

Kings Play Chess on Fine Grain Sand

Teaching “Threshold Six” to the First Year College Student

by Cynthia Taylor

As an American historian teaching in the Big History Program at Dominican University of California, one of the greatest surprises has been the discovery of the Paleolithic era: a historical period which constitutes the longest part of all human history often neglected in western civilization and world history courses.¹ As world historian Craig Benjamin persuasively argues:

The inclusion of the Paleolithic era into the world history narrative is critically important for at least two significant reasons. [First], it is the period during which we became what we are and began to realize our species’ potential, physically, socially, technologically and linguistically... and secondly, the Paleolithic era [as] the foundation of all subsequent

¹ This paper was first delivered as a presentation titled “Pedagogical Issues and the Teaching of Threshold 6: The Paleolithic Era” at the inaugural conference of the International Big History Association (IBHA) at Grand Valley State University in Grand Rapids, Michigan, August 2-5, 2012.

world history...the agrarian and modern eras[,] make no sense at all if the preceding 95% [of human history] is ignored.”²

By encouraging history professors like me to become more familiar with scientific evidence— such as the study of modern primates; modern-day anthropological studies of hunter-gatherer societies; genetics data; and the latest archeological discoveries of human bones, fossils and stone tools—this critical period of human history before off-limits to me as the darkest of all “Dark Ages” has suddenly become illuminated with countless teaching possibilities.

Indeed, inclusion of the Paleolithic Era is critical in explaining the human story but the Dominican Big History narrative goes a step further by placing this early period of human development into the larger context of the eight million year timeframe of what Cynthia Brown identifies as the “Hominine Evolution,” the story of how humans evolved from one branch of great apes about eight million years ago.³ In their text, Christian, Brown and Benjamin use the term “threshold” to describe the turning-points of evolutionary development from the beginning of the universe with

² David Christian, Cynthia Brown and Craig Benjamin. *Big History: Between Nothing and Everything*. Preliminary edition. Boston: McGraw-Hill Learning Solutions, 2010, 106. Print.

³ *Ibid.*, 85.

the Big Bang, or Threshold One dating back 13.7 billion years, to the emergence of today’s modern industrial society, Threshold Eight. “Threshold Six” then connects the emergence and evolution of hominines with the earliest period of the Paleolithic Era as the following table illustrates:

TimeSpan	Emergence of Humans	Human History	Geologic Era / Epoch
65 million ya	Dinosaurs disappear		Cenozoic Era begins
8_7 million ya	Hominines		Between Miocene and Pliocene Epochs (of Cenozoic Era)
2.6 million _250,000 ya	<i>Homo</i> species emerge	Lower/Early Paleolithic	Pleistocene Epoch (epoch of repeated glaciations or Ice Ages)
300K _50K ya	<i>Homo sapiens</i> emerge	Middle Paleolithic	
50_12K ya	<i>Homo sapiens</i> dominate	Upper Paleolithic: Hunter -Gatherer Societies	
12K ya		Agrarian Era: Threshold 7	Holocene Epoch
1750 CEDtoday		Industrial Era: Threshold 8	Anthropocene

Usually, if the Paleolithic period gets covered at all in a course it generally refers to the “Upper Paleolithic” of 50,000–12,000 years ago. But as the table shows, the Big History narrative includes not only the Lower, Middle and Upper Paleolithic time periods, in Threshold Six, but also the “hominine evolution” of seven to eight million years earlier. The challenge then becomes how to teach eight million years of early

human history within a short class period. This paper suggests, following Cynthia Brown’s lead, to use the taxonomic table of human development as a tool to help first year college students grasp this long and complicated history of humanity. In order to do that, the time table has been slightly amended to illustrate how the human “family” of hominines emerged about eight million years ago, the human “genus” of *Homo* emerged about two million years ago, and the *Homo sapien* “species” emerged some 250,000 years ago to provide a more coherent narrative structure for class lectures and a fuller explanation of why humans are the only surviving hominine.

TimeSpan	Emergence of Humans	Human History	Geologic Era / Epoch
65 million ya	Dinosaurs disappear		Cenozoic Era begins
8_7 million ya	Family --- Hominines		Between Miocene and Pliocene Epochs (of Cenozoic Era)
2.6 million _250,000 ya	Genus --- <i>Homo</i> emerges	Lower/Early Paleolithic	Pleistocene Epoch (epoch of repeated glaciations or Ice Ages)
300K _50K ya	Species --- <i>Homo sapiens</i> emerge	Middle Paleolithic	
50_12K ya	<i>Homo sapiens</i> dominate	Upper Paleolithic: Hunter -Gatherer Societies	
12K ya		Agrarian Era: Threshold 7	Holocene Epoch
1750 CEDtoday		Industrial Era: Threshold 8	Anthropocene

David Christian asserts that the “suite of changes occurring from about 50,000 years ago is described by archeologists as the ‘Revolution of the Upper Paleolithic,’...[and this era] provides the earlier evidence for creatures that also *behaved* like us”—especially how *Homo sapiens* exhibited great capacity for symbolic thinking and language, technological innovation, and collective learning.⁴ The Paleolithic Era, within the larger context of Threshold Six, becomes a time for young students to ponder the accomplishments of early humans: their great ingenuity and intelligence; their incredible ability to adapt to changes in their environment as they circumnavigated the globe, increased in population, and developed diverse foraging technologies which left a significant environmental footprint; and their creativity in developing artwork, complex social relations and cooperative communities.

The first step consists in familiarizing the students with taxonomic categories for as Cynthia Brown argues, “the classification of our species shows schematically how the features that make us human slowly accumulated.”⁵ Brown’s rather detailed

⁴ Ibid., 103. David Christian also states by as early as 130,000 BP, human exhibited distinctly human behaviors. For more information on this topic, see also Sally McBrearty and Alison S. Brooks, “The Revolution that Wasn’t: A New Interpretation of the Origin of Modern Human Behavior.” *Journal of Human Evolution* (2000), 39:453-563.

⁵ Ibid., 85-86. Cynthia Brown warns the reader of the difficulty in using the term hominine versus hominid versus hominoid and how scientists are not yet in agreement on what the proper

scheme of ten different categories has been laid out with descriptive detail in the next table. As the students study this table, it might be helpful to repeat David Christian's humorous definition of humans who "belong to the 'super-kingdom' of eukaryotes (we are multi-celled organisms); in the 'kingdom' of animals (we are not plants or fungi); in the 'phylum' of vertebrates or 'chordata' (we have backbones); in the 'class' of mammals (we're furry, warm-blooded, and our young develop within the womb); in the 'order' of primates (lemurs and monkeys); in the 'family' of hominoids (great apes); the 'subfamily' of hominines (bipedal apes); the 'genus' *Homo* and the 'species' *Homo sapiens*... or in short, humans are eukaryotic, multi-celled mammals from the order of primates." ⁶

classification should be. She explains how she and the authors of the text decided to use a system "which has all the great apes in the super family, [of] hominoids, with gorillas, chimps, bonobos, and humans in one family called hominids, all descendants in the human line in a subfamily called hominines."

⁶ David Christian, *Big History: The Big Bang, Life on Earth and the Rise of Humanity: Course Guidebook*. Chantilly, VA: The Teaching Company, 2007, 86-87.

Biological Classification	Human lineage	Descriptive Detail
Super-Kingdom of	Eukaryota/eukaryote	Made of eukaryotic [multi] celled organisms
Kingdom of	Animalia/animals	Not plants or fungi
Phylum of	Chordata/backbone	Animals with backbone
Class of	Mammalia/mammals	Chordates that suckle their young
Order of	Primata/primates	Large, tree-dwelling mammals
Super-Family of	Hominoidae/Hominoid	Humans and all apes – chimps, bonobos, gorillas, gibbons, and orangutans
Family of	Hominidae/Hominid	Includes gorillas, chimps, bonobos, and humans
Sub-Family of	Homininae/Hominine	Bipedal apes [upright, two-footed posture] – every species on the human side since the split from the chimpanzee line
Genus of	Homo	Bipedal apes with brains larger than 800 cubic centimeters
Species of	Sapiens	Anatomically modern humans - only remaining species of Hominine

The second step includes simplifying this rather cumbersome taxonomic list. In order for students to remember the human taxonomy, it may be helpful to require them to memorize the seven most essential categories: Kingdom, Phylum, Class, Order, Family, Genus and Species. Using the old mnemonic device or phrase “kings play chess on fine grain sand” is one suggestion for easy memorization. The next table illustrates how eight million years of human history can be reduced down to the last

three words of “fine grain sand” or “family,” “genus” and “species.”

Threshold 5 3.8 Billion – 8 Million Years Ago				Threshold 6 8 Million – 10,000 Years Ago		
<i>K</i> ings	<i>P</i> lay	<i>C</i> hess	<i>O</i> n	<i>F</i> ine	<i>G</i> rain	<i>S</i> and
Kingdom	Phylum	Class	Order	Family	Genus	Species
Eukaryotic Cells and Animals	Animals with Chordata / backbones	Mammals or chordata that suckle their young	Primates or tree -dwelling mammals	Bipedal apes [upright, two - footed posture] – every species on the human side since the split from the chimpanzee line	Bipedal apes with brains larger than 800 cc	Modern Humans Only Remaining Species of Hominines

From previous classes, students have learned, in Threshold Five, about the evolution of life (biology) on earth and will be familiar with the first four categories. At the end of this last threshold, class discussions have led to the evolution of complex animal societies of primates. Threshold Six would then trace 1) the emergence of the “family” of bipedal hominines; 2) the appearance of several groups of the genus *Homo*, including the species *Homo sapiens*; and 3) the eventual global dominance of the

human species, *Homo sapiens*, which could conceivably be accomplished in three class sessions.

Session One: Hominine Family. Cynthia Brown points out that “from 1994 to 2004 eight new early hominine species were discovered, making this decade one of the most fruitful periods ever in human paleontology.”⁷ At one of Dominican University’s Big History summer institutes, when this period was being discussed, a group of professors were asked to crawl around on their hands and knees and pick up an object at the same time. This exercise brought home in a visceral way the importance of human bipedalism. As the “first characteristic of hominines,” bipedalism is the first step in human evolution and something that cannot be overemphasized to young college students.⁸ With a new appreciation of this accumulating evidence, students can learn about “Lucy,” a 3.5 million year old female hominine skeleton founded in 1974, or “Ardi,” another female who could walk upright, found twenty years later in 1994, and the oldest species of hominine ever found, dating from 4.4 million years ago. These are important first lessons to sort out and teach to college student in order to help them understand their early hominine family members, even though as David

⁷ Ibid., 86-87.

⁸ Christian, Brown, and Benjamin, 93.

Christian argues “there is no sign of significant technological ability or enhanced linguistic ability.”⁹ Plus, it is most helpful to start early explaining the great scholarly debates that surround the ever-changing nature of the interpretation of evidence, especially when new evidence is ever appearing, so young college students get to the heart of what the study of history is really all about: the explanation of evidence.

Session Two: Genus *Homo*. Both Cynthia Brown and David Christian describe the appearance of the genus *Homo* within the larger context of their narrative of hominine evolution. Cynthia Brown notes the appearance of *Homo rudolfensis*, *Homo habilis*, and *Homo erectus* within hominine evolution, and Christian, in his televised lecture, grouped *Homo habilis* and *Homo ergaster* with australopithecines, that large and varied group of hominines. As noted in the first table, students can note the many varieties of a new genus *Homo* that occurred about 2.5 million years ago and roughly coincided with emergence of human history, of the Upper Paleolithic. It should also be noted that this corresponded with what geologists identify as a new geologic epoch, the Pleistocene, an era of repeated glaciations or Ice Ages. This is an opportune moment to once again stress how climate and environment played a major role in explaining the emergence of *Homo sapiens* during the Middle Paleolithic era.

⁹ Christian, page 88.

Again, this puts us in the middle of much disputed scholarship over classification, identification, and interpretation of archeological and paleontological evidence, but isn't college the time to introduce students to controversy and debate so they can come to their own conclusions and solutions? Plus, there is another important consideration: to make students aware that out of the great variety of this genus, now only one exists: *Homo sapiens*. Why out of so many, only one remains? Why is *Homo sapiens* the only one remaining species of hominines? These are very important questions to ask our students to reflect upon. Presenting the archeological and genetic evidence to students would be based on the comparison and contrast of several species now identified in the genus *Homo*: *Homo habilis* and this species connection to the Olduvian stone industry (and which made Louis Leakey regard them as the first real humans) to *Homo ergaster* (c. 1.8 million years old), usually identified with the more sophisticated Acheulian stone tool industry, and also considered the first hominines to migrate out of Africa.

Several important issues for class discussion at this stage, 1.8 million to 500,000 years ago, could include an analysis on why seventy-five individual skeletons of *Homo erectus*, a later version of *Homo ergaster*, have been found all over the world, except in the Americas. As descendants of *Homo erectus* spread out over Afro-Eurasia, evidence suggests that in Europe, under glacial conditions, a new species of *Homo* evolved: the

Neandertals, which also puts us in the period historians designated as the Middle Paleolithic era (250,000 – 50,000 years ago.) Most paleontologists, based on fossil and genetic evidence, believe that *Homo sapiens* emerged in Africa at this time, and began migrating out of Africa about 100,000 years ago and by the end of the Paleolithic era had circumnavigated the globe.¹⁰ During this period, (50,000 years ago) other hominine species disappeared, most particularly *Homo Neandertalis* and *Homo erectus*, probably under pressure from this new species. Again, this raises two important pedagogical points: 1) shaping the historical narrative around the “genus” *Homo* enables students to analyze through comparison and contrast a variety of species of this group of hominines, and to more clearly define what exactly made *Homo sapiens* distinctly human; 2) students can develop their historical thinking skills by introducing them to the current debate on when and where *Homo sapiens* originated, especially introducing them to the “multi-regional hypothesis ” versus the “Out of Africa hypothesis.”¹¹

Session Three: Species. In this final session of Threshold Six, the essential questions for class discussion include: What makes humans human? Why/how has

¹⁰ Ibid., 94-95.

¹¹ Ibid., 101.

this particular species been such a dominant one? What are the implications of its success, both positive and negative? These are some of the important questions that Big History raises because it elevates the Paleolithic era to the same status given to classical and modern civilizations. As the first table illustrates, the dominance of *Homo sapiens* as a species coincides with the Upper Paleolithic era, and the emergence of complex hunter-gatherer societies throughout the various world zones. Usually this is where most classroom narratives would stress the achievements of the Upper Paleolithic period when humans began adjusting to agrarian societies. But by taking the bigger historical picture, and including the Paleolithic Era into the broader confines of Threshold Six, it becomes clearer why teaching this historical period is so critical. Without a knowledge of how *Homo sapiens* emerged as the most “successful” and dominant species on the globe, later developments of classical and modern civilizations cannot be fully understood either. There is a danger of telling young college students a progressive triumphal narrative of the “Rise of Humans.” As Big History professors get a handle on this bigger narrative they will be able to lead their young students to a better understanding of how this longest of all human periods set the stage for the next geological epoch, the Holocene and the Anthropocene. Realizing how humans came to so quickly dominate the globe and leave such a large environmental footprint, helps us to understand the challenges humans face today. A

greater awareness of the dangerous environmental impact established by these ancient Paleolithic peoples may be helpful in finding solutions to the environmental issues of the present day.

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