Emergence of Civilizations: Notes 4

A brief introduction to archaeology: How we recover prehistory

- Most of this course will deal with societies that existed thousands of years ago
  - How can we know anything about them?
  - Obviously, we can't observe the people directly
  - If we were historians, we would consult written records
  - But most of what interests us here happened before people were writing much, or at all
  - So we have to figure out what happened in the past based on other kinds of evidence
  - Our main sources of information are the material things left over from these people's lives
- The methods and theories used to study these remains make up the field of archaeology
  - Basically, archaeology is anthropology extended into the past
    - Except that cultural anthropologists study living people
    - While archaeologists use mostly material remains to get at the same kinds of questions
  - To be more specific, archaeologists basically try to do three things
    - 1. Reconstruct how people lived at some moment in the past
      - creating “snapshots” of the past; like ethnographies (or documentaries) of societies
      - essentially, we want to know how things worked at some single time.
      - often called a **synchronic** view – looking in detail at a single moment or period in time
    - 2. Put a series of these “snapshots” in order, creating a historical description of how things changed over time
      - this is essentially the same as history, but not based on written records
      - hence sometimes called “**prehistory**”
      - or “**culture history**”
      - often called a **diachronic** view – looking at change over time
    - 3. then *explain* these changes over time; try to figure out *why* things changed as they did
      - usually by dreaming up hypotheses and testing them
      - This is the tricky part (not that the rest is easy!)
- The past is gone. What evidence is available to help us reconstruct it?
  - Answer: All the garbage and debris that people have left behind that hasn’t been destroyed.
    - people throw away garbage and leave stuff behind. It piles up. Just think of a dump, an empty lot, or an abandoned barn.
    - This is the **archaeological record**: The material remains of human activities
  - This junk is often - but not always - buried
    - archaeologists like buried junk because burial protects things
      - stuff that does not get buried, but instead lays around on the surface of the ground, tends to weather, decay, and disappear
    - sometimes people bury things intentionally
      - burials of the dead
      - putting trash in a pit
      - putting food in a storage pit and then failing to retrieve all of it
      - hiding valuables in a hole and failing to retrieve them

    - burying offerings to the earth or other supernatural forces
    - digging trenches into the ground and building foundations in them
    - Leveling an abandoned building and then building a new structure on top of the debris
  - sometimes buildings and other structures bury themselves
    - as an abandoned adobe house weathers in the rain, the walls melt and the mud covers the floor, the bases of the walls, and any trash that was still laying around
    - as abandoned stone walls collapse, the rubble of the upper parts does the same
  - sometimes nature buries stuff
    - floods deposit silt over anything laying on the ground
    - dirt washes or slides downhill and covers things laying around at the foot of the hill
    - wind may pile up sand and dirt in some places
    - plants, earthworms, and rodents actually create soil and move it bit by bit, gradually covering things and moving them downwards below the surface
  - But a lot of garbage does *not* get buried.
    - in many places, no soil forms and/or none is deposited by wind or water
    - in some places, wind or water may *remove* soil, leaving any artifacts or buildings exposed on the surface, where they may weather away
    - so what we find by excavating is a strange subset of all the original material remains
      - just the things that happen to have been buried and preserved
- So what do archaeologists find?
  - First, we usually *don't* find fragile or organic things that decay:
    - cloth, wood, leather, basketry, paper, most things made from plants or animals
  - But some artifact types are just durable, and are preserved in most environments
    - stone architecture, or other massive constructions
    - stone tools
    - pieces of pottery vessels used for cooking, storage, and serving
    - sometimes bone
    - patterns of different colors and textures of soils caused by digging and filling in pits or trenches, piling up dirt for defensive barriers or burial mounds, etc.
  - Some unusual environments preserve more evidence
    - Extremely dry environments (Egypt, Peruvian coast) preserve things by preventing bacteria, mold, etc. from growing.
    - Certain wet environments that permanently exclude air (underwater sites, bogs) also prevent decay
    - Frozen sites (Siberia, Alaska, the "Ice man" in Alps near the border of Austria and Italy) preserve organic materials well
  - Sometimes we just get lucky with odd circumstances; for example:
    - basketry or textiles preserved as impressions on pottery
    - seeds, textiles, or other organic materials that get burned to just the right degree (carbonized) and are preserved as charcoal "fossils" of the original object
- Ok, so some stuff remains. What can this garbage tell us about the past?
  - We have a problem here: there is a huge gap between
    - what we want to know, and

- the evidence available from which to figure it out
- We want to know about grand questions, like "what led to civilization?"
- but most of the evidence we have is mundane garbage that is not obviously related to those big questions
- and not even all of that – only whatever happens to be preserved

- Weaknesses of the archaeological record
  - Many of the most interesting aspects of culture are not material in the first place
    - we want to know about politics, religion, social structure, myths, etc.
    - but these are not material things that can be preserved
    - except in very indirect ways that we hope to figure out
  - Of the aspects of culture that *are* material, only a biased subset enters the archaeological record
    - certain kinds of things are consumed, like food
    - others are recycled, like metals and glass
    - others end up being burned for fuel, like parts of old buildings
    - The ways that things get into the ground are highly selective
      - Most things that get into the ground are worthless garbage
        - things that have any value generally won't be left laying around until they get buried
        - for example, the archaeological record under-represents gold jewelry - it contains fewer gold rings than did the material culture that it was drawn from
        - usually, only things that are worthless or not movable will be left for us to find
      - We find things that were intentionally buried
        - Caches of valuables that were never recovered
        - Burials of the dead
        - Offerings to the earth, spirits, gods, etc.
        - These sometimes contain whole or valuable items
        - but are a very biased sample of the things that were actually in use
          - only very specific kinds of things are likely to be buried in these ways
          - for example, an analysis of modern US burials would find that men usually wore nice suits and that nobody owned a TV, since they are never included in burials.
      - We occasionally find things that were buried suddenly by catastrophes like volcanic eruptions or mudflows
        - these are probably the only cases in which the archaeological record at least started off relatively complete
        - but these cases are very rare
  - Of the incomplete and biased selection of objects that enter the archaeological record, only an even more biased subset actually survives to be found
    - Many things just decay away: wood, plant material, cloth, leather, often even bone
      - So items that happen to be made of perishable materials are underrepresented
    - Even if the objects do get buried, they are often disturbed later, by people digging holes for house foundations or other purposes, or by plowing the site for farming
      - So evidence in places where people continued to live or work -- which are usually the best and most important places -- is underrepresented

- Of the incomplete and biased selection of things that are preserved, we only find a tiny fraction
  - the vast majority of the archaeological record is still underground
  - collecting and analyzing archaeological material is slow and expensive, so even known sites have only had a very small portion excavated
- **Result**: the known archaeological record is an incomplete, distorted reflection of the past
  - some parts of the picture will be reasonably easy to reconstruct
    - example: food garbage should reflect what people ate
  - but other aspects of culture may be harder to figure out from bits of garbage
    - like religious beliefs
    - political organization
    - social structure, etc.
  - we hope that we can be clever enough to figure out how people lived and what they did from these remains
    - but there is no guarantee that we can
    - or that we can necessarily get it right.
- But this incomplete, biased record does have some good points
  - first, it exists. It *is* evidence of the past
    - it *can* tell us some things about the past
    - which would be completely lost to us otherwise
    - so it is far better than nothing
  - second, most of it is free of the biases of historical records
    - history tends to focus on the interests of people who could write (or pay others to write), so it emphasizes kings, wars, politics, religion, the wealthy classes
      - but archaeological evidence is often more balanced in its coverage of kings and commoners, priests and potters alike
    - historical sources are often unintentionally or intentionally slanted, propagandistic, from a particular point of view
      - houses and garbage don't lie (at least not intentionally)
      - example: the difference between what people in Tucson told pollsters about their alcohol consumption and what Bill Rathje's University of Arizona Garbage Project determined by actually counting the bottles and cans in their trash

- How do we get this evidence?
  - how do we find sites (places with archaeological remains)?
    - archaeologists usually find sites by recognizing artifacts on the surface
      - sometimes walls, foundations, or mounds of accumulated debris are visible
      - more often, bits of broken pottery or stone tools are scattered on the surface
    - sometimes sites are recognized in photos taken from airplanes, showing patterns in relief, soil color, plant growth, etc.
    - by asking the local people, who often know where they have encountered artifacts while plowing fields, digging wells, etc., and who may have oral traditions of where events occurred in the distant past
    - by looking at old maps and documents

- by studying place names
- sites are often found accidentally, such as when a bulldozer working on a construction project plows up some artifacts
- The most thorough method is systematic site survey
  - walking in an orderly pattern back and forth across the entire landscape and recording all artifacts that are laying on the ground
  - If there is ground cover or sites are likely to be buried, it may be necessary to dig small trenches in likely areas, bore holes with augers, test samples of soil, etc.
- by the way, the term "**site**" generally refers to a place like a town, a farm, or a cemetery.
  - A smaller subset of an area, like a single house within a town, or a burial within a cemetery, is usually considered a **feature** within a site.
- systematic survey produces maps showing where sites were at different periods, how big they were, and sometimes other details
  - this information is used in **settlement pattern analysis**
    - we can estimate how the population grew (or shrank) over time
    - we can say some things about social organization based on the sizes, types, and distribution of sites over the landscape
      - did people live in many similar small villages, in a single large city, in multiple cities with towns around them, etc.?

- what if we want to know more about a particular site?
  - map the site
    - many different methods, from pace-and-compass sketches to high-tech laser theodolites or high-precision GPS
  - surface collections: look at the pattern of artifacts laying on the surface
    - this may indicate areas where different activities occurred, sectors that were occupied in different periods or by people of different statuses, etc.
  - sometimes use “remote sensing” techniques to learn about what is below the surface without (or before) digging
    - resistivity testing, ground-penetrating radar, magnetometers, etc.
    - in some situations, these methods can locate and map walls, trenches, pits, certain features like large stones or pottery kilns, over wide areas without having to dig it all up
    - sometimes useful, sometimes not; depending on local soils and other conditions
  - excavate: dig up more evidence
    - excavations are usually done by natural layers (“**strata**”) in the ground
    - each layer accumulated more recently than the one below it
    - taking the ground apart in this way is more complicated than it sounds
    - excavation is slow and expensive, so usually we only excavate a small portion of any site
      - so we only have small samples, not the whole picture
  - study the artifacts and their distributions in time and space
    - record the artifacts and their relationships using photographs, drawings, computer databases, etc.
    - identify and examine the artifacts, sometimes using microscopes, chemical analyses, etc. depending on the objects and questions to be answered

        - look for patterns or trends in the artifacts over time or between different parts of the site using computer and statistical analyses
    - How do we figure out what happened from all this evidence?
        - in many different ways
        - you'll see lots of examples as we go through the course

- How do we know old things are?
    - Two kinds of dating: relative and absolute
        - **Relative dating** puts things in chronological order, older to younger, without specifying dates in years
        - **Absolute dating** gives ages in years
            - also called “chronometric” dating, or "numerical" dating in your reading by DeCorse, or “chemical” dating by Wenke and Olszewski
            - each absolute dating method works only for certain kinds of materials, under certain circumstances
            - they typically involve sending samples to a lab and waiting for the results
            - most absolute dating methods are expensive
            - so we never have enough absolute dates
    - Relative dating methods
        - **Stratigraphy** (study of **strata**, or layers of earth)
            - Based on the **law of superposition**
                - When one layer lies on top of another, the upper one must have been placed there after the lower one.
                - This is the layer-cake model, with oldest at the bottom and most recent at the top
            - There are many things that can complicate stratigraphy
                - even just detecting the differences between strata is often difficult
                - it sounds trivial, but in practice is often hard to figure out
        - Ceramic (pottery) chronologies
            - Ceramics are useful as time markers
                - ceramics are fairly easy to make, and very useful for cooking, storing, and serving food
                    - so many cultures made a lot of pottery
                - ceramics break easily, but the fragments are very durable
                    - so the garbage of many cultures is full of broken pottery
                - ceramics can be made and decorated in a virtually infinite variety of ways
                    - so fashions or styles of pottery vary from place to place and often change
                - so the styles of pottery can serve as convenient markers of time and social groups that used each style
                - and we can expect to find a lot of pieces of pottery, unlike coins, textiles, etc.
            - There are two main ways to figure out the sequence of pottery styles in a particular region.
                - Stratigraphic sequences:
                    - in a site with clear stratigraphic layers, styles in the lowest layer are probably the oldest, followed by styles in higher layers, and so on

- Association with absolute dates:
  - radiocarbon dates (or other absolute dates) associated with pottery styles will indicate the order and duration of each style.
  - Example:
    - In the area where I work, there is a pottery style called the Tumilaca style.
    - I have run radiocarbon dates on cloth from tombs that contained Tumilaca style pots
    - the dates all fall from about 950 to 1200 AD.
    - so, when I find Tumilaca style potsherds on the surface of a site, I can be pretty sure that it was occupied during the "Tumilaca period", from 950 to 1200 AD, without having to run more radiocarbon dates.
- Once a sequence of ceramic styles is established, if you find pottery of one of the known styles at a site, you know that the site was occupied during that part of the time sequence
- So we often divide time up into periods that correspond to fashions in pottery style

- Absolute dating methods
  - historical dates (coins, dated inscriptions, etc.)
  - **dendrochronology** (tree ring dating)
    - the most precise method there is
    - Most trees grow by adding one layer or "ring" of wood per year: a low-density, light-colored part in the rainy season, and a high-density, dark-colored part in the dry season
    - The thickness of the rings varies depending on the climate each year
    - If you count the rings inwards from the bark of a tree, the widths of the rings are a record of the climate of each year back to when the tree sprouted
      - This is done using a narrow core drilled out of the tree, rather than cutting it down
    - Any given period of years has a unique pattern of ring widths
    - If you have a piece of wood with numerous rings, you can match its ring width pattern to an old tree and tell exactly which years your piece grew in
    - The pattern can be extended back further into time by finding older logs that have ring width patterns that overlap
    - this is extremely accurate and precise – to the exact year – but very time-consuming to create the master sequence
      - someone must find chunks of old wood that overlap, with no gaps, from the present back to the period of interest
    - must create a separate master sequence for each region and type of tree
      - some areas have no suitable trees
      - or the climate does not vary enough from year to year
      - or the microclimates vary so much from place to place in the region that no single sequence would work
      - or the work just has not been done yet
    - only relatively large chunks of wood with quite a few rings can be dated
      - if you don't have beams, posts, good-sized wooden artifacts, or large chunks of firewood at your site, you can't use this method
    - range of dating:

    - varies by region; up to 8000 years ago in a few places like northern Europe and the US Southwest
  - but no good master sequences for *any* of the regions we will study in this class
  - still, this method is important, because it provides a positive check to verify and adjust radiocarbon dates
- **radiocarbon dating**: the main points
  - It works. No serious scientist doubts the method
    - although it sometimes fails due to contamination of the samples or other problems
  - it is not precise, that is, radiocarbon dates give a range, not a specific year
    - like 500 AD ± 40 years
    - meaning the true date has a 68% chance of being between 460 AD and 540 AD
      - double the "error estimate" to get 95% confidence (500 AD ± 80 years)
  - a radiocarbon date tells you how long it has been since the tissue of a living thing died
    - How it works is explained in an optional reading posted on the website. I won't test you on that.
  - only organic materials can be dated
    - that is, things that were once alive: wood, bone, shell, leather, wool or cotton cloth
    - unfortunately, organic materials are scarce in most archaeological sites
    - but carbonized wood (charcoal) often survives even when other organic materials have decayed away
    - so charcoal is the most commonly dated material
    - of course, charcoal is only found where there was a fire…
  - inorganic things like pottery, stone tools, etc. cannot be radiocarbon dated themselves
    - if you want to know the age of an inorganic object, you hope some organic material that can be radiocarbon dated was found together with it
  - radiocarbon dates are often reported in two different ways
    - "radiocarbon years", which do not correspond exactly to calendar years
    - "calibrated dates", which are adjusted to correspond to tree-ring dates, that is, to calendar years
      - this is also explained in the optional reading on the website
      - calibrated dates are usually "older" than dates in radiocarbon years; up to about 1000 years older for the earliest periods we look at in this class
      - I use calibrated dates throughout this course, so you don't have to worry about the difference
  - dates are destructive (the sample is burned) and expensive ($200 to $700 per date), so we never have enough of them
- there are also other absolute dating methods that are sometimes used in special circumstances
  - **obsidian hydration**: dates (very roughly) when a piece of obsidian was flaked to make a projectile point or other tool
  - **thermoluminescence**: dates (roughly) when pottery was fired, or certain kinds of stones were heated in a fire
  - **paleomagnetism**: dates when soil was burned in a fire pit or when silt settled out of a still body of water

    - and others…
    - but none of these has been important in the cases we look at in this class, so I won't go into them here.

- Conclusions
  - we can tell reasonably well how old things are and in what order things happened
    - for this class, you won't have to worry too much about how these dates are generated
  - You will, however, want to think carefully about the evidence on which the prehistory we study is based
    - the past is not just given to us as in a history book
    - it is figured out from complex, material evidence
    - archaeologists do make mistakes
    - and reasonable people do disagree on the interpretation of the evidence
    - I will try to give you as much real evidence as possible to back up the reconstructions, and you will have to use it to make up your own mind about what really happened…