Polynesians were master sailors. Based on computer simulations, it would have been impossible to colonize the furthest reaches of Polynesia without a sail, though there are documented cases of rafts (without sails) drifting off course from islands. Moreover, it is thought that colonizing remote islands would have been a one-way affair, with no hope of returning home. The dating of Rapa Nui colonization is contentious. Early work by Heyerdahl suggested a date around A.D. 900. More recently, the dating of the earliest occupation has come into question. The early radiocarbon dates were from an unidentified sample of wood and are therefore questionable. There is a problem with dating wood samples that might be earlier than the human deposits. This is the old wood problem. Inner tree rings will radiocarbon date earlier than outer rings. More recent dates from excavation suggest the earliest occupation may have been much, much later—as late as A.D. 1200. Clearly, this is yet another mystery of Easter Island.

Island Devastation: Alternative Views

Rapa Nui was formed from volcanic seafloor eruptions and is today marked by rocky lava-covered terrain. There are no permanent streams or rivers, and water exists in the volcanic craters and springs. Three extinct volcanoes dominate the landscape. Today, Rapa Nui is a barren landscape, sometimes described as a moonscape. When explorers like Captain James Cook, landed on Rapa Nui, they noted the island’s limited resources and largely treeless terrain. Cook remarked, “Nature has been exceedingly sparing of her favors to this spot”. If you go to Google Earth and check out the images from other Polynesian islands, you can see why Cook and others would have been so unimpressed with Rapa Nui.

Studies of ancient pollen grains preserved in old lake bed sediments indicate environmental change over time. The study of pollen is called palynology and is useful in the reconstruction of ancient environments. Drilling down into the bed, one can get a core of accumulated sediments, including seeds, charcoal, and pollen. According to the pollen record, the island was once covered in palm forest, including a giant species with a trunk up to a meter in girth. Evidence of the roots of these giant palms is seen below the human occupation (recall the Principle of Superposition). Later, the forest pollen vanishes from the record and is replaced by grass. In addition, there is evidence of soil erosion and the use of smaller plant remains as opposed to wood.

One account of the failed environment comes from ornithologist and popular writer Jared Diamond. In this account, Diamond argues that the highly productive environment supported the great chiefdoms that built the moai. Forests were burned down to clear agricultural fields (slash-and-burn farming), or cut for fuel, canoes, or sleds to move statuary. The population of the island increased, and the greed of the chiefs in their drive to build more moai, which required wood, finally overtaxed the environment. In short, it was a kind of ecocide. Statues in progress were abruptly abandoned in the quarries and along transport routes. Civil war and even cannibalism ensued, and the statuary was toppled by rival groups.

Rats!

An alternative view to the ecocide hypothesis was recently proposed in a book by Terry Hunt and Carl Lipo called The Statues that Walked. The authors radiocarbon-dated the arrival of people to the island at A.D. 1200. They point to other studies that show the disappearance of most of the island's wood by 1650, after which people began to burn grass, ferns, and other plant material for fuel.

> Hunt and Lipo's explanation for the environmental change was altogether different than Diamond's. In colonizing islands, Polynesians often

Chilean wine palms may have been similar to palms that originally grew on Rapa Nui. Flickr, Creative Commons. Photo: Natalie Tapson

brought dogs, pigs, chickens, and rats with them to use as a food source. To understand their argument, it is necessary to look at another Pacific Island, Hawai'i. Polynesian researcher, Steve Athens, studied the deforestation of Hawai'i which lost most of its native forest by 1500. Lakebed pollen cores 26 feet thick showed that the decline began around 1200 in Hawaii, soon after people landed on its shores. Yet, deforestation appeared to precede human-caused fires. In addition, many native birds had begun to go extinct. In a total plot twist, Athens, a former UNM graduate student, blamed the Polynesian rats for the destruction. Rats, who had traveled to the island with humans, had occupied parts of the island that humans had not yet occupied. The sediment cores were also full of rat bones. At the same time rat remains showed up in the core sediments, there was also evidence for forest decline and the birds became less prevalent. Essentially, the rat was seen at the scene of the crime, but not humans.

Ecologists have shown that rats can devastate an environment, voraciously feeding on nuts such that new trees do not regenerate and leaving little for bird populations. On Lord Howe Island, a natural UNESCO Cultural Landscape due to its unique plant and animal communities were infested with black rats when a steamship ran off-course on the island. The rats have been implicated in the loss of birds, invertebrates, and plants. Hunt and Lipo argue that a similar "plague of rats" contributed to the decline and ultimate demise of the Rapa Nui

forests.

As with the Hawaii sediments cores, Hunt and Lipo found an abundance of rat bones in their excavations of cultural remains. Documents of the Cook expedition of 1774 also indicated that Rapanui ate rats. Hunt and Lipo concede that palms were also cleared and burned for agricultural purposes, but this, they argue, was not what devastated the landscape, ruining the island paradise. Rather, they argue that soils on Rapa Nui were always poor and that the Polynesian colonists made the most out of the resources they had. The story of Rapa Nui, they claim, is not one of human ecocide but of persistence and resilience in which the islanders employed innovative approaches and a willingness to invest massive amounts of labor. Hunt and Lipo write, “Rather than a case of abject failure, Rapa Nui is an unlikely story of success.”

It is easy to draw moral conclusions from the archaeological record. On the one hand, Rapa Nui’s environmental decline can be used as a cautionary tale about extravagant use of sparse resources. Or the record can be used to celebrate human ingenuity in the face of a difficult environmental situation. Whatever the truth, archaeologists need to recognize how these potential biases might color one’s approach to the past. We have to at least be aware of how our own motivation and current environmental concerns might affect our thinking.

Farming Ingenuity

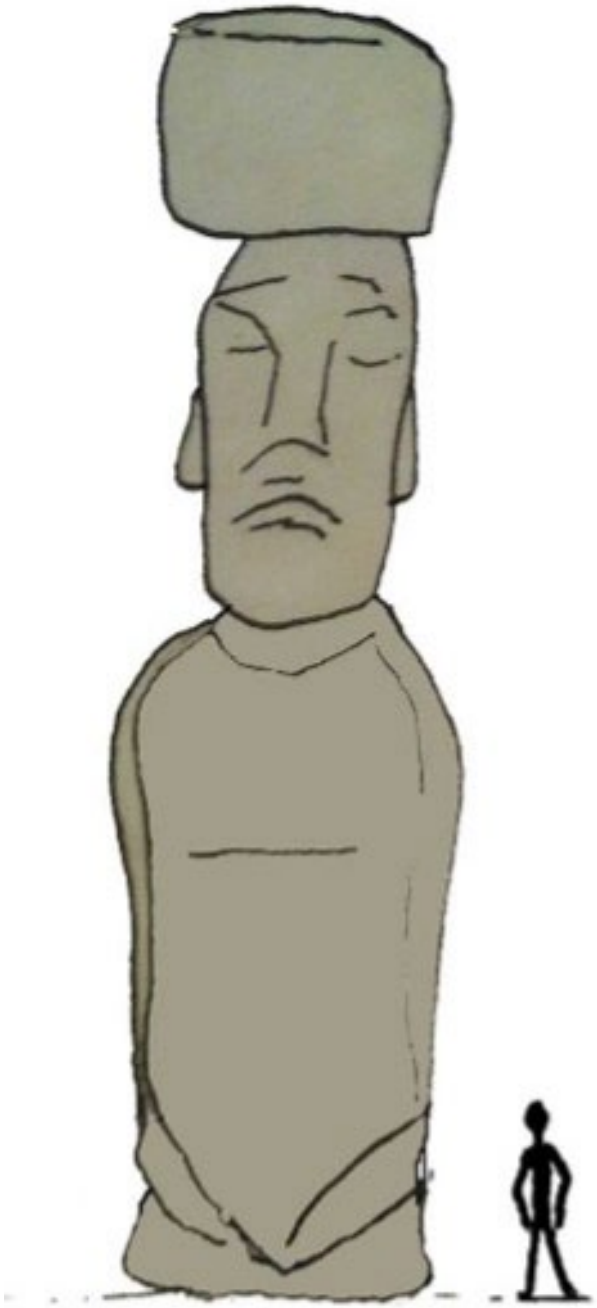
Rapa Nui is a wonder for its monuments, for the fact the people found it at all, and that people managed to grow anything. The soils are notoriously poor. The Rapanui had ingenious farming techniques. Small circular enclosures with high walls made of a rock called manavai protected the fragile plants from the elements. The soils inside the features were much richer than those outside of them, indicating they were enriched with organics. These features have been located, using satellite images and ground-truthing, walking the landscape to verify features found on the satellite images. More than 2,500 of these features were found within a mile of the coast of the island. In other areas of the island, other techniques were used to increase the productivity of the soil. Graduate

student Joan Wozniak surveyed, and walked the landscape systematically, other parts of the island, finding nothing but a field of rocks. Excavations, however, revealed stone tools, pits, and broken rock. She also noticed modern farmers on Rapa Nui placing rocks around their plants. Based on these findings she suggested that the inhabitants of Easter Island practiced "lithic mulching", or placing rocks around a plant to improve the temperature and nutrient leaching from the rocks. Where earlier explorers and researchers had seen a barren rocky landscape, this keen-eyed student had seen an ingenious agricultural trick that got the most of the soil conditions. Given the vast stretches of rock on the island, the people of Rapa Nui were busy moving rocks, and a lot of them.

The Moai

Some moai are positioned on stone "stands" called ahu facing inward to the island. Some, but not all had red pukao resting on their heads. These additions might have represented hair or headdresses of authority. Indeed, islanders were very interested in European-style hats and many were swiped off the heads of sailors never to be seen again. An early account suggests these moai were important parts of ancestor veneration rituals. We learned in the last chapter that ancestor veneration is often important to farming societies.

Dutch explorer Roggeveen related, "What form of worship of these people comprises we were not to gather any full knowledge of, owing to the shortness of our stay among them. We noticed only that they kindle a fire in front of certain remarkably tall stone figures they set up; and after squatting on their heels with heads bowed, they bring the palms of their hands together and alternatively raise and lower them." (p. 118). Many ahu have canoe-



The relative size of the largest standing moai is called Paro. Sue Ruth

shaped bases, and the front ramp of the ahu is covered with poro or smooth sea boulders. In front of the ahu complex is a plaza, perhaps an area for ceremonies. Crematoria, an area for human cremations, are located on the seaward side of the ahu. Installing the ancestral figures at the edge of land and sea is consistent with the Polynesian concept that after death the soul travels westward to the sea to the point of origin.

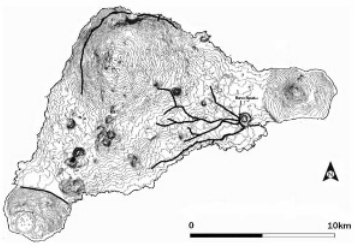
Other moai are not housed on ahu, but rather are located in and around the quarry Rano Raraku. There, hundreds of volcanic moai are located. The volcano is comprised of distinct bays that have their own individual style of quarrying. The Rapanui used harder basalt axes called Toki (check them out here) to carve the relatively soft tuff, and hundreds of them appear in the quarry. Ax marks can be seen on the quarry walls. Erich Von Daniken, who thought the Maya king Lord Pascal was piloting a spacecraft (we'll discuss this

later), did not think it possible that the Rapanui could carve the moai without modern equipment. And yet the tools and evidence are everywhere. In Polynesia's cosmology (world-view) volcanoes are important conduits between this world and the interior world. As such, the volcanic quarries may have had symbolic meaning in addition to supplying suitable stone for working into moai and pukao as well as freshwater. On other Polynesian islands, volcanoes are thought to be both living and self-replenishing. Eye sockets carved into quarry bays at Rapa Nui suggest the possibility that these areas were conceived of as living entities. The relative size of the largest standing moai is called Paro.

Quarry at Ranu Raraku. Flickr. Creative Commons. Photo: Stefan Krasowski

Partially completed moai reveal the stages of carving. The largest moai ever carved, El Gigante (65 feet, ca. 260 tons), lies at Ranu Raraku unfinished. The carvers began the giant sculptures in both vertically and horizontally oriented stone. Faces appear out of the rock with the bodies unfinished, indicating that

the carvers started with the facial features first then completed the head, then the body. Stone was chipped away from all but a single keel attaching it to the rock face. Some of the moai at the quarry are partially buried. One school of thought claims that the moai, once extricated from the quarry, were then slid down to the base of the volcano into trenches where they could be worked further. Others think they were installed there permanently. These “heads” are not in fact just heads. These quarry moai, like the ones installed on the coastal ahu, have full bodies
that appear to have been buried naturally. Recent excavations by Joann Van Tilburg show that carvings still remain on these moai, preserved in the sediment. Though some think that moai were installed permanently on the slopes of the quarry, others believe that when completed, all moai were intended to make their journey along roads to the sea to be installed on an ahu facing landward. There on the ahu, the eye sockets would be added along with the coral irises, obsidian or red volcanic pupils, and back carvings that might have represented tattoos.



The ancient road system on Rapa Nui. From Richards et al. 2011:198

The ahu are stone platforms that support the installed coastal moai. These were made by building the interior foundation and filling it with rubble. In some cases, as at Ahu Vinapu, massive blocks of basalt were cut to fit snugly together. This tightly fitting masonry is sometimes cited as evidence of South American origin, being similar to South American masonry. Unlike South American masonry, however, the interior stones are not snugly fit.

Moai was abandoned in progress and named El Gigante, about 260 tons. Flickr, Creative Commons. Photo: Bradley Stabler

The contrast between the stark environment of Rapa Nui and the colossal

sculptures has led people to suppose that the indigenous populations could not have managed the feat. Wilds ideas, like moai being catapulted out of volcanoes, have been offered up instead. Yet, moai roads have been reported since Cook's expedition and documented in more detail by Katherine Routledge in the early 1900s. Remnants of these moai roads have been recently recorded using detailed satellite imagery and ground truthing. Of course, parts of the road system have been obliterated by modern use or converted into horse trails and modern roads. Yet, the roads extend out of known quarries like Rana Raraku and lead down to the coast. The roads were intentionally raised in places and depressed in others to level the slope.

Moai on the Move

Two general competing ideas have been put forth to explain how the moai were moved from their quarries to the seaside: horizontally and vertically. Experimentation shows that with A-frame sleds, it is possible to slide moai with about 40 or so people. Getting the moai to its ahu in a horizontal position requires the use of levered sleds. In short, it can be done. Thor Heyerdahl tested the horizontal hypothesis through experimentation in the 1950s. Rapanui insist that the moai "walked" to their current positions. In 1986, Czech engineer Pavel Pavel seriously considered the "walking moai" idea and concocted a 12-ton cement moai with ropes attached, and with the help of 16 men, managed to move the moai, tilting it back and forth in the way one might move a refrigerator. Heyerdahl invited Pavel to come to Easter Island to try his idea out on real moai, which he did. It worked. The moai were walking, just like the natives said they could. As it turned out the natives even had a word, neke neke, for the motion the statues took while walking, which translates into "walking without legs".

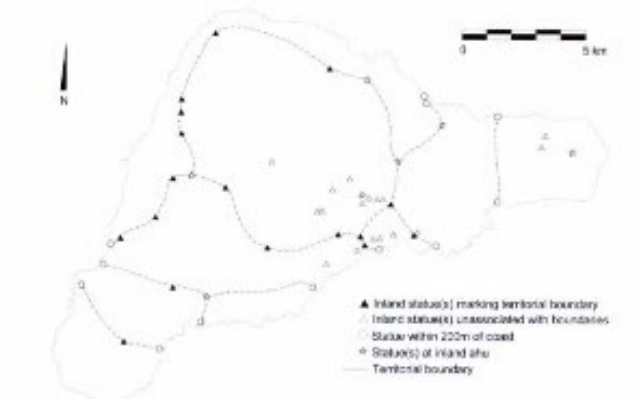
Indigenous archaeologist Sergio Rapu pointed out that the moai of the quarries are shaped differently than the moai installed on the seaside ahu. They were wide at the base with big bellies with a low center of mass, as well as angled to lean slightly forward. The moai on the ahu was considerably pared down. Rapu proposed that the moai were "engineered to move". (i, p. 87) following Rapu's

insight, Hunt and Lipo conducted a similar archaeological experiment to Pavel's with some adjustments, also showing that the moai could move vertically. Hunt and Lipo are of the school that the moai were all intended to be installed on ahu, some of which made it, some of which did not. They point out that more than 50 moai were abandoned along the roadway, facing away from the quarry and aligned with the direction of the road. The breakage of moai also suggested to them that they broke during transport with some force. When the moai were moving upslope, they tended to be on their back, and downslope on their fronts. Moreover, they find wear on the base of the moai that they argue is consistent with vertical movement. Finally, they suggest that no wooden apparatus was needed, and indeed palm would have been ineffective, being crushed by the weight of the moai.

Moai as Boundary Markers

Others reject the idea that moai were abandoned along roadways on their way to the ahu, but rather served to mark territorial boundaries or were stationed along roads for symbolic purposes. The coastal moais installed on ahu are thought to represent the coastal boundaries of territories. Early ethnography indicated the existence of territorial boundaries based on the lineages of the original founder of the island Hotu Matua. Using Geographic Information Systems (GIS), a mapping program, a group of researchers mapped out the interior moai and overlaid these on top of the early recorded territorial boundaries. GIS has become an enormously important technology in archaeology, allowing archaeologists to compare all kinds of datasets—soils, terrain, roads—with the material record. The authors found that moai not associated with roads corresponded well with ethnographic (historically recorded) territorial boundaries. Large stones that appear near these fallen moai may have served as platforms. Also, erosional patterns suggest that these may have stood for some time before falling. Some scholars have suggested the moai may have been used as a kind of competitive display between territories. The moai may have embodied mana, the pan-Polynesian idea in which nobility contains a powerful life force. The mana emanating from the statues could have served to protect the village and territory, perhaps not so different from

Neolithic ancestor veneration in the Near East. Today, there is still a royal lineage on Rapa Nui, the Miru, who are the descendants of the island's founder Hotu Matu'a.



Potential lineage territories marked by moai. Shepardson 2005: 174

Island Life

As we will see, like the Maya temples and Chaco Canyon great houses, the early research emphasis of Easter Island was the monuments—the moai. Less was known about how people lived their daily lives. Early accounts indicate that houses were mainly for sleeping and that many activities took place outside the house. Flenley and Bahn write that the elite houses were closer to the coast and more humble ones further inland. They argue that hare paenga, canoe-shaped houses with an outlined basalt stone foundation were high-status dwellings, as was thought by early Spanish explorers. Hare paenga are found close to platforms. Hunt and Lipo argue that these were merely communal houses and find no evidence for social rank. Near houses are ovens called umu pae, a stone-lined earth oven. Manavai are garden enclosures designed to protect gardens from the wind as well as provide additional shade and water. Hare moa (see image) were apparently ossuaries, places to house human bone, but were later used as stone chicken houses. Skulls from the royal clan were thought to increase egg yields. Food remains include dolphin bone, palm nuts, squash, fish, shellfish, chicken, and rats. Since Rapa Nui has no extensive reef, fishing seems to have been less important compared to other Polynesian islands. Human leg bone fish hooks are known. Flenley and Bahn suggest that the

northwest portion of the island specialized in fishing, which was a high-status food, while the southeast was mainly dedicated to cultivation.

Hare paenga, boat-shaped house. Flickr, Creative Commons. Photo: Josie.

Egg Dash

At Orongo at the southwestern tip of the island, there was a ceremony practiced in historical times. Young male candidates were nominated by warlords from different tribes. Taking place in September, the object was for the young men to travel from the 1,000- foot sheer cliff off the Volcano Rano Kau into the ocean and swim through shark-infested water on reeds, to the islet Motu Nui. There, each man would have to find the brown-speckled egg of the sooty tern and carry it back to his warlord host in his headband. The warlord then became the new sacred birdman, Makemake's (god) representative on Earth. The birdman's group had access to the eggs on the island or in later years other privileges. By 1878, the ceremony became a test of skill and had no ritual or political meaning. Numerous birdman petroglyphs (473 on the entire island) occur in the area of

Orongo along with ceremonial dwellings. One of these contained an unusual basalt moai, partially buried. The moai, Hoa Hakanana'i (Stolen Friend) was later taken to the British Museum (and later laser scanned for a 3D model). Ethnologist Katherine Routledge recorded a list of 86 sacred birdmen.

Cliff at Orongo overlooking Motu Nui and Motu It. Flickr, Creative Commons. Photo: Eduardo Llanquileo

Manavai. Flickr. Creative Commons. Photo: Sheep”R”US

Disease

The island was contacted several times beginning in 1722 by the Dutch, then by the Spanish in 1770, Cook in 1774, the French in 1786. Rapanui were captivated with the boats, metal, and for some reason, the hats, of the Europeans. They measured the boats using string devices, impressed it seemed with the length of the wooden planks used. In some cases, the Europeans used muskets against the Rapanui who were prone to swiping cloth and hats from the Europeans. As with the Inca, the Rapa Nui had no immunity to Old World zoonotic diseases. Recall that zoonotic diseases are ones that first began in animals, then “jumped species” to humans. People in the Old World had a greater tolerance for the disease, while the newly contacted people had none, with devastating effects. Since Native Americans, Australians, and Polynesians had few domesticated animals, the devastation by zoonotic disease was a one-way phenomenon.

Venereal disease likely also took hold on the island, as there are explicit accounts of sexual encounters between European men and Rapanui women. While early explorers indicated thousands of people on the island, Cook's expedition reported 600–700 people. Following the Cook expedition, whalers came to the island sporadically, sometimes kidnapping both men and women, creating hostility between the islanders and foreign ships. Later, Peruvians came to the island and indentured more than 1,000 Rapanui to work in guano (bird feces) mines and other forms of servitude. By 1877 the island had just 110 people left. In 1896 most of the island was purchased by a Chilean merchant who set up a sheep farm, further devastating the island, causing the extinction of native plants and erosion.

With the arrival of Thor Heyerdahl in 1955, things began to change for the island, as it became a tourist destination because of the moai, helping the economy. Eventually, in 1966, the islanders gained full Chilean citizenship with an indigenous governor who is also an archaeologist, Sergio Rapu. Yet, the tourist trade is causing its own problems, as it tries to maintain an infrastructure to support it. In 2012, the island was visited by about 70,000 tourists. Landfills, sewage, groceries have all become a problem with the renewed interest in the island. The island is heavily reliant on supplies from the mainland.

Courtesy of www.AirPano.com

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Chapter 8: The Southwest →

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Chapter 8: The Southwest

The Southwest

Chaco Canyon Door by Sue Ruth

As related in oral histories, the Puebloan people did not disappear—they simply moved, sometimes covering hundreds of kilometers during their migrations. And, for many Pueblo people today, the places they left today are considered sacred homelands, their points of origin.

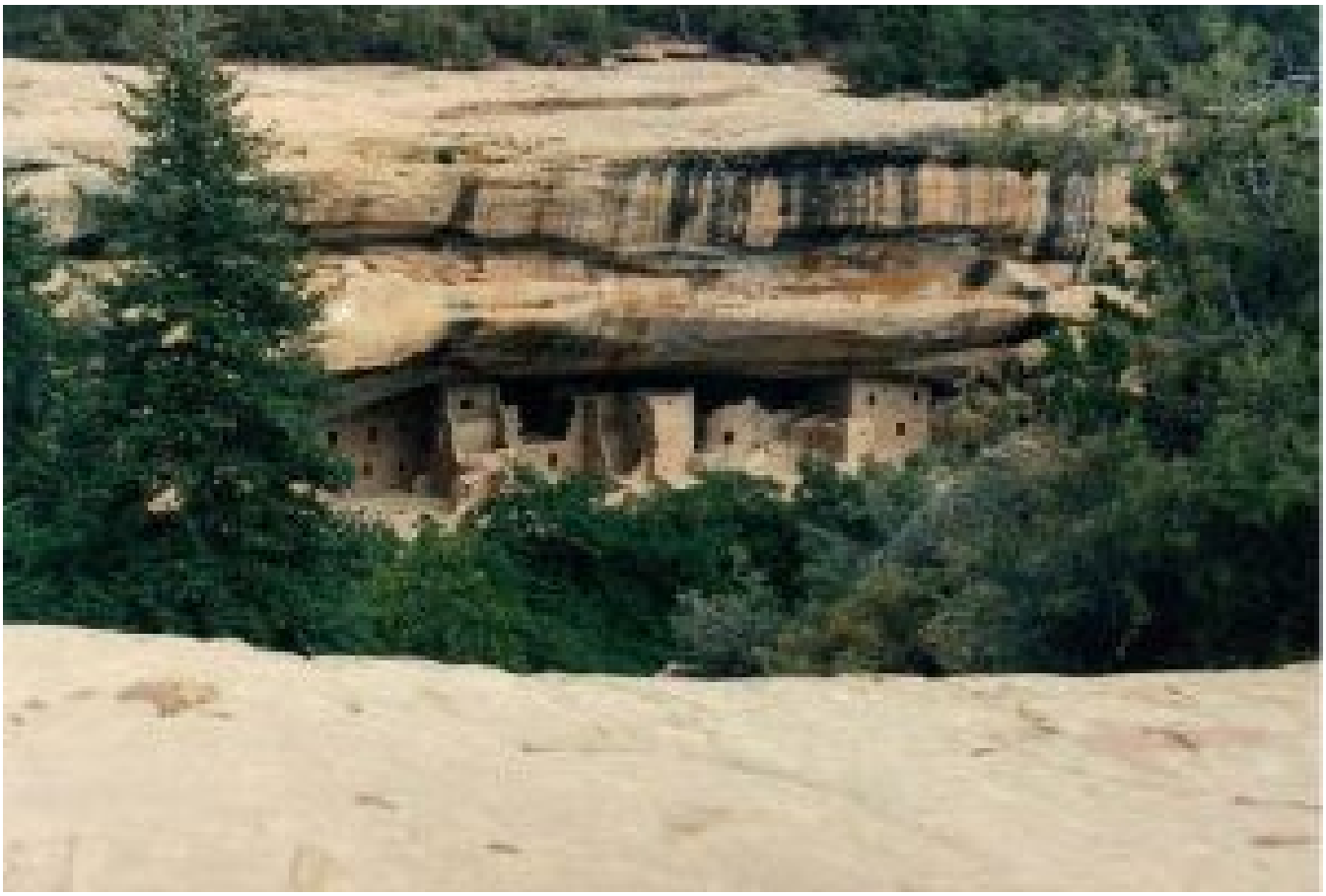
—John Kantner, Ancient Puebloan Southwest, p. 195

When people think of the American Southwest, images of pottery, maize, and pueblos come to mind. But if we look at the archaeological record, we see that these features so characteristic of the Southwest today, weren't always there. The Paleoindian Period (ca. 13,500—8,000 B.P.) which we discussed in Chapter 4 is the earliest known occupation of the Southwest. The time period following the Paleoindian period is called the Archaic period. The term "Archaic" is equivalent to the Mesolithic in Europe (Chapter 6). As with the Mesolithic, the Archaic does not represent a single ethnic or linguistic group, but rather, it refers to a subsistence strategy and architectural style. The Archaic period in the Southwest (ca. 8,000 .P.–1,500 B.P.) was characterized by semi-mobile/semi-sedentary hunter-gatherers. Late in the Archaic, people began incorporating maize into their diets and practicing a mixture of farming and foraging (see Chapter 5).

From ca. 200 BC to AD 700, people in the Southwest were living in farming villages in structures called pithouses, which are houses partially excavated into the ground. By this time, people were growing maize, squash, and beans, and likely moved between the growing seasons in order to hunt and gather foods, since crops could not be grown year-round. Ceramics appear in the archaeological record in the Southwest around AD 200 and become common around AD 500.

Three Traditions

After AD 700, three southwestern archaeological traditions that relied on agriculture emerged. These are called Hohokam, Mogollon and Ancestral Pueblo (formerly called Anasazi). These groupings refer to similarities in material culture, notably pottery, architecture, and burial customs, and not necessarily to ethnic identities. Considerable variation existed within each of these traditions and their boundaries were in no way fixed. All agriculturalists of the Southwest relied on maize as the basis of their subsistence system. As at Neolithic sites in the Near East, there is an abundance of ground stone in the Southwest for grinding maize into flour, testifying to the reliance on maize as a staple crop. These tools are called manos (the smaller stone held in the hand) and metates(the basin stone) and become larger and increasingly more elaborate as reliance on maize intensified. As you can see from the map, the term Southwest is not very accurate since it comprises a large portion of Northwest Mexico as well as the American Southwest. While we tend to think in terms of modern nation-borders, there was no boundary between Mexico and the United States in prehistory. For this reason, archaeologist Randall McGuire refers to the region as the Southwest-Northwest. In this chapter, we will focus on the agricultural periods, and three key sites/regions: Snaketown (Hohokam); Chaco Canyon (Ancestral Pueblo); and the Mimbres region (Mogollon).



Spruce Tree House, Mesa Verde. Sue Ruth

The Hohokam

The Hohokam culture area was located in the Sonoran Desert of southern Arizona, Sonora, and Chihuahua, but centered in the Salt-Gila River Valley in Arizona. The name comes from the indigenous O'odham inhabitants of the region and translates as "all used up" (*huhugam*). The descendants of the Hohokam are likely the O'odham, and the ancient Hohokam figure into O'odham oral histories (Donald Bahr in Fish and Fish 2007:123).

Many Hohokam sites are now under modern-day Phoenix. The Hohokam tradition is characterized by red-on-buff pottery, adobe architecture, cremation burials, and irrigation systems. This long-lived tradition (AD-450–1450) has been dubbed by archaeologists Suzanne and Paul Fish the "Hohokam Millennium" (AD-450–1450). Changes in material culture and architecture

occurred during this long span of time, and not every Hohokam site had every feature of Hohokam society.

The Hohokam hunted rabbits and deer and cultivated the Southwestern trio of corn, beans, and squash, which were originally domesticated in Mexico. Corn, beans and squash are sometimes called the Southwestern trio or Three Sisters because they provide benefits to each other. Maize acts as a trellis for the beans to grow on. Beans were a critical component of this trio. Nitrogen is necessary for plant life, and modern fertilizers contain nitrogen that plants can use (Chapter 6, Chemistry in Context). Not all forms of nitrogen can be used by plants. This is where beans come in. The bacteria on the roots of the bean "fix" nitrogen from the atmosphere and convert it to a form that plants can use such as ammonia (NH_4^+) or the ammonium ion (No_3^-). Thus beans helped to keep the soil fertile for other plants. The bacteria on the beans are in turn fed by sugars from the corn. Finally, the squash provides protection from the sun with its broad leaves. The Hohokam also grew agave and cotton. Cotton takes a lot of water to grow and the Hohokam may have traded cotton textiles around the Southwest (Doyel 1979). Remnants of cotton clothing have even been found, including a child's cotton poncho (Crown, in Fish and Fish 2009:25). Children are also visible in the Hohokam record through pottery. Dr. Patty Crown of UNM has argued that paintings on Hohokam and other Southwest pottery bear the mark of inexperienced potters, likely children.

Southwest culture areas. By derivative work: Arkyan Anasazi.svg: Modifié par historicair 00:26, 9 April 2006 (UTC) (Anasazi.svg) [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons

The Hohokam region received so little precipitation, less than is necessary to grow maize, that maize agriculture without canal irrigation would have been impossible. To solve this problem, the Hohokam engineered the largest canal system north of Mexico. Hohokam canals were major undertakings. Some of the canals are up to 12.5 mi. (20 km) in length and can still, be seen today. The largest Hohokam canals were massive—75 feet wide at their widest point and irrigated up to 70,000 acres! These canals required skilled engineering as well as labor to produce and maintain. The canal could not be too steep as the rapid flow would erode the channel, while too shallow of a grade would cause build-up. The grade was about 1 or 2 feet per mile, and evidence of water control gates has also been found (Howard). Archaeologists have used engineering equations to estimate the amount of soil removed to build the canal, the labor to build the canals, the water flowing through the channel, the crops it could have watered, and the number of people it could have supported (Howard). The largest Hohokam villages were populated with around 1,000 or 2,000 people. Today, the Phoenix Basin is one of the fastest-growing metropolitan areas in the country. Groundwater has lowered more than 500 feet, and many of Arizona's rivers, like the Gila, are dry or nearly dry. As a consequence of Arizona's burgeoning population and water problems, a massive canal system diverts water from Colorado to major cities in Arizona. Since the construction of Glen Canyon Dam, the Colorado River, the river that carved out the Grand Canyon, no longer flows to the sea.

The heyday of the Hohokam was between AD 700 and 1150, called the Pre-classic period. Snaketown, located in the Phoenix Basin at the confluence of the Gila and Salt rivers some thirty miles southeast of Phoenix, is the largest and best-known Hohokam site. Snaketown (AD 1–AD 1150) reached its height in the mid-1000s and might have served as a political-ritual center for smaller outlying settlements. People lived in wattle and daub structures built in shallow pits (a shallow pithouse) and in distinct clusters around a courtyard. Wattle and daub refer to a stick structure covered with clay or soil. These houses may have looked something like O'odham houses (see image). While we tend to think of houses today as something that we spend most of our time in, the Hohokam

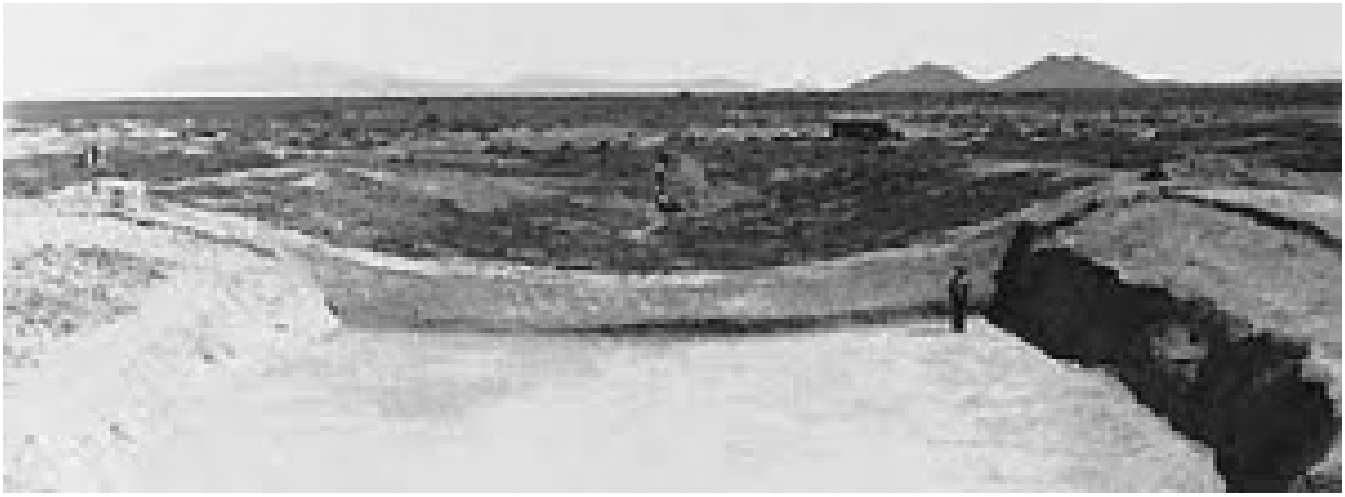
likely did much of their daily activity in the courtyards. Unlike the Ancestral Pueblo structures, Hohokam structures tend not to be highly visible on the surface.

From about AD 550-1100, the Hohokam used a characteristic red-on-buff (light brown) pottery with both geometric and figurative designs. This pottery was shaped by paddling the exterior with a piece of wood, leaving characteristics flattened areas. The Hohokam also had pyrite mirrors, mosaics, birds, and copper bells from western Mexico (Doyel 1979). The Hohokam also made clay figurines of humans and animals. The human figurines show headbands, jewelry, and sometimes ballgame paraphernalia. Decorative bone hairpins have also been uncovered depicting a bird eating a snake (also depicted on Mexico's flag!). Unlike the Mogollon and Ancestral Pueblos, the Hohokam cremated their dead and placed them in cemeteries. Schist (a type of metamorphic stone) pallets are associated with Hohokam cremations. The figurines coupled with cremations located beneath plazas suggest to research archaeologist Henry Wallace that ancestor veneration was part of the Hohokam belief system (Fish and Fish 2007:19).

Hohokam figurines. http://www.maximilien-bruggmann.ch/PhotoSearchDetail/?id=603&name=PUE-165A

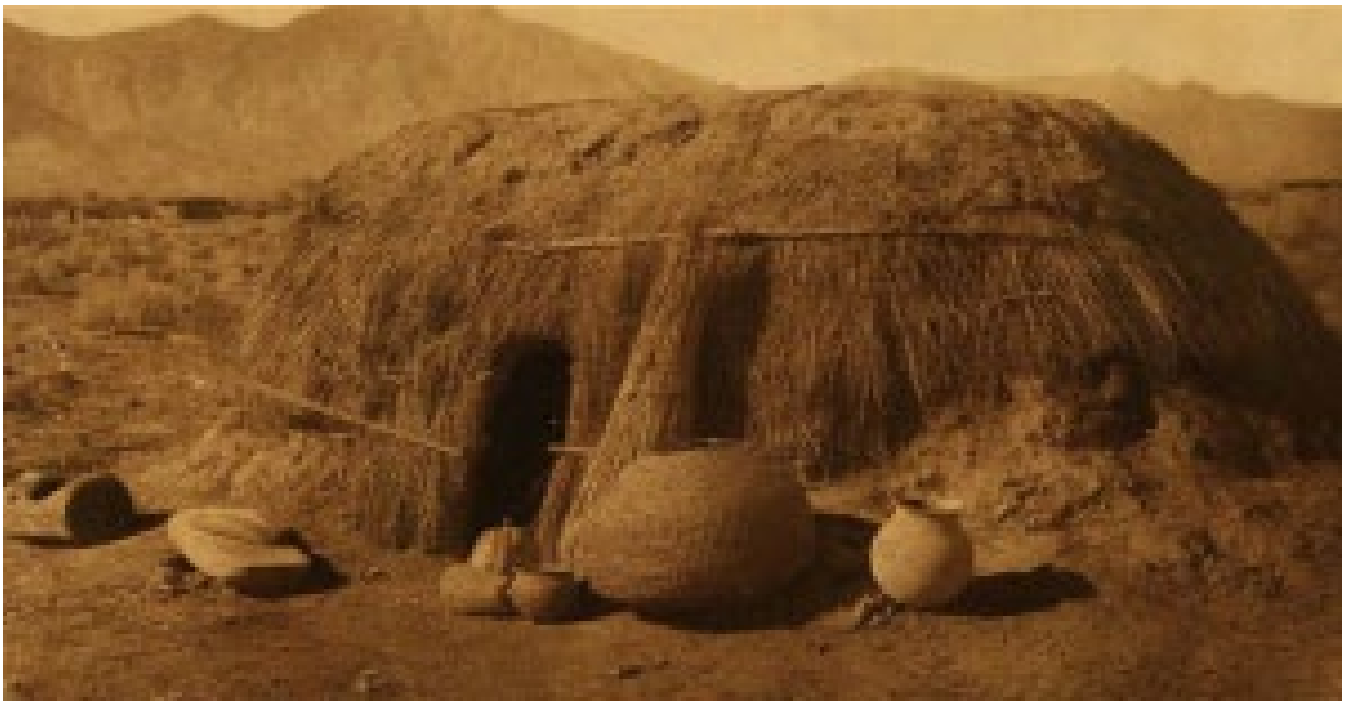
Ball Courts

More than 238 Hohokam ball courts have been found (Abbott). Snaketown also contains two ball courts—one being the largest in the Hohokam region. The ball courts reached their greatest extent in the 1000s. Hohokam ballcourts were oval-shaped and defined by curved earthen berms. The Hohokam likely played a version of the Mesoamerican ballgame, a ritualized game associated with fertility, sacrifice, and militarism. The Hohokam were likely playing the "commoner game" version of the ball game, which involved keeping a ball in the air, rather than knocking it through a circular disk (McGuire). Depictions of this game are known from west Mexico. Rubber balls made from the local plant (Guayule) were also discovered in dry caves in the Phoenix area. As with the game of chunkey at Cahokia, the game was likely tied to ritual, and the Hohokam may have hosted a ballgame between villages, and the game may have functioned to integrate Hohokam villages. It is thought that some type of social hierarchy in the form of chiefs would have been necessary to organize the construction and management of the canals, ball courts, and platform mounds (Doyel 1979). And yet, the ball courts were open structures and appear to have served the Hohokam community as opposed to a small cadre of elites.



The excavated ball court at Snaketown, Arizona. public domain.

Wattle and daub. Flickr, Creative Commons. By Joan.



Pima House.

Snaketown also had low platform mounds made of clean desert sediment, which are found on other Hohokam sites as well. The mounds were built up incrementally and increased in size over time. Their function, however, is unclear but is likely ritual in nature. One mound, Mound 16 at Snaketown, was palisaded. In at least one case, a parrot was buried inside the mound. These mounds may have been inspired by those to the south in northern Mexico. The Hohokam were legendary for their use of shells. If Catalhoyukians were “plaster freaks”, the Hohokam can be considered “shell freaks”. Most notable are the Glycymeris “armlets”, which came from the Gulf of California in western Mexico. Craft specialization means that people make more goods than they use for their own families. Archaeologist Barbara Mills found that Hokokam households located on platform mound compounds made and used more shell items than households further away from the platform mounds, suggesting that elite households were directly involved in the production and use of craft items. In some cases, whole villages specialized in the production of goods. Los Colinas, a large Hohokam site located at the end of the canal system, appears to have been a major producer of pottery for an entire canal system. This is an

example of village-level specialization, in which a village produces goods for an entire group of villages.

After AD 1150 Snaketown and other large settlements were largely abandoned and the population shifted to the Salt River Valley. Some people moved from houses in pits to above-ground adobe structures in walled residential compounds that were tightly clustered. The move may have been influenced by an overall climatic downturn that may have led to the abandonment of Chaco Canyon (see next section). Ball courts declined while more and larger platform mounds with 1 to 30 rooms on top of them were erected (Elson, in Fish and Fish 2007: 52). These were made of river cobbles, trash, adobe, and silt (Elson, in Fish and Fish 2007: 51). These ritual features seemed to have functioned differently than the open ball courts, often being inside a walled compound with restricted access. This more limited access compared to the open ball courts suggests a change in ritual and also increasing social differentiation and inequality.

Critical Thinking Question:

After AD 1150, trade and production of palettes along with the characteristic red-on-buff pottery and figurines declined. Around AD 1300 large multi-storied adobe structures called “big houses” like the one at Casa Grande in Arizona were built. During this time, it is thought that social hierarchy, cultivation, and population size increased (Fish and Fish 2007, 9). Large settlements become much larger with between 6,000-10,000 people. After AD 1450, the system of large sites disintegrated, followed by smaller more modest settlements. When Father Kino, a Spanish Jesuit missionary arrived in the region in the 1680s, the people bore little resemblance to the ancient Hohokam.

Ancestral Pueblo

The Ancestral Pueblo (formerly called Anasazi) was located in the Four Corners region of the American Southwest on the Colorado Plateau. They are the best known of the three agricultural traditions in the Southwest because of the spectacular preservation of ruins and artifacts. Perhaps the most famous site in all of New Mexico is Chaco Canyon (ca. AD 850–1150), a World Heritage Site. Chaco Canyon is located in San Juan Basin in northwestern New Mexico. The canyon itself is 9 miles long and has little permanent water and few trees grow in this environment. Chaco Canyon contains 14 great houses—large masonry complexes of several hundred rooms standing as high as four stories. It is estimated that a single room at Pueblo Bonito took as much as 44 tons of sandstone to be cut from the cliffs (Plog 1997:102). The great houses appear to have been built according to a preconceived plan. Each great house also had at least one great kiva—a large semi-subterranean (partially underground) ceremonial room with specialized features such as floor vaults, sipapu, masonry bench, raised firebox, deflector, and attached antechamber—which played a central ceremonial role in community activities, along with several smaller kivas. The sipapu is a hole that represented the point of emergence from the underworld. Great kivas were between 30 and 60 feet in diameter and could be up to six feet deep (Plog 1997: 105).

Large great houses are located mainly on the north side of the canyon. Smaller residential sites, more typical of earlier Ancestral Puebloan pueblos, are located on the south side of the canyon but occupied at the same time as the Great Houses. Pueblo Bonito is the largest of the great houses in Chaco Canyon with 650 rooms. It was built in major, planned construction episodes. Estimates of the population at the site range from a few hundred to a few thousand. Some suggest building activity at Chaco was related to the supernova of 1054 (SN 1054), the residual of which is the crab nebula (Plog 1997:100). A great house Pueblo Peñasco Blanco, there is a nearby pictograph (painted rock art) of a waning crescent moon and a starburst image, which may represent the supernova. Chaco Canyon is the source of much debate. It is not clear whether the site was residential, with full-time inhabitants, or purely ritual in nature. Few hearths were found in any of the rooms, suggesting little residential activity, but top floors had collapsed and in modern Pueblos, the habitation

rooms with hearths are found on upper levels. So, the evidence for habitation may not have preserved the ravages of time.

Chaco Order

The great houses at Chaco are not randomly built. Some have looked at Chacoan architecture and the use of space and found commonalities with modern pueblos. Of course, not all pueblos are exactly alike in their cosmology (world order), but some general trends are common. Fritz noticed that most great houses were symmetrical east to west. This may reflect the idea of duality so common in modern Rio Grande Pueblo cosmology today. The upper world and under are mirror images of each other, the sun rising in the east and setting in the west in the upper world, the reverse in the underworld. Humans first emerged from the underworld into the upper through a hole in the north. Solstices and equinoxes are an important way to divide up the calendar year, and people may be divided into two groups each responsible for different ceremonies. At Chaco, most of the great houses and circular great kivas are in the north, paralleling the pueblo oral tradition of emergence. The great kivas may be a metaphor for the original point of emergence. There is some suggestion of social power at the site. Room number 33 at Pueblo Bonito contained 14 people. Two of these were buried beneath a wooden floor with hundreds of grave offerings: thousands of turquoise beads, hundreds of turquoise pendants, 40 shell bracelets, a shell trumpet, and a cylinder-shaped basket covered with turquoise that was also filled with turquoise and shell beads. In addition to the 12 people above the wooden floor were turquoise beads and pendants along with shell bracelets, cylinder vessels, carved sticks, and large wooden flutes. “Other individuals buried in nearby rooms were laid to rest on a mat bulrushes and wrapped in feather-cloth robes and cotton fabrics” (Plog 1997:109). A total of 375 crooked staff were found in Room 32 at Pueblo Bonito. Shearin reported that crooked sticks were used by Pueblos as symbols of authority and power. The individuals were 2 inches taller than the average Chacoans with less evidence of anemia, suggesting better nutrition and access to food than the average Chacoan at smaller sites. Deer and antelope bones are also more common at the great houses than at the smaller sites (Plog 1997:109).

Additionally, inside some rooms at Pueblo Bonito and other Chaco great houses were found unusual and rare items such as intricately carved wooden objects, copper bells from Mexico, shell trumpets from the Gulf of California, effigy pottery shaped like humans or animals, turquoise, macaw remains, cylinder jars, and parts of headdresses and altars. Great Houses also occur outside of Chaco; these are called "Chacoan outliers." The Canyon imported a huge amount of pottery and other commodities from outlying areas. The exact type of relationship between Chaco and these outlying communities is not fully understood.

Chaco Chocolate

Work by Patty Crown on Chaco ceramics is revealing that Chaco had clear ties to Mesoamerica in the form of liquid chocolate which was an item used only by elites. She has found chemical markers for theobromine, an alkaloid in chocolate inside of pottery fragments from cylinder vessels at Pueblo Bonito. Crown currently holds field schools at Chaco Canyon, in historically excavated portions of the site only. New excavations at Chaco
are not possible as modern Pueblo Nations do not want this sacred site disturbed.

Dendrochronology and Wood

Prior to the 1920s and 30s, before tree-ring dating, Southwest archaeologists had a tough time knowing when things happened. They looked at changes in pottery styles at historically known places like Pecos Pueblo east of Santa Fe to get an idea of how pottery styles change over time. Archaeologists knew there were stylistic changes over time because they could see them in the stratigraphy at Pecos Pueblo. They knew, for example, that black-and-white pottery was earlier than more colorful multi-colored, polychrome, pots. Archaeologists used these sequences of changes in pottery styles to estimate dates for sites across the Southwest. Needless to say, it was a huge job.

Tree-ring dating, or dendrochronology, changed all that. Dendrochronology

uses the annual growth rings on trees as a dating method. Tree rings were obtained from preserved wooden beams found at archaeological sites. The technique was first applied in the Southwest by A.E. Douglass. Each sequence of tree rings is unique in terms of the varying thickness of the rings because of changes in time in rainfall. If we begin with a modern tree-ring sample (some Bristlecone pines have lived to be 5,000 years or more) and match up the ring pattern with successively older wood samples, we can create a sequence of tree rings widths that go farther and farther back in time. Since each ring represents a year of growth, we can count the rings to get the age of the wood. This is called a calendar date, which is simply an actual date of the wood. Once we have an overall master sequence, archaeologists can compare a sample to this master sequence, and get a date. This technique has been used to check the validity of radiocarbon dating. Importantly, inner rings provide older dates than outer rings, because the inner rings are older than the outer rings. This is called the old wood problem. For this reason, archaeologists like to use short-lived plants, seeds, or twigs when radiocarbon dating a wood sample, otherwise the technique might date the earlier growth of the tree and not the time when it was cut and used by people. Today, tree-ring dates go back about 8,000 years. One of the foremost dendrochronologists and wood specialists in the Southwest, Tom Windes, came to my face-to-face archaeology class in the fall of 2013.

Not only can dendrochronology provide a date estimate, but it can reveal the season in which the tree was cut. The light-colored portion of the ring represents the period of growth in spring and dark rings represent dormancy in winter. The outermost ring indicates the season of cutting. If the outermost ring is light, the tree was cut during its season of growth. Most tree harvesting at Chaco took place during the growing season in the spring/early summer. Tree rings also provide information about climate. Droughts can be seen in smaller sequences of rings and times of relatively high rainfall larger rings. Coupled with tree rings, ancient pollen remains found in ancient packrat middens can also be informative about past climate. These packrat middens or nests are solidified and preserved by a substance called amber, crystallized urine in the nest, and reveal the types of pollen that were in the area at the time. Long records of climate change have been created based on these middens. Needless

to say, packrat urine is a very important tool in Southwest archaeology. If you go to the New Mexico Museum of Natural History, you can see a small exhibit on packrat middens.

As wondrous as dendrochronology is, there are some problems. In many cases, wooden beams were reused for generations! This makes dating structures imprecise because house beams might date much earlier than the actual house use. Yet, only about 10 percent of wood at Chaco was recycled—they were wood connoisseurs, or as Ian Hodder might out it, "wood freaks". Their use of wood was sometimes extravagant. Some kivas, for example, had cribbed roofs—basically logs stacked on top of each other in a circular fashion. Also, tree-ring dating requires trees that put on annual rings, many desert plants do not. The dating method, therefore, wasn't so useful for the desert Hohokam cultures. Despite the problems, the sheer number of tree-ring or radiocarbon dates in the Southwest is around half a million, giving Southwest archaeologists a very good sense of when things happened.

The Chaco Wood Project has documented every piece of wood at Chaco, some 9,400 pieces. Wood came from a number of sources including:

- Vigas: primary roof support beams
- Latillas: secondary roof support beams
- Door lintels: beams above doorways

Chaco Canyon is mostly treeless with some pinon and juniper on the mesa with a few pockets of stunted Douglas fir, ponderosa pine on the higher mesa elevations to the east. Dean and Warren (1983) estimate that more than 200,000 trees were used to make Chacoan Great Houses. Chacoans likely met this demand by procuring wood from the Chuska Mts. (80 km west) or the Zuni Mts. (80 km south). Most of the wood imported was Ponderosa pine. Stones axes would have been used to cut down trees, but there is a notable lack of axes in the core sites at Chaco. The Chuska Mountains, however, are reported to be "covered" with stone axes, reminiscent of Ranu Raraku being covered in toki! To reduce the weight of beams, they were likely debarked and cured for a year

or more before being transported to Chaco. Could the Chacoans really have moved those beams all that way? There are numerous accounts of small groups transporting heavy loads at great distances. Nepali porters (sherpas) carry loads of 220 pounds for 59 miles in 15 days. Not only did they move large beams, but the Chacoans were not satisfied with using rough-cut beams, but put a great deal of time and effort into making the beams aesthetically pleasing by carefully shaping their ends. When I show stone axes to my face-to-face course, some students look at them doubtfully. Could these tools really cut down Ponderosa pines? How long would that take? Experimental archaeology suggests that primary beams (vigas) could have been felled in just 30 minutes. Morris cut down a 10-cm Ponderosa pine in 10 minutes. Delimbing, debarking, and end-finishing, however, likely took seven times as long as felling.

Roads and Astronomy

The Hopewell weren't the only ones with ceremonial roads. The Chaco road network connects great houses and extends out from Chaco Canyon to outlying areas and Great Houses. These roads, consisting of hundreds of miles of networks, can be seen in aerial photographs (Plog 1997:110). When barriers were encountered, stairs were carved out of the rock so the roads would continue in a straight line. The exact nature of the roads, however, is not known. They may have been used for ritual purposes, for races, or even transport of wood for distant mountains. Surprisingly, the roads don't appear to have been trading routes. Most of the road segments don't go very far (.6 miles) and few fall even close to paths that would have minimized travel time between communities. So, they don't appear important to trade. The roads, however, tend to connect great kivas, very large kivas, and ceremonial sites. In contrast, almost all roads appear to fit more closely with explanations that see the roads as having served localized religious, integrative, or political functions.

Keeping track of time using the moon and sun has been important to people all over the world for thousands of years. Some of the earliest calendars in Sumeria in the Near East were based on cycles of the moon, and only later cycles of the sun. At the Neolithic site of Stonehenge, the famous circle is oriented to the

rising sun at the summer solstice. The Maya, as we will discuss later, used a number of different systems for tracking time.

The ancient Chacoans were no different. Rising 135 meters above the canyon floor at Chaco Canyon, Fajada Butte contains a spiral petroglyph, an image pecked into rock, which is partially obscured by stone slabs. The 2-3 meter sandstone slabs, probably naturally oriented, cast shadows of the late morning and midday sun to indicate both solstices and equinoxes. During the summer solstice, for example, a dagger of light bisected the spiral. The feature is therefore been named the Sun Dagger. It has been argued that the Sun Dagger was likely more ceremonial than practical. Ancestral Pueblo farmers, like their hunter-gatherer forebears, knew what they were doing; they knew when to sow and when to harvest based on their own observations. For those who think Chaco Canyon was a pilgrimage center, the Sun Dagger was watched over by priests who sent up the signal by smoke as the dagger approached the central position, announcing the commencement of religious ceremonies and festivals. Some controversy exists over the use and accuracy of this feature. The dagger of light appears near the
central spiral a month before the solstice and then barely moves position. Due to the shifting of the slabs, the site has been closed to tourists.

Chaco stairway. National Park Service, public domain.

Fajada Butte, Chaco Canyon, New Mexico. Photo: Sue Ruth

What can we do about these delicate sites being “loved to death” as one past student put it, while still allowing people to connect with the past? One thing that people have tried is 360-tours or virtual tours. No, it’s not the same as being there, but it allows people to see what the sites are like and enjoy and appreciate them from afar. Another way is to simulate how they functioned. If you go to the New Mexico Museum of Natural History, in Albuquerque, there is an interactive display that shows you how the Sun Dagger works. Also, near CNM’s Rio Rancho campus, CNM instructor Jaymes Dudding built “Chaco Rising” inspired by the Sun Dagger. What is Chaco? Alternative Views Chaco remains a mysterious place. Even though archaeologists know about particulars—what was in the pot, how much labor was involved, when was it built—there is little consensus about the larger picture about what kind of site it was. One of the reasons is that excavations at Chaco took place before

standard excavation techniques were in place. The second reason is that there are very few features in the rooms at the great houses. The third early problem was the comparison with modern-day Pueblo architecture. The rooms at the great houses were assumed to be apartment houses where people lived. Tom Windes, at UNM, estimated the population size at Pueblo Bonito to be no more than 12 families at the most at any one time. He did this by counting hearths. Windes' study made it clear that the great houses were not apartment buildings where a large population lived. If not houses, what then? Critical Thinking Question: Why did Tom Windes count hearths instead of just counting up rooms?

Today, some archaeologists think Chaco Canyon was a largely empty ceremonial center and pilgrimage site, where just a few priests resided, who would call people in periodically for feasts. In this scenario, the great houses served to integrate people and no one was much more powerful than anyone else. There is some evidence for integrative feasting in the Canyon. This squares well with modern Pueblos who regularly hold integrative feasts and emphasize community over the individual. The rooms could have served as guest quarters, though they are surprisingly bare. Others think Chaco Great Houses were clan houses. Clans are lineages commonly tied to a distant ancestor, frequently an animal. Others, like Stephen Lekson, think that Chaco great houses really were grandiose houses, associated with politically important families. In this scenario, some had far more power and access to wealth than others. The elaborate burials, exotic goods, and crooked staffs suggest power held in the hands of few. The modern-day Pueblo focus on harmony, cooperation, and community was a reaction, he argues, against the corruption of power that occurred at Chaco. Some oral histories also square with this view. The rooms, in this view, would be used for storage of surplus grain (though storage vessels and evidence of spilled grain have not been found). In other areas, people did use masonry structures as storage facilities and lived in wattle and daub structures. Another idea is that the rooms are built for show, in order to support a massive, conspicuous building. Lekson objects to what he called "up-streaming", or assuming that modern pueblo people were basically just like pueblo people of the past. He argues that not only is this bad archaeology but robs Pueblo people of their history.

Chaco Rising is a modern sculpture inspired by the Sun Dagger. It was built by CNM instructor Jaymes Dudding. Photo: Sue Ruth

Perhaps the most interesting take on Chaco Canyon comes from members of Southwest Native American nations. Rina Swentzell of Santa Clara writes: Even then, my response to the canyon was that some sensibility other than my Pueblo ancestors had worked on the Chaco Great Houses. It was clear that the purpose of these great villages was not to restate their oneness with the earth but to show the power and specialness of humans.

Leigh J. Kuwanwisiwma, Director Hopi Cultural Preservation Office associated Chaco's great houses with Hopi clans. Chaco is prominent in Hopi oral history. He writes:

The appearance of the supernova of 1054…is today represented by the Blue Star

Katsina, who routinely appears in the mixed Katsina dance. According to Hopi oral literature, the "blue star" was the supernatural sign to the Hisatsinom (ancient ones) to end their migrations and begin to converge on certain sites, including Yupköyvi (Chaco).

Dine people (Navajo) have a close relationship with Chaco Canyon. Many Navajos participated in excavations at Chaco in the 1920s (as homesteaders competed for land) and worked to stabilize Chacoan Ruins in the 1930s. Richard Begay of the Navajo Nation related Chaco Canyon to the story of the Gambler. He writes The Gambler "He enslaved the people, and his orders became more severe and exacting." Lekson suggests that this Gambler story represents "kingship" as embodied at Chaco Canyon.

Connections to the South

In the early 1800s, writers of the Southwest, like Albert Gallatin, thought the Southwest was connected to Mesoamerica via the Toltec, a Mesoamerican culture based on maize agriculture. Others thought it was the homeland of the Aztecs the name of a prominent archaeological site in northern New Mexico "Aztec Ruins"). At the time, the Southwest was a part of Mexico. The Mexico-American War of 1849 separated the Southwest from Mexico and opened it to settlers. with the Great Moundbuilder debate, the idea that modern pueblos were relative newcomers and mere copiers of Aztec culture, was used to justify the displacement of Pueblos from their traditional lands. By the 1900s, archaeologists began to cast doubt on the idea that the now American Southwest was the homeland of the Aztecs and began to see it as a separate entity.

Today, the Mexican influence on the Southwest has become undeniable. For example, One hundred and eleven cylindrical jars were found beneath a room at Pueblo Bonito. Using a technique called liquid chromatography, Patty Crown at the University of New Mexico and her colleague Jeffrey Hurst at Hershey Corporation found evidence that Chaco cylinder vessels were used for drinking liquid chocolate. Cacao trees, which produce the seeds from which chocolate is

made, are tropical plant and do not grow anywhere near Chaco Canyon. Chocolate was used as a luxury item for elites only in Mesoamerica, and cylindrical vessels were used for preparing and drinking chocolate among the Classic Maya, which we will discuss in more detail later). Chocolate in some form must have been coming from the south. Exactly where is not yet known.

"Chaco Canyon Ceramics" by Gary Todd is licensed under public domain.

As we will see in the Mimbres section other exotic goods were coming from the south as well. We today have altered our landscape in numerous ways—mining for fossil fuels, clearing land for domesticated animals to graze, and creating dams for power. Archaeologists and students of archaeology need to be careful not to read what they want to see in the archaeological record—that is, we need to be leery of social and political agendas. Ancient peoples of the Southwest and elsewhere also altered their environment. And we see evidence that people were not necessarily living in ecological harmony with their environment. At Chaco Canyon, packrat middens show that the area was cleared of the native pinon

and juniper, and huge amounts of wood were brought in from neighboring areas. In addition, there is evidence of social hierarchy in the burials and exotic goods at Pueblo Bonito. While modern pueblo ideology focuses on harmony and balance, it is possible that this was not always the case in the Southwest.

Leaving Chaco

The Great Houses at Chaco Canyon were abandoned in the mid-1100s, perhaps associated with the drought that hit at the time. The last beam at Pueblo Bonito was cut in 1129 (see dendrochronology below). Some of the outlying communities, like Aztecs to the north, continued. But people didn't entirely disappear from the area. Some people came back into Chaco Canyon after the drought of the mid-1100s. They remodeled the great houses for use as residences—adding hearths, sealing up old doors, creating interior walls, depositing trash and burying dead in old rooms. This is not so unusual—people evidently lived in the Colosseum in Rome in medieval times! Some places in the Southwest flourished after the decline of Chaco, but no single pattern emerged. One site in northern Arizona called Wupatki emerged. Huge quantities of turquoise, shell, copper bells, and macaws were discovered there. Wupatki may have been particularly productive farmland due to the cinder cone volcanic eruption at Sunset Crater in 1085 (or so), which covered the soil with beneficial ash. Another site called Aztec in New Mexico may have been the "new Chaco". Mark Elson is researching the effect of the Sunset Crater eruption and how it might be able to inform us about how humans respond to catastrophes. The ash plume from the volcano would have been visible from Chaco Canyon. This is especially relevant today with catastrophes like hurricanes, earthquakes, tsunamis, and flooding becoming more and more evident. He argues that the cinder cone eruption, which initiates from a crack in the earth with loud cracking and popping coming from the center of the Earth, along with the ensuing lightning, lava flows, ash, and cinders, would have had a significant impact on the surrounding populations—psychologically, religiously, and practically. Impressions of maize in lava were carried away to other areas. Investigators did an archaeological experiment at Hawaii lava flows to see if a detailed impression of maize could be made, and discovered they could not be

made very easily. Mark Elson thinks the impressions were made near spatter cones of very hot and fluid lava as part of a ritual, and later carried to a habitation. In areas with thick cinder cones cover, maize agriculture was no longer possible, and people became “volcano refugees”. Experimental archaeology has shown that lighter cinder cover actually serves as a mulch, whereby maize can grow. The volcano refugees subsequently moved to these areas, where maize was previously impossible.

Fracking Chaco?

Chaco Canyon is located in the San Juan Basin, an area rich in fossil fuels. More than 10,000 natural gas wells currently exist. More recently, the Mancos Shale has been eyed for hydraulic fracking for oil. The Bureau of Land Management (BLM), which manages much of the land around Chaco Canyon, has issued more than 200 permits already. Because the original cultural (and environment) assessment was done in 2003 before fracking was possible, environmental, archaeological, and tribal groups have raised concerns. The courts are now considering a moratorium on new oil permits in the area and the decision could also shut down existing fracking operations that have already begun.

Mimbres Mogollon

The descendants of the Mimbres Mogollon were also likely the modern-day Pueblos. Like the Hohokam, the early Mimbres Mogollon lived mainly in pithouses. There is an emphasis on hunting and dry farming with some evidence for irrigation. Around A.D. 900–1000, a fundamental change occurred; the Mimbres Mogollon people shifted to above-ground structures. Cross-culturally, when people live in pit structures they are almost always seasonally mobile. Above-ground structures are associated worldwide with a shift to agriculture and the need for storage of grain.

Sunset Crater: By Mikesanchez1109 (Own work) [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via WikimediaCommons

Mimbres were heavily reliant on maize. The shift to above-ground “pueblos” appears to be associated with increased reliance on maize and increased sedentism. Today, Mimbres architecture is not much to look at, because it was made from large rounded cobbles and fell apart easily, unlike elegant Chacoan architecture. Archaeologist Stephen Lekson called Mimbres architecture “artfully stacked river cobbles.” Because of this deterioration, Mimbres sites seemed less spectacular than sites to the north and were ignored for many years. That is until Mimbres pottery was discovered. In contrast to the great houses at Chaco Canyon, Mimbres house clusters, or room blocks, grew gradually over time as populations increased. Mimbres pottery is the iconic Southwest pottery that inspires Southwest art even to this day. The pottery has a sparkling white background with black mineral paint, and the vessels are hemispherical, like half a globe. The images that appear on Mimbres- Black-on-white pottery as it is called include geometric and figurative designs. Women,

men, and composite animals can be found on the pots. Females are identifiable by their aprons, which have been found in cave contexts with menstrual blood. Butterfly whorls, a Hopi hairstyle of girls of marriage age, appear on the pots. Men are easily identifiable by genitalia and often appear in hunting scenes. Throwing sticks, historically used for hunting rabbits are identifiable. Indeed, jackrabbit bones occur in huge numbers on Mimbres sites. Wooden swords and crooked staffs, perhaps symbols of authority, also appear. While some scenes appear to depict everyday activities, others are clearly other-worldly. Marc Thompson, who has lectured in my face-to-face courses, argues that the vessels depict the Hero Twins, who are also prominent in Mesoamerican iconography and origin narratives. The Maya Hero Twins are known for battling monsters in the underworld. Warrior twins also appear in Pueblo and Diné (Navajo) narratives. Images resemble corn maidens and katsinas (kachinas), or ancestral beings, prominent in modern Pueblo religion. Some have suggested that the Mimbres pottery is the first evidence of the katsina in the archaeological record. Also, there are a lot of crescent-shaped rabbits on Mimbres Black-on-white. Many different indigenous tribes of North America believed a rabbit resided in the moon; This rabbit shape can be seen today if you look at the full moon. One depiction shows a crescent-shaped rabbit and a kind of starburst, thought to represent the 1054 supernova event in the constellation Taurus, which would have occurred during a crescent moon.

Some Mimbres vessels appear to have been used for domestic, everyday purposes, while others are clearly linked with burials. As at Çatalhöyük, many Mimbres burials were intramural—located inside structures and beneath floors. The face of the deceased often had black-on-white bowls inverted over them. These bowls were ritually "killed" by punching or drilling a hole in the center (remember the Hopewell platform pipes?). The hole has been a metaphor for the sipapu, the conduit or portal between this world and the spirit world. The sipapu is the place of emergence from the underworld and was represented in kivas by a small hole through which the spirits could enter. The vessel itself could have been a metaphor for the dome of a sky. Ruth Bunzel quoted a Zuni consultant: "The sky, solid in substance, rests upon the earth like an inverted bowl". For the Hopi, upon death, the spirit traveled to the underworld, and

upon death in the underworld the spirit returned again to the upper world, creating a cycle (Plog 1997:18). It may be that these killed bowls acted like portals for the return of the soul.

Mimbres bowl thought to represent 1054 Supernova

In the 1970s, prior to laws against unmarked grave excavation, many Mimbres sites were bulldozed by looters looking for spectacular Mimbres pottery which occurred mainly in burials. While sites like the Galaz Ruin were destroyed by heavy machinery. Today, they are completely gone. Who Made the Pots? Most potteries of the Southwest were made by coiling, using long ropes of clay to build up vessel walls. These coils are evident in the finished product. There was no potter's wheel or pots made from molds. Patricia Gilman looked at the Mimbres pottery to evaluate craft specialization—whether certain individuals or sites were responsible for the manufacture of goods. She found that all of the known Mimbres sites have evidence for production. This finding suggests that Mimbres pottery production was probably not specialized, in the sense that each village was making pottery for themselves and not depending on just one village for these special pots. Steven LeBlanc examined and identified individual potters on Mimbres pottery based on similar styles of depiction. Patty Crown points out that it can take 10 years or more to become a proficient potter and painter, and so there must be some evidence of this learning process in the archaeological record. She identified several poorly executed vessels that were likely painted by children. Because Mimbres Black-on-white vessels were often burial goods and contain potentially religiously charged images, their display in museums and even in digitally accessible databases is controversial. If you go to the Maxwell Museum of Anthropology on the University of New Mexico campus, you will see that some vessels have been removed under consideration of NAGPRA (remember Kennewick Man?). Ancestors continue to be important.

Trade and Exchange

We know that the Hohokam had shells from the Gulf of California and a version

of the Mesoamerican ballgame. Chacoans had chocolate ultimately derived from Mesoamerica. Mimbres pottery and material culture make these southern connections even more vivid. Long distances were not a problem for early Southwesterners. Archaeologist Steven LeBlanc suggests the Mimbres acted as middlemen for trade from Mexico to Chaco Canyon.

Mimbres also had Glycymeris shell armlets from the Gulf of Mexico and even depicted these on ceramic vessels. Jett and Moyle (1986) identify 20 fish species, 18 of which are marine fish. They argue that the Mimbres were traveling 1500 miles to the Gulf of California to trade in marine shells and other exotic goods. One image has even been interpreted as a whale, though there is no evidence for aboriginal whaling in that area. Others, like Marc Thompson, see fish as representations of souls traveling to the Underworld. Several people have pointed out that the Mimbres fish have odd ventral fins that resemble feet. Interestingly, there is very little evidence that of using fish as a food resource. Note that the fish have four leg-like appendages. Fred Kabotie, a Hopi author and artist, wrote that there is a Hopi story in which children fall into the water and become fish. He suggests the Mimbres might have had a similar story.

Mimbres Black-on-white bowl that has turned red from an oxidizing atmosphere. public domain

Perhaps most spectacular are the macaws and parrots depicted on Mimbres pots. Scarlet macaws have been imported from lowland Mexico, but military macaws and the thick-billed parrots might have been obtained from closer natural ranges in Mexico. Macaws occur about 700 miles away from the

Mimbres region in the rainforests of Mexico in La Huasteca, but they may have been found in west Mexico as well (McGuire). Macaw and parrot skeletons, feathers, and artifacts have been found at Mimbres sites and other sites like Chaco throughout the Southwest. Feathers continue to be important ritual objects in the Southwest. Parrots and macaws were important to Mimbres culture and appear to have had ritual significance, and women are shown handling them. This association is interesting because men in Pueblo society traditionally controlled kivas, masks, and altars. The ritual association of women suggests that women may have had significant ritual obligations, particularly with regard to exotic birds, in the past. Significantly, many macaws are able to mimic human voices. It is thought that macaws were brought in as young birds. These birds would have required specialized care in order to survive and flourish during the long journey. Based on skeletal development, year-old macaws were sacrificed in the spring, perhaps during the equinox, and ritually buried. They were likely killed after their long tail feathers grew in. Copper bells from Mexico are found in the Mimbres region and might have been traded along with the parrots and macaws.

Post-Chaco, Post-Mimbres

The 1200s saw increased aggregation in apartment-style complexes we now call pueblos. That is, we know people were living in them year-round. The famous Mesa Verde site with its cliff dwellings and large-scale with large populations sites is a good example. This was the beginning of the “Little Ice Age”, a period of widespread cooling.

Fish on Mimbres bowl. Flickr, Creative Commons. By Shannon Mollerus.

The growing seasonal changes brought on by the onset of the Little Ice Age may have pushed people to aggregate and may also be responsible for the violence seen in the archaeological record. Aggregations may have afforded some protection and secured access to land. These aggregations led to close quarters for people, along with their garbage and excrement, which as we have discussed, are not ideal living conditions. In a study of coprolites, ancient feces, from a Mesa Verde community, all samples showed evidence for pinworms.

Compounding the problems of the Little Ice Age, a severe drought referred to as "The Great Drought" struck between ca. 1275 and 1300. This drought precipitated the virtual abandonment of the Mesa Verde region, though people had been migrating out for decades. By 1300, no one was left. In popular literature, we often hear that the Anasazi "disappeared". We know that they did not disappear but simply moved. Many Pueblo oral histories recount migrations of clans and even tales involving cliff dwellers. Mesa Verdeans in many cases moved south to various areas that were already inhabited, including the Rio Grande Valley. The immigrants met with other people, who sometimes resisted the newcomers violently. In other places, the immigrants brought with them Mesa Verde architecture and artistic styles associated with pottery, and multi-ethnic communities formed. It has been suggested that the newcomers received less profitable land, setting up inequalities between the original residents and the incoming people from the north. Whatever the nature of the cultural contact, most of the petroglyphs (rock art that is pecked or scratched into the rock) at the Petroglyph National Monument here in Albuquerque were created during this time.

At least twelve aggregated villages were in place in the central Rio Grande Valley when Coronado's Expedition came in the early 1540s in search of gold. A battle between Coronado and the Pueblos may have taken place at a site here in Albuquerque called Piedras Marcadas. Later, the Spanish quest to convert the Pueblos began in earnest, and at sites like Quarai and Gran Quivera south of Albuquerque, indigenous people built churches at the behest of Catholic officials. Pueblo people, of course, still live in the Southwest in 21 different sovereign nations and many still speak their native languages. They maintain traditions that connect them to their ancestral past—kivas, katsinas, and maize farming remain a central part of many Pueblo Indian nations today. We have seen the importance of ancestors in the Neolithic near the east and Ranu Raraku. The same is true in the Southwest, where archaeological sites themselves are sacred ancestral sites. Because of this, archaeological excavation is often seen as a desecration rather than an opportunity to learn about the past. As a result, southwestern
archaeologists are increasingly using non-invasive techniques like surface

recording and ground-penetrating radar, and electrical resistivity that show what is beneath the surface of the earth without destroying it in an excavation. Still, excavations do take place when a site is already slated for destruction in the course of building a school, a pipeline, or some other project on state or federal land.

Athabaskans

Early Athabaskan-speaking people in the Southwest, have long been thought to have been relatively late arrivals, coming into the area in the 1500s. These are the ancestors of the Apache and Navajos or Diné. The term Protohistoric is sometimes used to refer to this time between the prehistoric period and the presence of historic documents. That is, there are a few written accounts but widespread historical documents are lacking. Like prehistory, the protohistoric is kind of an odd way to divide up the timeline, but it is still used in a kind of nebulous way. Some scholars think Athabaskans came into the region through a mountain corridor along the border of New Mexico and Arizona, the earliest known dates for Athabaskan sites coming from the mountainous regions. Entry could through the Plains likely occurred as well. The early archaeological record for the early Apaches in the Southwest is scant, but new genetic and artifactual research suggests that small numbers were in the Southwest in the 1400s and perhaps as early as the 1300s, earlier than previously thought. This early Apache presence was in no way uniform throughout the Southwest, exhibiting different forms of adaptations in different environments. Late Apachean (the late 1800s) presence in the Southwest is marked by tipi rings, micaceous pottery (pottery with flecks of mica in it), and projectile points made from metal, especially barrel rings, or glass.

While there are numerous books and conferences dedicated to Chaco Canyon, little has been done to synthesize Athabaskan archaeology. For example, in all of the classic textbooks, Prehistory of the Southwest, by the late Linda Cordell, only four pages are dedicated to Athabaskan and Ute archaeology. Other historically based texts have been written, but none explicitly archaeological in nature. One of the most interesting archaeological applications to

understanding Apache history comes from my former employer Karl Laumbach, who writes about a skirmish between the Apache and cavalry unit of buffalo soldiers. By using metal detectors, the field workers were able to identify the rifle and pistol cartridges (metal casing for bullets) of the military men and the Apaches, who used a variety of rifles. The data were entered into a Geographic Information Systems (GIS) Database to develop a visual representation of the skirmish. Not only that, but each weapon leaves a particular mark on the cartridge, which enables researchers to establish that there were more than 180 weapons, and each individual weapon could be tracked across the landscape.

Quarai Mission, built by indigenous people of New

Mexico. Photo: Sue Ruth

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Chapter 9: Moundbuilders →

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Chapter 9: Moundbuilders

The Moundbuilders

Serpent effigy, Turner Group, Mound 4, Little Miami Valley, OH by Daderot is licensed under public domain.

When I reached the foot of the principal mound, I was struck with a degree of

astonishment, not unlike that which is experienced in contemplating the Egyptian pyramids. What a stupendous pile of earth!

—Henry Marie Brackenridge to Thomas Jefferson, on encountering the remains of Cahokia

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Tp>housands of prehistoric earthen mounds are known throughout the Mississippi and Ohio River basins and throughout the southeastern United States. The people who built these earthen mounds are known collectively as the Moundbuilders, but they were by no means a distinct and unified culture. The Hopewell Tradition (ca. 100 BC-AD 500) refers to a large network of trade and exchange connected by a similar belief system. The Hopewell tradition encompassed a huge area of disparate peoples across what is today the eastern United States. However, these groups shared a religious ideology, or belief system, as evidenced by similar burial practices and symbolic prestige goods. Hopewell Hopewell earthworks, monuments made of earth, include enclosures, and processionals (parallel mounds connecting enclosures). Hopewell enclosures appear to have been sacred spaces rather than defensive works. Habitation sites (where people lived) were located away from enclosures and burial mounds.

Another moundbuilder culture (there were several) called the Effigy Mound Culture built effigy mounds or mounds in the shape of animals. Serpent Mound, the largest effigy work in the world, is 1,330 feet long and three-foot high. Serpent Mound dates somewhat later than the Hopewell but is one of the most famous examples of a Moundbuilder earthwork. Like many spectacular archaeological sites, it has seen its share of abuse. Frederic Putnam, an early advocate for preservation, wrote in 1886:

Hundreds of persons visit the place every year, and among them have been vandals who have dug into the embankment and left unfilled the holes they made. As a consequence, the rains, and the trampling of cattle and visitors, have caused such places to wear away and thus seriously injure this sacred

work, the only one of its kind.

Serpent Mound Spiral. Hieronymous Rowe at English Wikipedia [CC BY-SA 3.0 http://creativecommons.org/licenses/by-sa/3.0) or GFDL (http://www.gnu.org/copyleft/fdl.html)], via Wikimedia Commons

The Hopewell tradition is also characterized by elaborate mortuary mounds in which the dead were
interred. Mortuary mounds increased in size as burials were added to a central burial mound. At least one study at the Hopewell Mound Group site in Ohio has looked at genetic relationships between people buried in the mounds. Mill's work suggests that people buried in the mounds were not closely related, and share commonalities with diverse Native American tribes like Apache, Iowa, Micmac, Pawnee, Pima, Seri, Southwest Sioux, and Yakima. In addition to elaborate earthworks, the Hopewell tradition is characterized by prestige goods,

items used by elites, and people with a disproportionate amount of wealth and power, which circulated over a wide area.

This extensive trade network is often referred to as the Hopewell Interaction Sphere, centered in the Scioto River Valley of south-central Ohio. Trade goods included copper from Lake Superior, obsidian from Yellowstone, Knife River flint from the Dakotas, pearls from the Ohio and Tennessee Rivers, shell from the Gulf and Atlantic coasts, and mica, steatite, and chlorite from the Appalachians. Hopewell trade networks obtained grizzly bear teeth and claws along with Knife River Flint from the Northern Plains. Obsidian from the Obsidian Cliffs source in Yellowstone National Park in Wyoming was traded as large biface blanks that were then finished into large ceremonial points. Sheets of mica, a mineral silicate that separates into sheets, from the southern Appalachian Mountains were cut into elaborate plaques that perhaps were used in public ceremonies to evoke connections to the supernatural and validate the ritual and political power of the bearer. Exotic Hopewell goods included artwork of copper from the Western Great Lakes. The copper was either cold hammered or annealed (heated then hammered) not smelted from ore. We'll talk more about metalworking later in the semester.

Perhaps most interesting of all, are Hopewell platform pipes. Typically made from Ohio Pipestone, the pipes sometimes took the form of animals, with the figure facing the smoker. Most of the pipes, like most Hopewell prestige goods, have been recovered from burials. One interesting idea put forth by Robert Hall is that political leaders smoked tobacco in these pipes as part of ceremonies designed to mediate the interaction between different cultural groups participating in the Hopewell Interaction Sphere. These ceremonies might have been much like the historic Peace Pipe Ceremony, in which violence was forbidden when pipes, called calumets, were passed. This type of approach to understanding the past, where modern people are linked to past ones, is called the direct historical approach.

As with the later Peace Pipe Ceremony pipes, early Hopewell pipes were made in the form of weaponry, the atlatl. Also, many of the pipes are found in

mortuary contexts and appear to have been deliberately broken. At first, this might seem an unusual practice, but ritually killing objects is quite common even today. In the American Southwest, certain pottery types were "killed" by drilling or punching a hole through the center and then placed over the deceased head. This ritual killing might have released the spirit associated with the object.

A Raven Effigy Pipe. rdikeman. Creative Commons Attribution-Share Alike 3.0 Unported

Vikings had a similar practice of killing swords by heating and bending them and burying them with the fallen warrior. The swords had powerful magical qualities and were thought to have been killed to avoid retribution. Even today in some cultures, pots and pans, shoes, and other personal objects of a loved one are destroyed and removed from the home to facilitate passage to the next world.

Hopewell exotic goods were probably made by craft specialists, people who produce more goods than they use for their own families. In more complex societies, there are often craft specialists who are devoted full-time to making goods. Craft specialization is an important concept in archaeology. It shows that some people are supported by others for their work as artisans. Secondly, the existence of prestige goods and the specialists that make them indicates at least some degree of social hierarchy, that is, some people have more power and prestige than others. While prestige goods may have been traded along the same routes as foodstuffs, exotic goods were likely exchanged between high-status political leaders only and eventually buried with them. Indeed, most Hopewell exotic goods occur in burials. Some Hopewell graves contain many exotic goods, while others are simple cremations, suggesting differences in status. Examination of differences in mortuary treatment is a key way that archaeologists make inferences about political structure, or who had power and made decisions. The high-status Hopewell burials are thought to have been leaders who gained prestige through their accomplishments, called achieved status. Children, who could only have inherited their status, are rarely found with elaborate grave goods. In later Moundbuilder cultures, the distinction between the powerful and the populace becomes even more distinct, as we will see. Leadership in these later cultures is thought to have been hereditary or inherited.

In addition to copper goods, stone tools are also found in high-status Hopewell burials. Large caches of extremely well-made bifaces—stone worked on two faces—and finished projectile points of high-quality raw materials are found in high-status Hopewell burials. More than 7,000 bifaces of high-quality Burlington chert were found in a single burial mound at Mound City. Obsidian from the Obsidian Cliffs source in Yellowstone National Park in Wyoming was traded as large biface blanks that were then finished into large ceremonial points. Obsidian from the Obsidian Cliffs source in Yellowstone National Park in Wyoming was traded as large biface blanks that were then finished into large ceremonial points. As with people living tens of thousands of years ago in the Upper Paleolithic, the Hopewell sought to distinguish themselves, and leaders in particular, with personal adornment. Elaborate copper pieces worn at the

neck called gorgets, along with headdresses, earspools, and ceremonial celts set apart the political leaders from the populace. As we will see in later chapters, it is very common for elites to set themselves apart in terms of dress and even alter their biological features.

Hopewell Subsistence

The Hopewell phenomenon, with its monuments, long-distance exchange, craft specialization, and status differentiation was based largely on hunting and gathering. There were some native domesticates, like goosefoot and amaranth, but nothing nearly as productive as maize. Hopewell shows that social complexity (differences in wealth, specialization, monumental structures) can arise in primarily hunting and gathering cultures. Social complexity in hunting and gathering societies seems to be possible in environmental regions that are highly productive.

The Great Hopewell Road

In Frederic Putnam's day, development and farming were destroying the mounds at an alarming rate, and he began to raise funds to purchase the sites like Serpent Mound to preserve it. Journalist Ephraim Squier and physician Edwin Davis began a large-scale survey of mounds in the Ohio Valley and created maps of mounds that are still used today. Much was lost, however, and we will never know the full scale of the Hopewell. Technology, however, has revealed some surprising traces of the Hopewell. Bradley Lepper read early descriptions of Hopewell earthen enclosures and noticed a reference to a causeway or road. The road was essentially bounded by two parallel earthen banks 150 feet apart. Investigating, he noticed traces of these parallel lines of aerial photos from the 1930s that could have joined two separate major Hopewell ceremonial centers, Newark and Chillicothe, which are sixty miles apart. He calls this The Great Hopewell Road. More recent technology called LiDar, Light Detecting and Ranging, uses lasers to map the surface of the Earth and can reveal subtle features not detectable with the naked eye. LiDar has

been used to help try to track the course of the Great Hopewell Road. Ceremonial roads like this one, as we will see, are quite common in the human past and have been discovered in Neolithic England, the American Southwest, Mesoamerica, and other archaeological cultures.

The Great Moundbuilder Debate

Who built the mounds? By the early 1800s, two models were developed to account for these earthen mounds. The Lost Race Model contended that the mounds were constructed by a "lost race" of non-Indians that was displaced by more recent Indians. Others suggested the moundbuilders left to become the splendid Maya or Aztecs to the South. The natives who occupied the area at the time were thought to have driven out this spectacular culture. Remember that it was George McJunkin, the discoverer of the Folsom site, who changed that story forever. The Native Model contended that the ancestors of recent Native American Indians made the mounds. You will learn in this week's video how this debate played out.

The Mississippian

The Mississippian Moundbuilder culture occurs well after the Hopewell around AD 800–AD 1500. Well-known Mississippian sites include Moundville in Alabama, Spiro Mounds in Arkansas, and Cahokia in Illinois. While maize appeared perhaps as early as 100 BC in Florida and its use was widespread throughout the east by AD 400, it did not become the primary staple crop in the eastern part of the United States until around AD 800. Remember that maize was first domesticated in central highland Mexico, and had to travel to North America. Maize agriculture tied people to land and created the opportunity for large food surpluses, urban centers, and dense populations. Surplus production allowed segments of the population to be freed from agriculture and provided the potential for differences in wealth and status. The frequency of the stone hoes and stone-lined storage pits indicates that reliance on intensive maize agriculture and food storage became more important during the Mississippian

period. Cahokia, a World Heritage Site in modern-day Illinois, just east of East St. Louis, became the largest prehistoric city north of Mexico—perhaps the only true city north of Mexico. Once regarded as a mostly empty ceremonial center, it is today regarded as a true city, as big in its day as London. The site is located in the fertile Mississippi floodplain called the American Bottom and was a hub of exchange, with flat-topped mounds, fortifications, planned settlements, and a definite social hierarchy, in which some
people were afforded higher social status. Cahokia was at its height between AD 1050 and 1300, with more than 100 earthen mounds in an area of 5 square miles. While maize supported the Cahokian economy, the diet was supplemented by wild turkey, aquatic resources, and local plants. At least 25 mounds were completely leveled, including the second largest, during the founding of St. Louis, and so archaeologists will never have the full picture of the scale of this city. Cahokia Beginnings: Alternative Views Cahokia archaeologist Timothy Pauketat, notes that the construction of Cahokia began abruptly in the AD 1050s, near the time of the 1054 supernova which could be seen in daytime near the crescent moon for 23 days. The celestial event was recorded by Chinese astrologers. Pauketat suggests that this event may have been viewed symbolically and caused the “big bang” of Cahokia. Others object to the idea that a symbolic event can produce such a major change and focus more on the productivity of the area and population growth as motivating factors. We see in action a contextual approach and ecological approach at odds.

The Central Precinct

The central ceremonial precinct at Cahokia called “downtown Cahokia” was surrounded by a palisade or wall enclosing approximately 200 acres. The palisade was made from wooden logs and mud and was rebuilt several times over 200 years. This central precinct acted like a gated community, with elite residences on top of platform mounds and ceremonial temple mounds located inside the palisade. Elites living atop the mounds were both socially above and physically above the general populace. This is not such an unusual idea. Early presidents of the United States atop “mounts” like Mount Vernon, Monticello,

and Montpelier. Outside the palisade, the residences are more modest and likely housed the general populace. Residential hierarchy refers to differences in the location and elaboration of houses and is a useful indicator of social differences. The inner precinct also contained a ceremonial plaza. The palisade may have more than just a social barrier. It was built with upright logs set into a trench and then covered with a coating of clay, presumably to prevent burning by attackers. Though there is no evidence of invasion, the wall could have served defensive purposes.

Moundville, Mississippi. Altairisfair. public domain.

The Mounds

As with the earlier Moundbuilder cultures, earthen mounds continued to be used for burials during
Mississippian times. In addition, new platform mounds were used for both elite residences as well as temple mounds. These platform mounds were used by

people of high status. Public ceremonies were likely conducted atop the temple mounds to solidify the social status of high-ranking people.

The largest prehistoric structure north of Mexico, Monks Mound is 30 meters (c. 100 ft.) high and covers 14 acres at its base. Like the palimpsest of bison paintings at Altamira and the layers of occupation of tell Abu Hureyra, Monks Mound wasn't created in a single episode. The mound was constructed in 14 stages between AD 600 and 1250 and supported several structures. Cahokians got the earth to build the mound by excavating an enormous borrow pit, which was later filled in with trash of all kinds which was still decaying when the excavation pit was opened (it apparently reeked). More than a million charred seeds from borrow pits filled with trash indicate they were smoking tobacco.

Today, you can actually climb to the top of Monk's Mound. During excavation, lenses (lenticular-shaped deposits) of different colored sediment could be observed in the excavation profile in Monks Mound. Each lens represents a single basket load of earth carried by a laborer. Approximately 21 million cubic feet of earth were moved in the construction of Monk's Mound.

Mound 72

Mound 72 at Cahokia sounds innocuous enough, but its contents reveal much about social hierarchy and religious beliefs at Cahokia. The mound is long and ridge-like and oriented to the rising sun at the winter solstice. Mound 72 was used repeatedly for elaborate burial rituals that included high-status people with abundant offerings accompanied by human sacrifices. A total of 261 burials spanning 100 years were recovered during the excavation of Mound 72. At the base of the mound, one male in Mound 72 was buried on a wooden litter —a stretcher-like platform. The skeleton lay on a bed of more than 20,000 shell beads that were once sewn onto a cape in the shape of a falcon. Below him was buried another male. The males were in shrouds indicating they may have died sometime before internment.

Associated with the caped male in Mound 72 were, young female human

sacrifices, including a mass burial of 50 young women lined up on wooden litters. The victims were likely killed nearby and carried on the litters to a pit in the mound. These females do not show evidence of violent treatment. Looking at the carbon and nitrogen isotopes in these women's skeletons compared to the high-status burials, it became clear that the women ate more maize and less meat than the central male figures. Corn is missing vital amino acids found in meat, and these women may have suffered from poor nutrition. Dental studies suggest they may not have even been from Cahokia proper. Historic accounts of the Natchez Indians, who also built earthen mounds, indicate that female relatives were sometimes strangled upon the death of a high-status male. In one account a French reported:

"The death of a chieftain touched off a sacrificial orgy when several aides and two of the man's wives and three children were strangled so they could escort him into the next world." (Indian Tribes of the Lower Mississippi Valley)

It is, therefore, possible that these women in Mound 72 might have been strangled wives or female kin of the deceased, which would have left no physical evidence of violent treatment on the skeleton. Other sacrifices occurred associated with the caped man along with mounds of grave goods. Some of the skeletons occurred in bundles, indicating that they had died much earlier, and subsequently placed in the pit. Charnel houses are places where the dead are interred to decompose, and the bones are later retrieved for burial or reuse. We saw a similar practice in the Neolithic where bodies were buried, then later re-excavated and the skull removed. The skulls were then used in other contexts and sometimes reburied in skull caches. Associated with the central caped male burial were mounds of grave goods. Caches of distinctive projectile points, arrowheads, of different styles, and different materials occur as grave offerings in Mound 72. Because of their similar orientation, the points were probably hafted onto arrow shafts when they were interred. Darker-tipped points pointed to the winter solstice sunrise while lighter-tipped points pointed to the summer solstice sunset. The orientation of other caches suggests the points were not hafted. The tri-notched projectile point of these caches is characteristic of the Cahokia region. The use of different styles and raw materials for the projectile

points may indicate that mourners, perhaps subjects or allies, came from outlying areas to pay their respects to the deceased chief. Non-local point style from the Caddoan Mississippian (southwest of Cahokia) along with points made from an Arkansas black chert were discovered in Mound 72. The orientation of other caches suggests the points were not hafted. The tri-notched point is characteristic of the Cahokia region.

Mica flakes and shell disks were also burial offerings in Mound 72. Chunkey stones, historically used in the game of chunkey, also occur as burial offerings in Mound 72. In historic times, the chunkey stones would be rolled on edge down the playing field. Depending on the game, players would either throw their spears to where they thought the chunkey stone would fall over, with the closest player winning the round, or players try to knock the chunkey stone over with their spears. Like the Mesoamerican ballgame, the game of chunkey may have had both social and religious connotations. Large pipes depicting men about to roll the chunkey stone have been found at several Mississippian sites. You will read more about this game in this week's readings.

By Herb Roe, www.chromesun.com – Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=11214315

Other high-status shrouded burials occur in the mound as well, including men, women, and children. Beneath these burials were more human sacrifices. These, unlike others, showed evidence of violent death, including decapitation, and were not carefully placed. This execution appears to have been conducted at the mound with the bodies falling into the pit. Finger bones dug into the fine white sand that lines the bottom of the pit, suggesting that some were not dead when buried. No offerings were associated with these individuals. In another pit, four males linked at the elbows were both beheaded and behanded. These people might have been enemy war captives slain to honor the passing of a high-status leader. Many other sacrifices occur in the mound as well as in surrounding mounds. Mississippian iconography at other sites reiterates

themes of violence and human sacrifice. The Ramey Tablet is a sandstone tablet that has been interpreted as depicting a tree or rack with severed heads found in Mound 72. Images of skeletons with severed heads, severed heads alone, headless bodies, and fortifications are interpreted as evidence of warfare during Mississippian times. Ceramic vessels depicting apparent possible decapitated and tattooed heads also occur in the Mississippian. It is not clear, however, if they represent trophy heads, or honored dead.

Connecting past and present through historical connections, like the historical Natchez use of mounds and human sacrifice, is called the direct historical approach. The dramatic difference in burial elaboration along with clear evidence of human sacrifice is an indicator of differences in wealth and power in Cahokian society. Residential hierarchy, the central precinct, and burial distinctions indicate that some people had far more wealth and power than others. These distinctions are so pronounced, that status was almost certainly hereditary or inherited.

Several regional variants of later Mississippian culture were found in the eastern United States, from the eastern shore of the Atlantic to the margins of the plains. Each variant had different local forms of pottery, projectile points, and other material culture objects, but these were unified by common ritual iconography, which is sometimes referred to as the Southeastern Ceremonial Complex. SECC motifs include birds, hands, rattlesnakes, spiders, cats, stone maces, and death images. These motifs appear on shells, pottery, copper, and stone. The above image shows the hand-in-eye motif and intertwined rattlesnakes from Moundville, Alabama. The opposite side was concave and used for pigment grinding. Elaborated bifaces and maces are also found throughout the Mississippian and were likely symbols of power. Engraved shell gorgets and conch are expertly carved with symbols of the SECC. It has been suggested that the conch shells may have contained the so-called Black Drink made from holly leaves that was used historically in the American Southeast for ritual purposes. Recently, archaeologist Patty Crown at the University of New Mexico examined the organic residues absorbed into porous ceramic mugs or “beakers” from Cahokia and surrounding areas. The pores help preserve the

residues from degradation. They used a technique called liquid chromatography. You'll read this week about what she found. Today, 300,000 visitors visit Cahokia each year.

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Chapter 10: Classic Maya

Mayan ruin – Palenque, Mexico, Yucatan region Flickr, Creative Commons. Photo: ashabot

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We can view the Classic Maya, not as a “less developed” society trying only to control the forces of nature and to survive economically. Instead, they can be regarded as fellow travelers—who simply chose a different path— through the darkness.

—Arthur Demerest

Mesoamerica and the Classic Maya Mesoamerica—Chiapas, Tabasco, Yucatán Peninsula in Southern Mexico, Guatemala, Honduras, El Salvador, and Belize— was the home of a number of civilizations. Mesoamerica is a region of tremendous environmental diversity. The uplands include volcanic mountains and various types of tropical forests and the lowlands are tropical. One of the civilizations of Mesoamerica was the Classic Maya (AD 300–900) of the "Maya lowlands" the humid subtropical rainforests of Guatemala, Belize, western Honduras, and the Yucatan peninsula. Features of the Classic Maya appeared centuries earlier at sites in both the lowlands and highlands. Like the Pueblos of the Southwest, the Maya still live in the area and speak their native languages, although they no longer live in kingdoms with elaborate architecture.

Terrace farming in Guatemala, Flickr, Creative Commons, Photo: Magnus Franklin

Like the later Southwest Cultures and the Mississippian, the Classic Maya were reliant on maize along with beans and squash for food. They supplemented this diet with fruit trees and cacao (bean from which chocolate is made), kept bees for honey, and hunted animals of the rainforest. In the Maya lowlands, there are a variety of microenvironments, but generally, soils are thin and delicate, and easily exhausted. The Classic Maya used a diversity of techniques to farm these diverse environments. In addition to the three staple crops, the Maya had stands of fruit trees, like avocado and papaya, and left areas of rainforest uncleared for hunting and fuel. They used a number of different farming strategies including slash and burn (also called

swidden), where areas were cleared, burned, and then farmed. This technique eventually depletes the soil, and the area must be left to rejuvenate and a few years. This practice continues among the Maya today.

The Classic Maya likely left more massive trees standing which would have allowed the rainforest to recover more easily. Also, the use of human waste as fertilizer would have improved production. Another technique used was terrace farming in which hillslopes were leveled into “steps” and the constructions of retaining walls which reduced erosion and kept in moisture. A third technique was used in swampy areas; sediments in these areas were piled up and cultivated. These “raised fields” are called chinampas. Box gardens, where soil and muck were brought in from swampy areas have also been documented.

Most of the populace of Maya centers lived in dispersed communities in and around major centers. The center of Classic Maya fluorescence, the Peten of Guatemala, was far more populated in the past than it is today. Today, modern farming techniques focus on single crops and widespread clearing and have destroyed vast stretches of rainforest in this area. One of the most studied periods of the Maya is the Classic Maya (AD 300–900). The Classic Maya had several distinguishing traits:

- Competitive “kingdoms” or interacting polities
- Divine kingship (called K’uhul Ajaw)
- Ceremonial centers with masonry pyramids
- Elite burials
- Warfare
- Ball courts
- Mural paintings
- Decorated ceramics
- Writing
- Calendars (general obsession with time)
- Maize agriculture (slash and burn, chinampas, terraces)

The Classic Maya society was

Copan Ballcourt, Flickr, Creative Commons

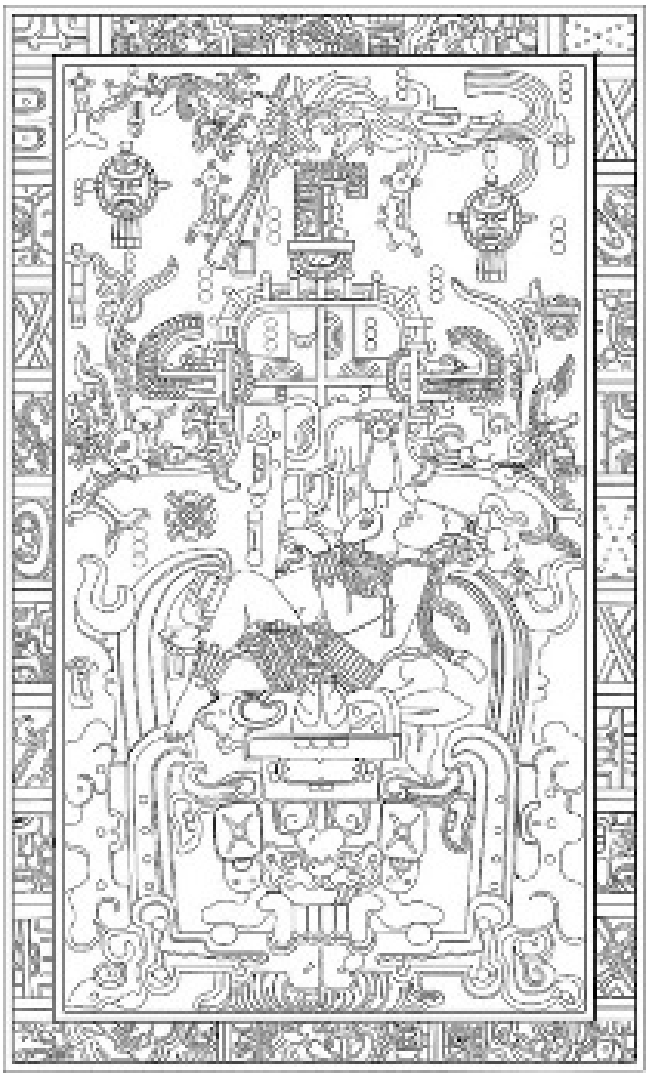
hierarchical with a number of different classes of people. The ruling class included kings who also served as priests, along with their families. That is, there was no separation of church and state. Rulers were associated with divine beings, not unlike Julius Caesar being descended from Aphrodite. This state of affairs is in no way uncommon in the history of civilizations. The ancient Egyptian pharaohs claimed to be gods, the Babylonian ruler Hammurabi claimed to be appointed by God, and the Mycenaean kings had absolute power. Yale historian Donald Kagan suggests that it is we who are the "oddballs" in separating the affairs of church and state. Those that threaten this system, he adds, have the weight of human experience on their side.

Elite Maya women participated in bloodletting rituals and other ceremonies, but rarely held political power. In the absence of a male heir, women could serve as regents or occasionally queens, and pass on the title. The nobility were titled people, scholars, architects, merchants, warriors (women sometimes held noble titles). Commoners were farmers and laborers, which included the majority of the population. Finally, Maya society also consisted of slaves, criminals, and prisoners of war.

The Classic Maya were organized into competing kingdoms. Warfare was commonplace and victories and defeats were recorded on Maya stone monuments. They competed through ritual pageantry and conspicuous consumption— ostentatious building projects and elaborate prestige goods like carved jades and liquid chocolate. Early scholars of the Maya, before the Maya writing was deciphered, thought that the Classic Maya were peaceful gentlemen scholars, debating finer points of science and art in their jungle campuses. This romantic view turned out to be only partially true; The Classic Maya were no

different from any other complex culture—with warfare, science, writing, and great art. Divine Rulers Maya kings were especially important to the Classic Maya. They were the embodiment of the axis mundi or World Tree, the divine connection between supernatural worlds and this one. Rituals and pageantry associated with the K'uhul Ajaw served to propitiate the gods.

These divine rulers were buried within the masonry temples themselves. At the Maya site of Palenque, ruler Lord Pacal (K'inich Janaab' Pakal) was buried deep within the Temple of Inscriptions. The stairway leading to his sarcophagus was filled with rubble that took four years to remove. The five-ton sarcophagus depicts the deceased Pacal lying at the base of the World Tree (axis mundi) falling into the Great-Maw-of-the-Underworld, based on standard and well-known Mesoamerican iconographic representations. Maya kings were the personification of the World Tree connecting the planes of the Maya cosmology. The sarcophagus was famously interpreted by popular writer and convicted con-man Erich Von Daniken as Pacal piloting some form of flying craft—apparent evidence of the extra-terrestrial nature of the Maya culture.



Inside the sarcophagus was a jade mask of the deceased ruler. Jade was a highly prized exotic raw material used in the production of esoteric ritual paraphernalia. These items were used in public displays to verify the social status and supernatural sanction. Beads, ear spools, and shells filled with red ocher were found (remember the 100,000-year-old Blombos in South Africa?). For most of the Maya populace, the deceased were buried beneath the floor or in shrines, typically including only a pot or two. The discrepancy in the burial of different members of the population is called burial hierarchy and is a common piece of evidence archaeologists used to identify differences in wealth and power.

As we have seen, humans, in general, are interested in their appearance, decorating themselves since the Upper Paleolithic, and gazing in pyrite (Hohokam) and obsidian mirrors (Catalhoyuk). The Classic Maya were no different. The elite, in fact, strove to look dramatically different from everyone else and engaged in some remarkable body modification. Most striking are the long, sloping foreheads of the elite created by binding that reshaped the skull. Ears, noses, and lips were pierced. Jewelry was made from jade, shells, wood, and bodies were tattooed and painted. Commoners also decorated themselves, enhancing their teeth with inlaid stones.

Classic Maya "kingdoms" centered around masonry four-sided pyramidical temples, elite residences, plazas, and ballcourts. In the early 1900s, the Maya were believed to reside in vacant ceremonial centers, inhabited by small groups of priests (Remember that this is also an idea regarding the use and function of Chaco Canyon in New Mexico). It was thought that the thin delicate soils of the rainforest could not sustain large populations. The priests were thought to direct rural, peasant populations through periodic rituals at the centers. More recent investigations have revealed thousands of mounds at the site of Tikal in Guatemala that has been identified as residential structures, indicating that thousands of people lived in these centers. Maya commoners lived in wattle and daub, stick and mud houses, houses on low mounds around the ceremonial center, similar to these houses used by the Maya today. The dispersed nature of Maya farms and the variety of farming techniques allowed the Classic Maya to flourish in a delicate area. At Tikal and other Classic Maya centers, most people lived in more modest homes of wattle and daub. In the lowlands, these houses were built on low earthen mounds to keep them above the water. While these more ephemeral (short-lived) houses are now gone, the mounds they once stood one remain. Archaeologists use mounds to identify where farmers lived and how populated the area around major centers was. Among the Classic Maya, people were loosely distributed in farming villages out from the center.

Maya House Mound. “Ruins Unsettled” by Josh Kellogg is licensed under CC BY-NC-ND

Modern-day Maya house, "La vida de los mayas en México, desde la península de Yucatán-5" by Ana Ruth Rivera is licensed under CC-BY-NC-SA 2.0

The site of Tikal located in the Peten Basin of Guatemala is not only a World Heritage Site, but is also featured as the rebel base in Star Wars! The site has two temples facing each other —Temples I and II—on either side of a great plaza or court. Temple I was built as a mausoleum for ruler Jasaw-Chan-K'awiil. The carved wooden lintel on Temple II depicts a royal woman, perhaps Jasaw- Chan-K'awiil's principal wife, who was buried there. The exceptionally hardwood of the Zapote Tree was used for lintels to hold up the temple doorways. The Temple of the Great Jaguar (Temple I) is over 150 feet high. The tops of the pyramids were rooms used for sacred ceremonies. The whole thing was topped with a roof comb. Tikal's lords lived and conducted their activities in the Central Acropolis, south of the great plaza, spreading over four acres and containing 42 multistory buildings. The acropolis at Classic Maya sites grew

from repeated rebuilding and expansion resulting in “hills” of architecture. The north side of the plaza is framed by the North Acropolis, a huge platform that appears to have been a burial place for Tikal’s nobles. Several other examples of monumental architecture are found at Tikal and these are connected by causeways or scabies. These were raised paths covered in white plaster that linked buildings to the Great Plaza. These roadways connecting important monuments might remind you of the Great Hopewell road connecting moundbuilders sites or even the road system at Chaco Canton.

Tikal. Flickr, Creative Commons. Photo: Dennis Jarvis.

Maya Religion

Maya religion reflected the fundamental role of agriculture in their society. The Maya creation narrative, the Popol Vuh, recounts Maya creation in which the gods created human beings out of maize and water. The Hero Twins figure prominently in the Popol Vuh (and also appear in Pueblo narratives in the Southwest and perhaps on Mimbres pottery). In the Maya religion, gods kept the world in order and maintained the agricultural cycle in exchange for honors and sacrifices. The Maya believed the shedding of human blood would prompt the gods to send rain to water the maize. Sacrifice took many forms, including auto-sacrifice, the offering of one’s own blood, especially the K’uhul Ajaw. Elite women performed bloodletting rituals in which they collected blood from their tongues onto paper and sacrificed it by burning it; men practiced genital bloodletting. One lintel depicts a bloodletting rite with a vision serpent. Lady 6-

Tun, a wife of Bird Jaguar, has used the stingray spine in her basket perhaps to make a hole in her tongue. The rope is then run through the hole to collect the blood, which drips onto the bark paper. Bloodletting also involved prisoners of war. The frescoed murals at Bonampak in Chiapas, Mexico in the Temple of the Murals depict mostly naked prisoners with bleeding fingertips. One prisoner is subjugated by a ruler grabbing his hair. Note that some of the men presiding over the ritualized torture or wearing jaguar pelts (At Catalhoyuk, Turkey, there are murals with men wearing leopard skins).

Writing

True writing systems indicate the sounds and words of a language, not just a general idea. The term ideographs are sometimes used to refer to image that conveys some generic meaning but are NOT symbols that stand for the sounds of language. The Maya had the most complex writing system in all of Mesoamerica, which was the only area in the New World to have written. And they wrote on everything they could get their hands on, from stone stelae (upright stone monuments), wooden door lintels, pottery, murals, cave walls, carved jades, shells, and other precious objects. The glyphic stairway at Copan, Honduras, contains more than 2,000 glyphs, the longest known Maya text. The Maya also had bark paper books called codices (singular codex). Codices are screen-fold books of bark paper bound with deerskin. These mainly contain astronomical and calendrical information. Some 15,000 examples of Classic Maya writing have been discovered from monuments, pottery, tombs, and other sources. All but three codices were burned by Spanish Bishop Diego de Landa:

We found a large number of books of these characters, and as they contained nothing in which there were not to be seen superstition and lies of the devil, we burned them all, which they regretted to an amazing degree and which caused them much affliction.

Religious or ideological zealotry has not been good for the preservation of ancient remains. In AD 397 Cyril and his monk army destroyed the Memphis Serapeum along with other ancient Egyptian temples. More recently, the Taliban destroyed the Bayamin Buddhas.

Much of the Mayan writing on monuments such as stelae is political propaganda, used to legitimize a king's right to rule. Maya stelae, or upright stone monuments, recorded births, ascensions, conquests, marriages and alliances, sacrifices, deaths of rulers as part of this political aggrandizement. Maya's writing was a specialized craft. The Maya scribe was an important and respected professional, with a noble lineage. The Ah k'u hun was the chief scribe or keeper of the Holy Books or Royal Librarian. It is thought that the general populace was illiterate and that reading and writing were the privileges of the elite. Classic Maya texts were written in a courtly Mayan language,

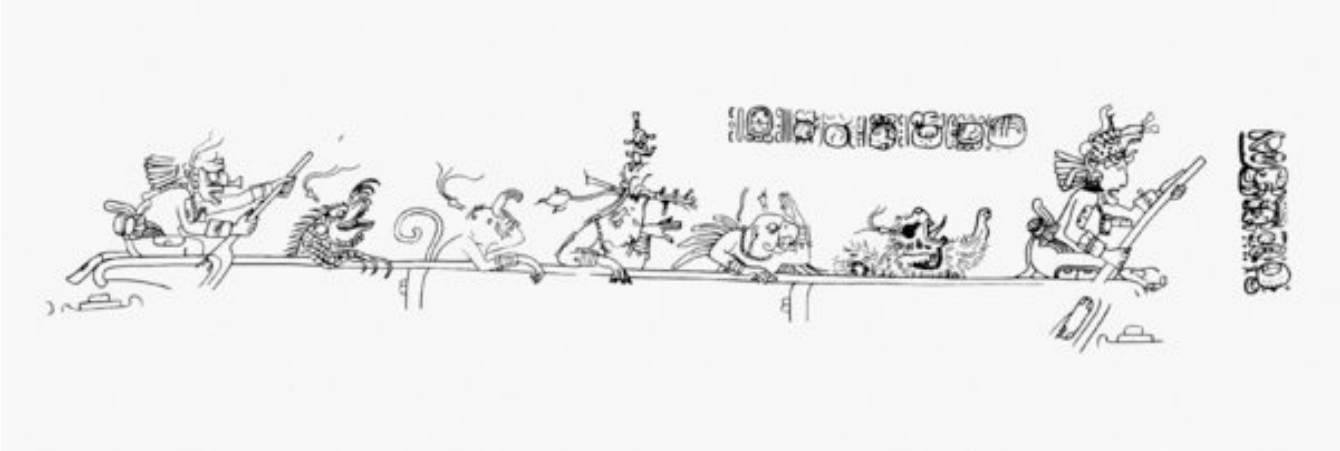
functioning somewhat like Latin in Medieval Europe. The Maya did not use an alphabet, with each letter representing a small unit of sound. Instead, they used glyphs that represented whole words or syllables (clusters of sound).

Maya glyphs. “Codex” by Pietro Izzo is licensed under CC BY-NC-ND-SA 2.0

Maya Codex. “Los Codices Maya” by Dave Cooksey is licensed under CC BY-NC-ND-SA

Mayan art and writing were not completely separate. Indeed, the word for writing, tz’ihb, refers also to painting. Maya art contains densely coded information and incorporates glyphs into the design. The Maya logogram for “baby” looks like a baby on its back In the depiction of Lord Pacal on his sarcophagus, we see that he is in the same position as he is reborn as the lightning god. Maya art also uses glyphs or abbreviated glyphs to identify colors, material, smell, shininess, and so forth in the depiction. For example, the Maya glyph for wood is. We can see parts of this glyph on canoes, trees, and

other wooden objects depicted in Maya art. Specific gods can also be recognized by their earspools, headdresses, paraphernalia, and body markings. Chahk, the rain god, is often depicted with scales and an ax, usually in the act of chopping a baby jaguar.



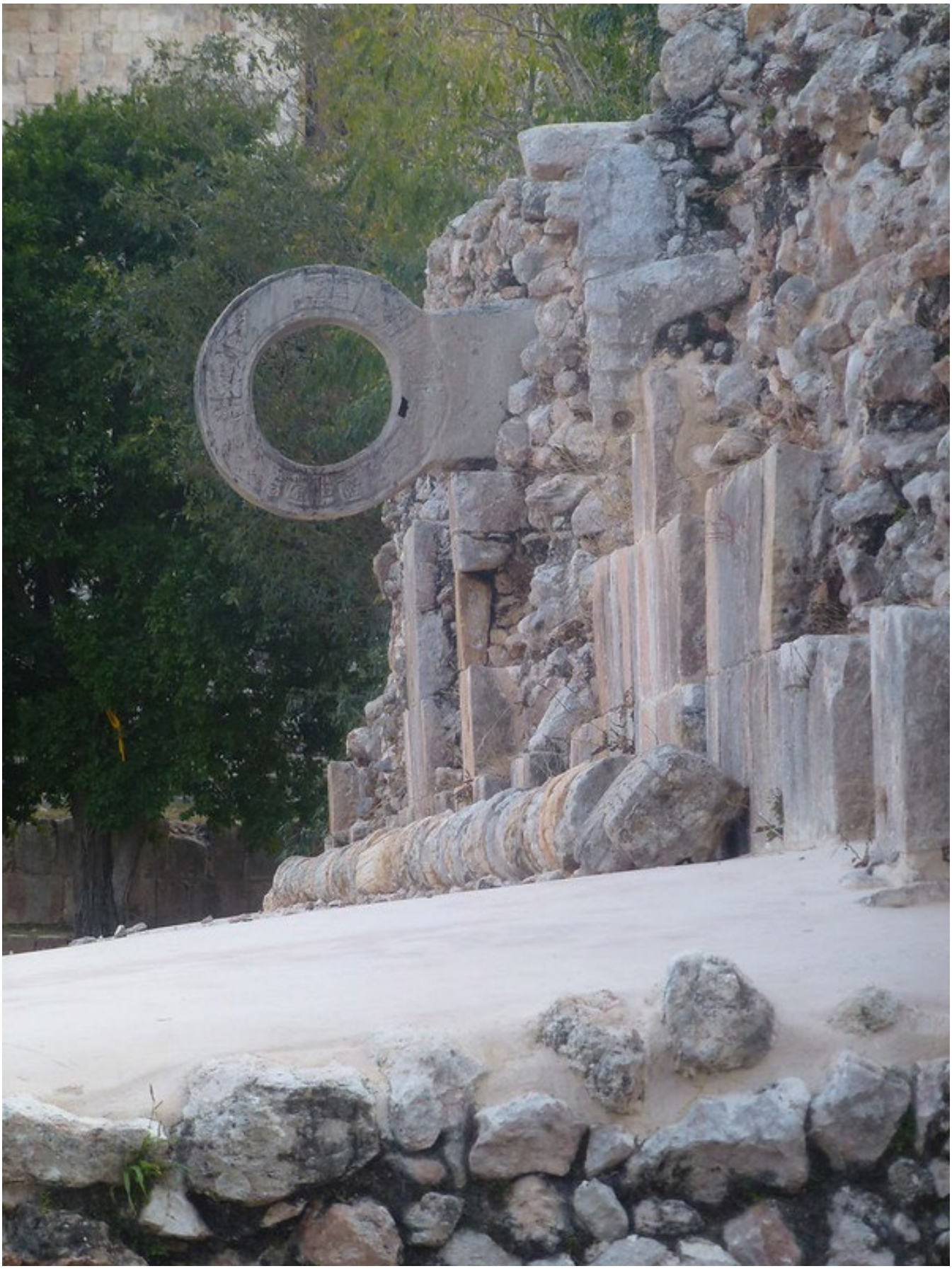
Maya Canoe scene. Note the abbreviation for wood on the canoe at the lower right.

The Maya Rain God Chahk.

Maya maize god as scribe. Note the shell used to hold ink. Public domain.

Mesoamerican Ballgame

Before there was the Olympics, there was the Mesoamerican ballgame—the ultimate team sport. The Classic Maya and other Mesoamerican cultures discovered that the extract of the rubber tree could be made into a very bouncy ball by adding juice from the morning glory plant. A few balls have survived to this day and many are depicted on figurines. The Mesoamerican ballgame found throughout Mesoamerica, and depiction occurs on murals and statuary.



Ballcourt at Uxmal. Flickr, Creative Commons. Photo: Mark Bellingham.

The players wore a yoke made of cloth, wood, or leather around their mid-section for protection from the hardball decorated with a hacha. The uniform and rules varied by culture. The Mesoamerican ballcourt was built of limestone masonry like temple monuments and painted. Classic Maya ballcourts were in the shape of an "I", with the endzones the top and bottom of the "I". The "benches" at the base of ballcourts were decorated with scenes of human sacrifice. The ballgame was not just a sporting event but a religious one as well. The losers, at least in some cases, appear to have been sacrificed. Stone relief at El Tajin in Veracruz depicts a ballplayer being sacrificed by having his heart cut out. At the popular honeymoon destination of Chichen Itza, ballplayers are depicted as being decapitated with a large obsidian knife.

Chocolate

Cacao, (from kakawa, a Mayan word) from which chocolate derives, was a precious commodity consumed mostly by nobles and the seeds were even used as a form of currency. Chocolate was usually consumed in liquid form. There appears to have been a number of different Maya recipes for liquid chocolate. Liquid chocolate was poured between cylinder vessels to produce a froth, the most delicious part of the drink. The process of producing chocolate from cacao seeds is quite elaborate. Cacao pods contain a sweet white substance in addition to the cacao seeds. The seeds must be fermented in the sweet white substance for a few days. The seeds are then roasted and crushed to make chocolate liquor. Not all cacao is the same, but the variety that grows in the Maya region still produces the best-tasting chocolate today. Milk and sugar weren't added to chocolate until after the Spanish arrived.

“Tajin Sacrifice Scene” by Thomas Aleto licensed under CC BY 2.0

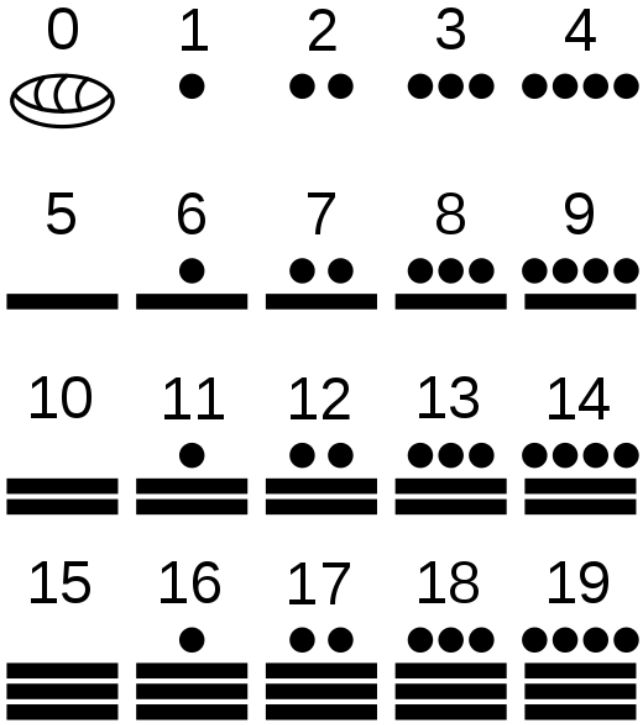
Cacao pod”. Flickr. CreativeCommons. Photo: Rosie tulips

Calendars

The Maya were astronomers in the sense that they kept track of the cycles of the moon, sun, Venus, and stars. They used the cycles to make future predictions; That is to say, astrology. The Maya also had several ways of tracking time, not unlike archaeologists. Perhaps the one that most people are familiar with is the Long Count, which was used for tracking very long time periods of time. The Maya invented the concept of zero and used a symbol to represent zero mathematically, which facilitated the manipulation of large numbers. The Long Count is basically a count of days forward from a base date, specifically 3114 B.C.E. in the Gregorian calendar. The base date is very much like A.D. (Anno Domini) or C.E. (Current Era). We also have rotating cycles, seven days named after Norse gods with months named after Roman gods and emperors. A Long Count date appears at the beginning of every Maya monumental writing. Mayan numbers are very simple. A dot means “one” and a bar means “five”. Two bars

mean “ten”, and so on. The Maya did not have other units of time that are equivalent to ours, however. There was no 7-day week for example. Instead, they carved up time using 20 as a base. Here is how the Maya organized time in the Long Count:

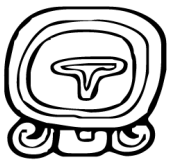
Kin= 1 day
Uinal= 20 days
Tun=360 days
Katun= 20 tuns (7,200 days, about 19.7 years)
Baktun= 400 katuns (144,000 days, about 394 years)

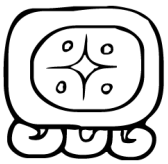


Maya numerals by Bryan Derkson is licensed under CC BY SA 3.0

Long Count dates are often written like this in English: 13.0.0.5.10. However, the Maya wrote numbers vertically with the largest unit at the top and the smallest at the bottom, similar to the familiar thousands, hundreds, tens, ones, system. Now you can see why it is called the Long Count. It was the Long Count that set off a frenzy of panic in some circles in late 2012. That was the date for the Long Count cycle to come to an end. After 13 baktuns, the Long Count “turns over” and starts again, or according to some, the world ends. Given that

the Maya themselves inscribed dates beyond the end of the 13th baktun it appears that even the ancient Maya didn't think it was cause for alarm. But wait, that's not all. The Maya had two other calendars at play. The Maya had a 260-day calendar called the Tzolk'in and a 365-day solar calendar called the Haab. The Tzolk'in was a ceremonial calendar that marked important ritual days, which continues to be used to this day. The Haab was the civil calendar, used to keep track of days in accordance with the changing seasons. The combination of the two calendars called the Calendar Round, returned to its starting point, 4 Ahau 8 Cumku, every 52 years. (The smallest number that can be divided evenly by 260 and 365 is 18,980, which equals 52 years). This was an occasion for building monuments, ceremonies, and celebrations.

Seq. Num. [1]	Day Name [2]	Glyph example [3]	16th-c. Yucatec [4]	reconstructed Classic Maya [5]		Seq. Num. [1]	Day Name [2]
01	**Imix'**		Imix	Imix (?) / Ha' (?)		**11**	**Chuwen**
02	**Ik'**		Ik	Ik'		**12**	**Eb'**
03	**Ak'b'al**		Akbal	Ak'b'al (?)		**13**	**B'en**
04	**K'an**		Kan	K'an (?)		**14**	**Ix**

05	**Chikchan**		Chicchan	(unknown)		**15**	**Men**
06	**Kimi**		Cimi	Cham (?)		**16**	**K'ib'**
07	**Manik'**		Manik	Manich' (?)		**17**	**Kab'an**
08	**Lamat**		Lamat	Ek' (?)		**18**	**Etz'nab**
09	**Muluk**		Muluc	(unknown)		**19**	**Kawak**
10	**Ok**		Oc	(unknown)		**20**	**Ajaw**

The Tzolk'in can be visualized by two rotating wheels. Wheel 1 has thirteen numbers and Wheel 2 has 20 named characters. The combination of the first number and a day won't repeat for 260 days. The Haab is somewhat more familiar having months. There are 18 months of 20 days each, plus one month of 5 days for a total of 365 days. That last awkward month of only 5 days was

said to be bad luck and may have even gotten you sacrificed. If you want to know when you were born according to the Maya calendars try this link The Maya had still other forms of tracking time. The Katun cycle was particularly important (about every 20 years) and was a cause for monument building and celebration.

Collapse?

The Maya "collapse" occurred in the 700s. most archaeologists do not like to use the word collapse, especially in the Maya case, because the Maya continued in other areas. Nonetheless, something different began to happen around the 700s. During this time monument building began to decline along with hieroglyphic texts and some long-distance trade contacts ended, and warfare increased. And yet, because the environment was so variable and the kingdoms so diverse, the collapse happened differently in different areas. Some areas were depopulated, others built fortifications, some areas even flourished during this time period while others saw a slow decline. The phenomenon that universally disappeared during the collapse was the idea of the holy lord, the K'uhul Ajaw, with the associated stelae and tomb temples. In this way, the word "collapse" does not necessarily mean the disappearance of a people, but the disappearance of a particular ideological system.

Some have argued that the system of the holy lord was inherently unstable and the constant competition for power, costly displays, and warfare were ultimately unsustainable. Others point to climate change and population sizes as being a major factor in the collapse. Some have argued for a disconnect between climatic, demographic and ideological factors that could no longer be sustained. The Maya passion for plastering public monuments is a good example. Lime plaster, so important in the maintenance of the theater state of the K'uhul Ajaw, required burning of limestone, which is turn required fuel. In this way, the material required to support the pageantry of Maya kingdoms may have directly contributed to environmental degradation in the form of rainforest clearing and subsequent erosion. The pageantry of the K'uhul Ajaw was incompatible with the delicate nature of the rainforest. Research continues

today to try to understand how the collapse of the K'uhul Ajaw unfolded in different regions.

Acid Rain and Maya Monuments

Oil refineries and tour busses produce chemicals that can lead to acid rain in the Maya region today. The oil refineries produce nitrogen and sulfur oxides (Nox and Sox), eventually producing sulfuric and nitric acid as they react with water and oxygen in the air. Pemex, which is government-run, owns the oilfields, which are economically important to the region. The Maya constructed their monuments from limestone ($CaCo_3$) and like corals in the ocean and subject to deterioration from acid rain. The acid rain can turn the limestone or lime stucco into gypsum, which flakes and crumbles off. In some cases, it produces a "black scab". Removing the scabs also tends to remove the underlying paint and stucco. In other areas that are rarely visited, sites may be more protected by the forest from acid rain. While the sculptures at the Parthenon were removed to an indoor location (and replaced by replicas outside), the giant Maya temple monuments cannot be sheltered so easily.

Recommended Readings

Demarest, Arthur 2004 Ancient Maya: The Rise and Fall of a Rainforest Civilization. Cambridge. Coe, Sophie D. and Michael D. Coe 1996 The True History of Chocolate. Thames and Hudson. i Arthur Demarest, Ancient Maya: The Rise and Fall of a Rainforest Civilization. Cambridge. 2004, P. 297 ii Vessel with Mythological Scene [Guatemala; Maya]" (1978.412.206) In Heilbrunn Timeline of Art History. New York: the metropolitan Museum of Art, 2000–. http://www.metmuseum.org/toah/works-of-art/1978.412.206. (October).

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Chapter 11: The Moche →

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Chapter 11: The Moche

"Moche Ceramic Portrait Vessel, Peru" by Gary Todd is licensed under public domain.

The waters off the west coast of Peru are some of the world's richest fishing areas. The shore, however, is one of the world's driest deserts as the cold air off the seawater inhibits rainfall on the shore. The rain doesn't fall until it reaches the Andes, forming rivers flowing from the Andes through the desert. The entire coastline is marked by rivers. Much like the Hohokam of Arizona, without canal irrigation, agriculture would be impossible here. The Moche Culture (ca. AD 150–AD 700) consisted of several political centers located along these Peruvian waterways. Like the Mississippians, Southwest cultures, and the Maya, the Moche were reliant on maize, coupled with other native domesticates like potatoes, peanuts, and peppers. They also hunted marine mammals. The Moche are most known, however, for their fantastic artwork, elaborate elite burials, and ritual theater.

Monumental Architecture

The site of Cerro Blanco, also called the Moché site, is located along the Peruvian coast in the Moche River Valley. The Moche Valley where the site is located is thought by some to have controlled other centers along the coast of

Peru. The site of Cerro Blanco is dominated by two major "pyramids"—the Huaca del Sol (130 ft) and the Huaca de la Luna (100 ft). A huaca (wak'a) is a revered monument or object in the native language of Quechua. Between the two pyramids is a large plaza. Huaca del Sol was a solid adobe, built of more than 130 million bricks. Laborers might have been conscripted to build these pyramids from neighboring valleys. Archaeologist Michael Mosley has found more than 100 different maker's marks impressed into the adobe bricks and has made a case that these symbols represent the makers of different workshops, much like marks on the bottoms of modern-day pottery. Different sections of pyramids were made of bricks with different symbols, suggesting different groups of laborers worked these different sections.

"Mud Bricks with Makers' Marks at Huaca del Sol/Huaca de la Luna, Peru" by Tyler Bell is licensed under CC-BY 2.0

The Spanish destroyed the western portion of Huaca del Sol when they diverted the Moche river to
hydraulically mine Huaca del Sol for its rich tombs. Today, less than half the

monument remains. Huaca Sol was likely used as both the chief's residence and mausoleum for important leaders. Across the plaza, Huaca de la Luna is a complex of three platforms surrounded by high adobe walls. Painted murals have been discovered on the Huaca de la Luna depicting warfare and decapitation.

Scene from Huaca de la Luna. "Las Huacas de la Luna" by Walrren Talbot is licensed under CC BY 2.0

Huaca del Sol at the Cerro Blanco Site. "Huaca del Sol" by Gustavo M. is licensed under CC-BY 2.0.

Pottery

Moché pottery, like Mimbres pottery, is world famous for its craftsmanship and naturalistic depictions. Unfortunately, just like Mimbres pottery, it has been the target of looters which continues to this day. Moché pots from Peru, in contrast to those of the Southwest, were made using pottery molds. A master artisan would create the mold matrix, the original sculpture. Clay would be added to the exterior to create the mold, which once dry was fired. Clay was then added to the interior of the two halves of the mold, making replicas of the original mold matrix. In this way, exact copies of the original work could be made. Not surprisingly, pottery was produced in workshops by craft specialists.

One common pottery form is the stirrup-spout vessel, which was likely used for pouring liquids. Moché portrait vessels are often stirrup-spout vessels that depict actual people—almost certainly Moche warriors. Archaeologist Christopher Donnan has done an extensive study of Moche portrait vessels and

found that individual men can be identified through distinguishing marks like scars and headdresses. These men are depicted throughout their lives, from childhood to adulthood. You can see how the mold matrix would be a useful technology for depicting individuals throughout their lifetime. The matrix could be used over and over again with slight adjustments made for aging.

On some of the vessels, there are references to coca. Coca is a native plant containing the alkaloid
cocaine. It is traditionally chewed or used in tea as a stimulant or pain reliever. On some Moche pots, vessels for coca are depicted or leaves being chewed in the mouth. It is thought coca was important in warfare to maintain alertness and vitality. Some of the vessels show warriors on the losing end of the battle—naked and bound awaiting sacrifice.

Moche pottery and meaning

Moche pottery was not just portraits. They also made the so-called Moché "sex pots." These were functional vessels of a variety of forms. There are at least 500 known vessels or sculptures of this type. Unfortunately, many of these pots come from unknown contexts, being the spoils or collectors and looters (like Mimbres pots of the Southwest), and the Moché had no written records. A variety of sex acts are depicted including masturbation, fellatio, and anal penetration. The most common of these is male-female anal sex, while the depiction of vaginal penetration is rare. In some cases, the woman is breastfeeding an infant at the same time. Historical Spanish records (much later than the Moche) indicate that both homosexual and heterosexual anal sex were common along the Peruvian coast, though the Spanish attempted to eradicate the behavior.

Moche sex pot. "Moche Pottery" by Gary Todd is licensed under public domain.

Myth or Reality?

Elaborate battles are frequently depicted on Moche pottery. In one famous example, called the Luhrsen Vessel, the battle ensues between pairs of elaborately dressed warriors. Naked men with ropes around their necks are depicted as well. Other Moche vessels depict characters in a sacrifice ritual, including a Warrior Priest, an Owl Priest, and a Priestess. The Warrior Priests drinks from a goblet while captives have their throats slit by people holding small cups. It was originally thought that these images represented purely mythological events as there was little material evidence to indicate this type of ritualized warfare. Later discoveries at Sipán, San Jose de Morro, and Cerro Blanco, indicate that these images were depicting, real people and actual events. The Lord of Sipán, as he is called, represents the Warrior Priest. A total of 451 gold, silver, copper, textile, and feather objects were buried with him. Groups of sacrificial victims, horribly mutilated and encased in clayey mud,

have been found in the plaza area between the two principal huacas at the site of Moche (Cerro Blanco). Statuettes representing captives, with ropes around their necks and penises, have also been discovered in association with these skeletons. These finds indicate that the images on Moche pots and murals represent real practices and not purely mythological events.

It is thought that Moche nobility engaged in ritualized warfare—with the losers stripped of their clothes and sacrificed. Blood from the victims was consumed by priests and the victims are subsequently dismembered. Today, ritual warfare occurs between villages in the Andes, but while violent this stops short of death.

The warrior culture of the Moché is not so unusual and can be seen again and again throughout history. Certainly, Teotihuacan in Mexico glorified the warrior, particularly in the Temple of the Feathered Serpent. Late Bronze Age Europe (1300–800 B.C.) also had a distinct warrior theme, where men gained status through their exploits. Huge numbers of weapons, especially battle axes, were in circulation, and depictions of warriors in their regalia abound. The macho-ness of the Bronze-age warrior is captured in Homer's *Illiad*.

Social Hierarchy

Moche society was hierarchical with apparent inheritance of wealth and power. Marked disparities in burials and residences occur, that is, burial and residential hierarchy. Burials near the huacas are more lavish, and some residences are more solidly built than others. These more elaborate residences also contained valuable objects such as copper implements and stirrup-spout vessels, thought to be used for drinking chicha, or corn beer.

Shift in Settlement

Around AD 600, the beginning of the Moche collapse, an extreme El Niño (mega-El Niño) event occurred on the coast. Flood waters damaged Moche constructions during this time. The rains also explain the sacrificial victims

encased in the mud at the site of Cerro Blanco. Ice cores and sediments indicate that a severe drought followed the mega-El Niño event on the coast. This climatic oscillation from wet to dry could have greatly weakened the Moche culture. Not only would people have suffered from environmental devastation, but they might have lost faith in the elite ideology. In the 600s, the large ceremonial centers are abandoned. The Moche began building fortified sites on defensive locations on high ground. Piles of sling stones indicate warfare—likely among the Moche themselves.

← Chapter 10: Classic Maya

Chapter 12: Gift of the Nile →

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Chapter 12: Gift of the Nile

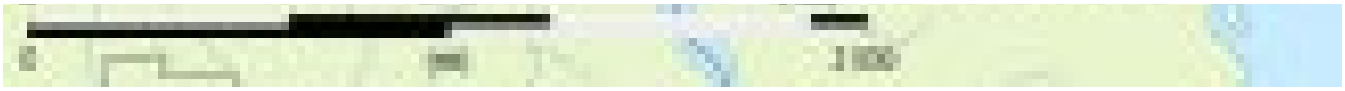
I gave bread to the hungry, beer to the thirsty, clothes to the naked, and a boat to him who was boatless."— Liturgy from the "Book of the Dead"

Lay of the Land

Egypt is a land of very little rainfall, averaging only 10 millimeters annually, not so different from the Moché environment of Peru. The Nile River, so critical to Egyptian culture, flows south to north through this vast desert. The Nile flows from mountains in the south to the Mediterranean in the north. Perhaps a little counter-intuitively, the northern delta is called Lower Egypt because of its downstream position. The southern portion of Egypt is called Upper Egypt because of its upstream position. Prevailing winds blew from the north to the south and so Egyptians used sails for going south and the natural current for heading north. In hieroglyphics, going south is indicated by ships with sails and going north by those without. To the south lay Nubia, below the first cataract of the Nile, where the river flows through granite and is marked by boulders and rapids.

The Nile has deposited fertile silty soils along its banks, providing the desert a richness along the valley floor. Egyptians called the Nile floodplain “Kemet” (meaning black land) for its fertile soil and the Nile itself Iteru. In ancient Egypt, the Nile flooded annually about 7 or 8 meters, bringing water and fertile silt from the African interior while at the same time removing salts. When the waters receded, a narrow strip of land along the Nile became agriculturally productive. Because the surrounding land was arid desert, this narrow strip along the Nile became densely populated. Flooding also facilitated the movement of building stones and statuary directly from quarries along the Nile cliffs onto barges. In the 1960s, the construction of the Aswan Dam stopped the annual flooding that for so long directed the lives of the Egyptians.


LIBYA
EGYPT
Luxor
Aswan
Lake Nasser
Red Sea
CHAD
ERITREA
Khartoum
SUDAN
Blue Nile
Lake Tana
ETHIOPIA
SOUTH SUDAN
White Nile
CENTRAL AFRICAN REPUBLIC
Juba
Lake Albert
UGANDA
Lake Kyoga
DEMOCRATIC REPUBLIC OF THE CONGO
Jinja
KENYA
RWANDA
Lake Victoria
BURUNDI
TANZANIA



The Blue and White Nile feed into the Nile. “White and Blue Nile” by Hel-hama licensed under CC BY-SA 3.0.

Dynastic Egypt

Dynastic Egypt spans a huge time frame between ca. 3100 BC to 30 BC. King lists have been found from several sites, helping archaeologists and historians sort out historical chronologies, or time periods. Some kingships were held concurrently, making chronology building more difficult.

Chronology: Ordering Historical Events

- Archaic Egypt, or Early Dynastic Egypt (ca. 3100 to 2575 BC)
- Old Kingdom (ca. 2575 to 2134 BC)
- Middle Kingdom (ca. 2040 to 1650 BC)
- New Kingdom (1530 to 1075 BC)
- Late Period (1070 to 30 BC)

The Early Dynastic or Archaic Period (ca. 3100 to 2575 BC) consisted of the 1st, 2nd, and 3rd dynasties. Memphis (near modern Cairo) was founded as an administrative and economic center of the state. Egypt was politically

centralized at this time, meaning that power and authority were consolidated under a single government. A bureaucracy, or administrative organization, was formed to rule over different areas. The country was divided into precincts called *nomes*, each governed by a *nomarch*. During this time, pharaohs (overall rulers) assumed the role of divine kings, and writing, royal tombs, large-scale projects, and Egyptian ideology emerged.

"The Narmer Palette" by unknown licensed under public domain.

The first pharaoh, or ruler, Narmer (aka Menes), is given credit for consolidating Upper and Lower Egypt c. 3100 BC from the previous independent competing kingdoms of Predynastic Egypt. The Narmer Palette depicts Narmer defeating his enemies. On one side (left), Narmer wears the white crown of Upper Egypt and postures over an enemy. On the other side (right), wearing the red crown of Lower Egypt he marches to view decapitated prisoners. The entwined creatures likely symbolize harmony. Narmer combined

the white crown of Upper Egypt and the red crown of Lower Egypt, symbolizing a unified Egypt. Interestingly, elaborate headdresses worn by important leaders along with staffs symbolizing power are recurring themes in prehistory—think of the Maya, Moche, and Mississippian. Also, note that Narmer is grabbing the hair of his vanquished foe, not so different from the much later ritualized combat of the Moché. The veracity of Narmer as the first pharaoh, conquering by force remains debated in archaeological and historical circles. There is little evidence for a violent overthrow and the textural evidence is also scant. As with the Maya, rulers could have used images for political propaganda. Then again, as we have seen with the ancient Moche, virtually nothing is off the table, and events depicted in art could represent real-life events.

The Old Kingdom

The Old Kingdom (ca. 2575 to 2134 BC), which comprised the 4th to 8th dynasties, was in many ways a continuation of the Archaic Period and was characterized by prosperity and stability. The pharaoh had secular (non-religious) and sacred powers and was the earthly manifestation of Horus (falcon god) or the son of Ra (the sun god). Ra's identity was often fused with others in an attempt to unite different areas. The pharaoh's duty was to mediate with the gods and assure the annual flood cycle.

The Old Kingdom was centered in Memphis and was characterized by massive public works, like the construction of royal tombs and temples. The layout of early Memphis is unclear, but it appears the central area was dominated by the palace surrounded by a fortress of white walls. The necropolises (cemeteries for an ancient city) for Memphis were Saqqara and Giza. The Pharaoh Djoser had the Step Pyramid at Saqqara built northwest of Memphis, with a vast necropolis or mortuary complex. The stepped sides were oriented to the cardinal directions. The pyramid inaugurated the practice of pyramids as royal tombs. The king's body was buried in a chamber beneath the pyramid. The Step Pyramid at Saqqara was designed by Imhotep and was surrounded by a stone wall. The king made public appearances here during life.

Saqqara pyramid of Djoser

The pyramids of Giza—the Great Pyramid (Pyramid of Khufu, c. 2560–2540 BC), the Pyramid of Khafre, and the Pyramid of Menkaure—were built during the Old Kingdom period. After death, the pharaoh was buried in a chamber in the pyramid and joined the sun god, the pyramids being symbolic ladders to heaven. More than 2 million limestone blocks went into the construction of the Great Pyramid (compare to Huaca del Sol in the Moché river valley).

“Great Pyramid of Giza from a 19th-century stereopticon card photo” by unknown licensed under public domain.

The Great Pyramid was part of a larger complex with an enclosure wall, a memorial or mortuary temple, causeways, queen pyramids, and pits. Causeways or sacred roads are another recurring themes. Remember the Great Hopewell Road, the Chacoan roadways, and the Maya sacbes? Excavation at the

Great Pyramid complex revealed the remains of an Egyptian boat, the Khufu ship, made of cedar planks. This ship is sometimes called the solar barque and might have been the vessel to carry the King to the heavens with the sun god Ra. This ship is analogous to the vessel possibly portrayed on the Nebra Sky disk. It is also possible that the vessel was used by the king for actual voyages along the Nile. The Great Sphinx of Giza—a recumbent lion with a human head—appears to be associated with the funerary complex of the Great Pyramid. The combination of human and feline goes back to the Upper Paleolithic with the Lion Man of Hohlenstein Stadel, Germany dating to ca. 38,000 years ago. And we saw humans wearing leopard and jaguar skins at Catalhoyuk, Turkey, and among the Classic Maya at Bonampak.

Sphinx & Great Pyramid at Giza, Egypt by Tom Beazley is licensed under CC BY 2.0

A complex system of taxation involving agricultural products, raw materials, and labor was in place in the Old Kingdom. The increasing number of mortuary and ritual centers during the Old Kingdom required support for their maintenance. Through time, these became more poorly built and smaller. The Old Kingdom became increasingly decentralized as nomarchs gained power and

fought with each other, resulting in political instability. One text, the "Lamentations of Ipuwar," relates "The land is full of gangs and a man goes to plow with his shield…All is in ruin, a man smites his brother, plague is throughout the land, blood is everywhere…The land is diminished, its rulers are multiplied." The pharaoh granted estates to priestly specialists, which eventually diminished the pharaoh's resources. Prolonged drought also weakened the state, and the Old Kingdom came to an end. This period of strife is known as the First Intermediate Period.

Middle Kingdom

The Middle Kingdom (11th to 14th dynasties) was centered in Thebes in Upper Egypt but moved back to Memphis in the 12th dynasty. Thebes became a religious center for the god Amun-Re. Pharaohs of the Middle Kingdom were less despotic than the Old Kingdom and the status of the pharaoh was diminished. A few smaller pyramids were built during this period, but the practice virtually died out by the end of the Middle Kingdom.

Above: Relief of Amenemhat I from his mortuary complex at El-Lisht licensed under CC BY SA.

Trade increased during the Middle Kingdom, particularly with Nubia (Sudan) to the south and Palestine to the northeast. The Hyksos “ruler of foreign countries” from western Asia took control of northern Egypt. Ambitious mining and construction projects weakened political control, leading to the Second Intermediate Period, a time of decline.

Above: Depiction of Asiatic people, possibly Hyksos, entering Egypt, c. 1900 BC licensed under CC BY SA.

The New Kingdom

The pharaoh Ahmose of Thebes drove the Hyksos out of northern Egypt, ushering in the New Kingdom (1530 to 1075 BC). The New Kingdom was a time of centralization of power and is one of the best-known periods. The 18th Dynasty of the New Kingdom is known as Egypt's Golden Age. Kings were military, religious, and judicial leaders, and the New Kingdom extended rule farther north than ever before. Armies and priesthoods became increasingly powerful. The political capital returned to Memphis and Thebes became an important religious center. Many ambitious construction projects occurred during this time. Ramesses II (Ramesses the Great) built more temples, statues, and obelisks than any other pharaoh. An obelisk is a large column built from a single piece of stone with a pyramidal shape at the top. There is very little mention of slaves in Egyptian writing, but there are texts referring to

conscripted labor called corvée labor. It is therefore thought that people were required to work for the state at least for part of the year, similar to military service in some countries today. Evading state work resulted in serious penalties.

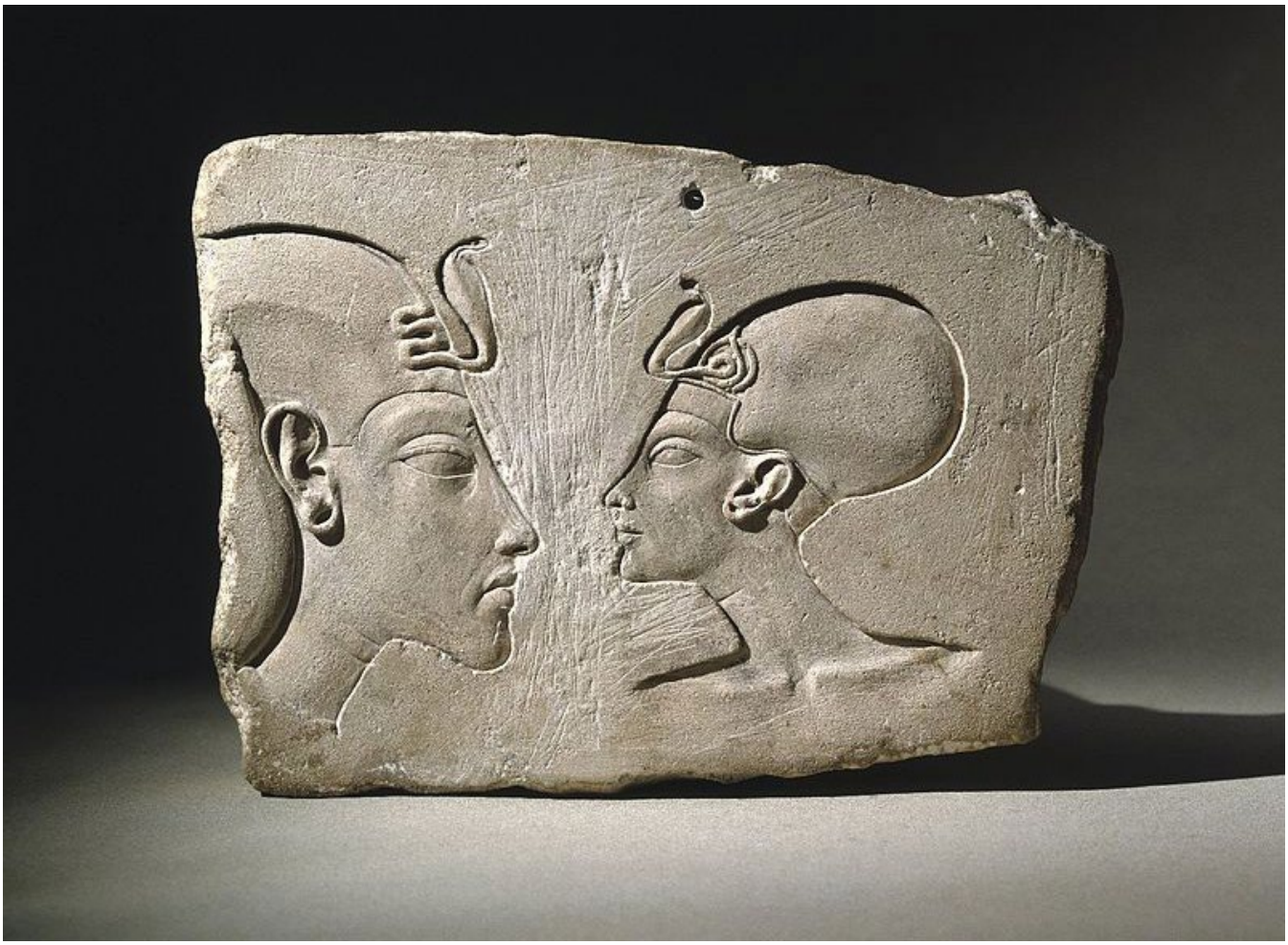
Unlike the pyramid tombs of the Old Kingdom, the Valley of the Kings, on the west bank of the Nile opposite Thebes, was the burial place for pharaohs and nobility during the New Kingdom. Most of these tombs were carved into limestone rock, and most of these were robbed in antiquity. Care and expense were devoted to mummification in the New Kingdom. King Tutankhamun was pharaoh during the New Kingdom. His tomb was discovered in the Valley of the Kings by Howard Carter. Many obelisks—carved out of a single piece of granite—were constructed during the New Kingdom under the reign of Hatshepsut, a woman pharaoh. A woman as pharaoh went against the Egyptians' idea of the correct order of the world or ma'at. Most Egyptian obelisks, eight of them, are now in Rome. The Washington Monument in Washington D.C. was inspired by Egyptian obelisks, though it is not built from a single piece of stone. The monument was a way to connect the relatively new country to the mystery and power of ancient Egypt.

Valley of the Kings licensed under CC BY SA 2.0

“The Flaminio Obelisk (An Egyptian obelisk of Ramesses II brought to Rome

from Heliopolis) Piazza del Popolo." by Charles Ng is licensed under CC BY 2.0.

New Kingdom pharaohs promoted the god Amun-Re, whose cult was based at Karnak. Amenhotep IV promoted another god, Aten, and established a new capital at Amarna (also called Akhenaten), escaping the influence of the powerful priesthood. Akhenaten banned the worship of other gods and had their names expunged from monuments. The art of the period changes dramatically. Bodies become androgynous (sexually ambiguous) and heavily drooping, and heads are egg-shaped. This period is known as the Amarna Period. After his reign, Egyptians returned to the previous religion.



"The Wilbour Plaque, ca. 1352-1336 B.C.E" by Brooklyn Museum is licensed under public domain.

As Egyptian neighbors increased in power, pharaohs turned to diplomacy. The Amarna Letters from Tell El Amarna are a collection of 350 clay tablets that served as diplomatic letters between Egypt (Amenhotep III) and its neighbors, mainly concerning mutual defensive pacts and the exchange of gold, lapis lazuli, ebony, horses, ivory, and ebony. Gifts and wives were exchanged between Egypt and other kingdoms, ushering in an era of diplomacy rather than warfare. Pharaohs married daughters of western Asian kings, but Egyptian daughters never married foreign rulers (p. 43). Thutmose III brought the sons of conquered foreign towns to be educated in Egypt and indoctrinated in Egyptian ideology.

The Rammesides came to power in the 19 and 20th Dynasties as the Assyrians were coming to power in the Near East. The biblical account of Exodus is placed

by some scholars during this period. Hebrew names are known from Egypt during the New Kingdom and Hebrews are known to have worked on state projects. No mass exodus, however, was recorded. Huge mortuary temples were built at Thebes, putting a strain on resources. Worked for the royal tomb and went on strike when the government was unable to pay. Rameses II had his memorial temple built at Thebes, now called the Rassesseum, where the colossus head “the Younger Memnon” was discovered, (and taken to the British Museum in 1818). The finds inspired Percy Bysshe Shelley’s sonnet Ozymandias. Nile inundations have taken their toll on the monument along with neglect. At Abu Simbel, Ramesses II had two massive temples carved into the rock face along the Nile built for him and his wife in Nubia (southern Egypt). The monuments were built between 1264 and 1244 B.C. The temples were cut into blocks and moved to higher ground in 1968 when threatened by the construction of the Aswan Dam. Today, these are listed on UNESCO’s World Heritage site list.

"The Great Temple of Ramses II, Abu Simbel, AG, EGY" by Warren LeMay is licensed under public domain.

"The statue of Ramses the Great at the Great Temple of Abu Simbel is reassembled after having been moved in 1967 to save it from being flooded" by Per Olow licensed under public domain.

Growing unrest, corruption, and unsuccessful military campaigns led to the Third Intermediate Period a time of political decentralization. The Assyrians attacked Thebes carrying booty and obelisks back to Assyria. The Late Period saw an artistic renaissance that looked back on Egypt's greatness. Nubian, Egyptian, and Persian kings ruled at different times in the Late Period. The occupation of Egypt by Alexander the Great removed the Persians and brought the Late Period to a close, after which Egypt was ruled by the Macedonian and Ptolemaic dynasties. Egypt became a Roman colony in 30 BC.

Belief

The Egyptian sense of order was called maat or ma'at, and transgressions against righteous behavior could result in chaos. Everyone from the lowliest peasant to the pharaoh was responsible for maintaining maat. In the Book of the Dead, Spell 25 indicates rightful behavior: "I have not slain people. I have not been sullen…I have not had intercourse with a married woman…I have not disputed the king." The pharaoh was instrumental in ensuring the maintenance of harmony through offering to the gods in temples. The pharaoh was the incarnation of the god Horus (who avenged the death of his father Osiris). Egyptians revered and valued life, but prepared for death. Upon reaching adulthood, one began making arrangements for his or her tomb. The Egyptians believed that the soul separated into different parts upon death. The ka took the physical form of the person and required all the things that the living needed. Unlike other civilizations that we've studied, the Egyptians believed that the mere representation of things, like servers, acted as the real thing in the afterlife. Human sacrifices were therefore not performed after the first dynasty. The soul also took the form of ba with the head of the person and the body of a bird. The ba stayed with the sarcophagus at night in the tomb. During the day, the ba flew away to be in the sunshine. Finally, the akh was the spirit of the dead that mingled with the gods. Mummification was necessary for the ka and ba. The sarcophagus was often in the shape of the deceased so the ba could recognize the correct person, and sometimes facial features were modeled using plaster. The process of mummification changed over time, with the earliest being naturally desiccated corpses in pits. With the use of sarcophagi, other

means were necessary to preserve the body, including removal of the internal organs (the heart was often left in the body), packing the body with natron (a natural salt), and wrapping the body in linens. Canopic jars were used to house the organs. The soul of the deceased was judged in the afterlife. The dead would recite the liturgy from the "Book of the Dead": I gave bread to the hungry, beer to the thirsty, clothes to the naked, and a boat to him who was boatless."

Writing and Scribes

Like the Maya, Egyptians had a true writing system in addition to scribes. Also, like the Maya, not everyone was literate and it is estimated that only one percent of the Egyptian population could read and write (p. 77). Unlike the Maya, the Egyptians had vast archives to keep track of herd sizes, grain, production of goods, wages, booty, fallen enemies, as well as letters, wills, titles, inventories, journals, regulations, conscription lists, and so on. Close accounting made taxation and conscription possible. Scribes wrote on ceramic or limestone scraps, while formal documents were written on papyrus made from overlapping reeds. Scribal instructors were strict. On one papyrus text, it warns, "Scribe do not be idle…Do not give your heart to pleasures, or you shall be a failure…Preserve in action every day, so that you may gain mastery. Spend no day in idleness or you shall be beaten—a boy has a back, and he listens to a beating."

The Rosetta Stone was discovered in 1799 by Napoleon's invading forces. The granitic tablet contains texts in ancient Greek, and Egyptian hieroglyphs and demotic, a cursive form of the hieroglyphic script. The multiple scripts allowed epigraphers to decipher the hieroglyphs, once thought to be completely pictographic. Thomas Young proposed that the cartouches, ovals enclosing groups of hieroglyphs, on the Rosetta Stone contained royal or religious names, leading to a breakthrough in decipherment. Jean François Champollion announced the complete decipherment of Egyptian hieroglyphs in 1823. Egyptian hieroglyphs are logophonetic, meaning they use logograms and symbols that stand for one or more sounds. Hieroglyphs also contained determinatives, which are added at the end of a word to indicate the category to

which the word belonged.

← Chapter 11: The Moche

Chapter 13: Student Projects →

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Chapter 13: Student Projects

Student Focus

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut elit tellus, luctus nec ullamcorper mattis, pulvinar dapibus leo.

← Chapter 12: Gift of the Nile

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Student Focus

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