Once Again from the Beginning:
The Role of Historical Inquiry in the Anthropocene

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Introduction

Scholars, scientists, and people across the globe agree that climate change is an issue of unprecedented danger that needs to be approached from an interdisciplinary viewpoint. However, historians have had a difficult time discussing it because it does not have a clear end and beginning or because historians have not overcome "the difficulties of crafting narratives in the absence of any clear moments of closure."[1] What many scholars – from philosophers to biologists – have attempted to answer is why humans, unlike any other animal, can reproduce beyond the natural carrying capacity of specific environments and of the planet as a whole. There is not – and might never be – a definitive answer to that query, so, as historians, we struggle to find our place in the conversation. Post-colonial historian, Dipesh Chakrabarty argues for a new type of history: a species history. He suggests that a brand new epistemological framework that combines human and natural history but is more than the sum of its parts is necessary to bridge "the distinction between human and natural histories—much of which had been preserved even in environmental histories that saw the two entities in interaction," which "has begun to collapse."[2]

Our distinct species, *Homo Sapiens*, has walked on the Earth for about two hundred thousand years of our planet's four and a half billion-year history. For much of that time, our species had to adapt to the environment for survival. Nature was a humbling force with harsh weathers, punishing landscapes, fierce creatures stronger than us, and constant balancing checks, which continuously adjusted our means of subsistence. This natural struggle is not

[1] Claire Bond Potter and Renee C Romano, *Doing Recent History: On Privacy, Copyright, Video Games, Institutional Review Boards, Activist Scholarship, and History That Talks Back*, (Athens: University of Georgia Press, 2012) 5

[2] Dipesh Chakrabarty,"The Climate of History: Four Theses." *Critical Inquiry* 35 (2009): 207

singular to this species; our existence within and dependence upon biotic communities is what signals to the need to understand human events within the context of a world ecosystem.[3] Eventually, millennia after, the human species began to rebel against the forces of nature through flexibility, cooperation, resourcefulness. The human species is distinguished by a series of processes including the capture of fire, crafting of tools, conquering of land and language, collective learning, and remarkable population growth.

Both scientific and non-scientific evidence suggests that definitely by the end of this century, possibly by the end of this decade, the history of planet Earth will be drastically rewritten. Human beings, through a mixture of pioneering technologies, fossil fuel use, mass agricultural production, and unabated population growth have become the single dominant force of change on the planet; an unprecedented feat for a single species.

By outlining how the human species has come to be an unprecedented geological force, probably threatening the species itself, I do not want to suggest that the ideal is to return to pre-industrial, or even pre-agricultural times, therefore possibly falling within the intellectual traps of what William Denevan calls the 'Pristine Myth,' which romanticizes a pre-colonial world of natural, 'virgin,' landscapes untouched by humans.[4] Instead, the intention is to find a framework through which the field of history can be a useful tool to understand the current moment of a climate crisis and the seemingly unruly path towards environmental degradation.

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[3] J. Donald Hughes, *An Environmental History of the World: Humankind's changing role in the community of life,* (New York: Routledge, 2001), 6

[4] William M. Denevan, "The Pristine Myth: The Landscape of the Americas in 1492," *Annals of the Association of American Geographers*, 82 (1992): 369

There are two fields of historical study that consider environmental and scientific knowledge essential to understanding human history, and often challenge historical narratives like economic and political histories that place nature and the environment as secondary to human agency. Philosopher and environmentalist, Aldo Leopold wrote in 1935:

> One of the anomalies of modern ecolog[ical thought] is that it is the creation of two groups, each of which seems barely aware of the existence of the other. The one studies the human community, almost as if it were a separate entity, and calls its findings sociology, economics and history. The other studies the plant and animal community and comfortably relegates the hodgepodge of politics to "the liberal arts." The inevitable fusion of these two lines of thought will, perhaps constitute the outstanding advance of the present century.[5]

Combining the traditions of environmental history and big history to outline how the human species has reached the current moment of unprecedented, human-induced changes in the climate, I will look at how scholars, from a range of disciplines, have considered key moments in time as a turning point for our species.

Traditionally, historians have self-classified in terms of nation-states, a historian of Mexico, France, India etc. This classification has importance because of language, continuity, and simplicity. Usually, archives are organized by national governments or organizations that have documents that pertain to the location where they are. For environmental and big history, such a classification fits poorly given that the natural phenomena under study do not behave according to political borders. Environmental history, as a self-conscious term within the field of history, came about in the 1970s, but it has intellectual roots dating much farther in the past. An example is the *Epic of Gilgamesh* a text dealing the cutting of cedar forests in the Levant and

[5] Aldo Leopold, "Wilderness," Leopold Papers 10-6, 16, 1935. Quoted in Curt Meine, *Aldo Leopold: His Life and Work*, (Madison: University of Wisconsin Press, 1988) 359-60

one of the first texts about environmental change generated by human action.[6] Before the field of environmental history as such, scholars have looked to the environment to better understand human behavior in works such as that of Ibn Khaldun, a North African Arab historian (1332-1406), Montesquieu, a French Enlightenment philosopher (1689-1755), and George Perkins Marsh, an American philologist and pioneer environmentalist (1801-1882) whose 1864 book *Man and Nature* set the basis for much of American environmentalism.[7]

The work of the *Annales* school and, most notably, Braudel, included histories of medieval Europe that considered the geography and environment of the Mediterranean as essential to their texts. The environmental aspect that these scholars were focused on was not the human effect on the environment but a more geographical understanding of the region where they would write essential texts on harvests and epidemics.

For some contemporary historians like A.T. Grove and Oliver Rackham, that should be the purpose of environmental history: to focus on climate, geology and geomorphology, not living things.[8] Others, maintain that the focus of environmental history should be, as J.R. McNeill defines it, "the history of the relationship between human societies and the rest of nature on which they depend."[9]

The study of 'big history' argues that the discipline of history is marked by a limited view of time that largely focuses on the most recent centuries and ignores a more comprehensive view of deep time. Historian David Christian first used the phrase 'big history' in the 1980s

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[6] Fi Sandars, N. K. 1972. *The epic of Gilgamesh*. Harmondsworth: Penguin.

[7] George Perkins Marsh, *Man and Nature; or, Physical Geography as Modified by Human Action*, London: Low, 1864, 602

[8] J Donald Hughes, *Three dimensions of environmental history,*

[9] J.R. McNeill, "The State of the Field of Environmental History," in *Annual Review of Environment and Resources,* Vol. 35: 345-374

while teaching a course at Macquarie University that brought academics from astronomy to history to speak about an all-encompassing past.[10] This began a revolution in historical thinking in which, as historian Fred Spier puts it, "human history is placed against the background of a coherent overview of the entire known past, from the beginning of the universe to life on Earth today."[11] The idea of big history comes from a criticism of the tradition of the historical field.

It is through those criticisms and their resulting scholarly outcomes that we begin to find the necessary expansions of the historical field, which allow for a broader, more thorough understanding of the human relationship to nature that under enough scrutiny can potentially lead us closer to an explanation of how – and why – we have left the Holocene epoch and transitioned to the Anthropocene epoch and an era of climatic uncertainty.

In the first chapter of this paper I focus on that expansion; history has largely been a history of literary societies and although attempts are made to expand the subjects considered within the historical field, fewer attempts have been made to expand the temporal limits of historical study. Both big history and environmental history prove the necessity to consider what is commonly referred to as prehistory. In the second chapter, *From the Neolithic Revolution to the Industrial Revolution*, I zoom in to the transformations in human society that many consider to have been flashpoints of change in the human/nature relationship. The adoption of intensive farming globally has had undeniable consequences on how people understand the land around them, how they treat it, and how they organize their societies. The Industrial Revolution is a threshold moment when humans harnessed fossil fuels for energy

[10] Fred Spier, *Big History and the Future of Humanity*, (Chichester, U.K.: Wiley-Blackwell, 2010), 1

[11] Fred Spier, "Big History: The Emergence of an Interdisciplinary Science?," World History Connected October 2009 <http://worldhistoryconnected.press.illinois.edu/6.3/spier.html> (9 Mar. 2017)

production and forever-altered the human impact on atmospheric temperatures. In geological records, this is an essential moment of change. Therefore, the time between these two revolutions is essential because the rate of progress and development in both technological and intellectual ways was never before seen. Finally, in the chapter *Towards the Anthropocene,* I discuss the evolution of human behavior which has turned our species into no longer just biological agents but into a geological force capable of drastically transforming the biological processes of the planetary ecosystem. Scholarly debates on what the Anthropocene is and when it started inform this project because they reflect different views to when people began having radical effects on the natural world. I want to argue, in the chapter and throughout this work, that the very evolution of our species manifests a specific relationship between humans and their surrounding environment which the field of history has the tools to uncover but needs to expand or transcend both its temporal and disciplinary limits. The argument is not deterministic, that climate change is inherent to our evolution, but, instead, that historical inquiry into our species history can add layers of evidence to scientific study and communicate a history of climate change that can offer new ways of thinking about the future.

Chapter 1: Expanding the Temporal Limits of History

"Not only does prehistory extend written history backwards, it carries on natural history forwards."[12]

The historical field goes through similar transformations to the ones it observes, documents, and tells. Historical knowledge is made up of packed layers that can be observed individually but cannot exist without one another. At the bottom is the study of what is called deep time, or the earliest period which a discipline considers. Paleoanthropology, for example, defines how archaeologists and evolutionary biologists observe the societies of the Paleolithic. These disciplines focus on developments like stone tools to understand these past times for which documents, which conventional history largely relies on, are not available. The deep time of historians is commonly related to the beginning of writing, often in the so-called Fertile Crescent between Mesopotamia and the Nile delta.[13] Although ancient civilizations and the archeologist understanding of deep time stand widely apart in time, they provide the bedrock on which the disciplines base their narratives.

For historians, the archeological or evolutionary biological view is considered prehistory—before history. Historian Mott Greene observes that despite contemporary transformations in the historical field, the term prehistory has proved difficult to let go of; "to abandon prehistory, would be to postulate continuity between the biological descent of hominids and the 'ascent of civilization' of the abstract 'mankind' of humanistic historical

[12] V Gordon Childe, *Man Makes Himself*, (London, UK: Watts & Co, 1936), 9

[13] Shryock, Andrew, and Smail, Daniel Lord, *Deep History : The Architecture of Past and Present*, (Berkeley, US: University of California Press, 2011)

writing. Prehistory is a buffer zone."[14] Prominent prehistory scholar V Gordon Childe argues for the importance of prehistory as a "bridge between human history and the natural sciences of zoology, paleontology, and geology," and urges the historical field to overcome the tendency to underrate "prehistoric revolutions," because we lack written evidence or because the epistemological challenge of narrating the deep past gives the impression that "their effects have ceased to oppress us individually."[15] Above this bedrock we find the study of complex societies. Here, historians begin to trace "early modern" societies. A view of how societies began to interact, move, and conquer. This history is the support for a history not more than a few centuries in the past marked by the great shift to postcolonial modernity. It is a study of war, empire, politicization, and economic development that is considered the most relevant historical knowledge.[16]

When, in 1859, Charles Darwin published *On the Origin of Species*, he sparked a revolution that problematized the understanding of human origin. Likewise, philosopher Georg William Friedrich Hegel, viewed human history as a trajectory of hard won progress, through which humans left a state of nature into one of political activity and awareness. It required a transformation of human origin from a brand of speculative but biblical philosophy to a science-based enquiry. A new history used the view of progress created during the Enlightenment, in which human origin and the rise of civilization is marked by a triumph of man over nature. This new tradition rejected the timeline of creation but maintained human exceptionalism. As a

[14] Mott Greene quoted in, David Christian and William H McNeil, *California World History Library: Maps of Time : An Introduction to Big History*, (Berkeley, US: University of California Press, 2004), 18

[15] Childe, *Man Makes Himself*, 9

[16] David Christian and William H McNeil, *California World History Library : Maps of Time : An Introduction to Big History*, 35

historian of the early twentieth century explained, this new historical narrative describes "the process by which the chaotic chatter of anthropoid apes has been organized in the wonderful fabric of human speech." It offers a panoramic vision of man "in every stage of his long climb up from his feeble and brutish beginning."[17] The religious aspect was therefore replaced by a new type of exceptionalism that was presented through a vocabulary of progress and modernization. The metaphors and language that previously described a religious, chronologically limited history of human origin was transformed into a secular, but almost equally exceptional story. As big history proponents explain it, "the Garden of Eden became the irrigated fields of Mesopotamia, and the creation of man was reconfigured as the rise of civilization."[18] This new perception of human history had at its core that humans had overcome the limits of nature because of a great ability to dominate their surroundings, which allowed man to progress and become socialized.

The biological and behavioral sciences could adapt the framework rejecting creation and the idea that humans and nature are at odds, assuming, rather, that human systems are natural systems. This was not the case for the fields of history and cultural anthropology, as the equation between cultural and natural systems required a shift in the historicizing that dominated nineteenth century writing. A writing that centered human history as the conquest of nature and birth of a political society. Renowned French historian, Jules Michelet, outlined the nineteenth century logic as: "When the world was born there began a war that will last until the world's end, and this is the war of man against nature, of the spirit against the flesh, of

[17] George R. Coffman, "The Medieval Academy of America: Historical Background and Prospect," *Speculum* I, 1929, 5-18

[18] David Christian and William H McNeil, *California World History Library : Maps of Time : An Introduction to Big History*, (Berkeley, US: University of California Press, 2004)

liberty against determinism. History is nothing but the story of this endless conflict."[19] Michelet, in 1843, pinpointed the rationale of a homocentric history that prevails even as historians try to extend the temporal limits of the field.

The war that Michelet proposes is singular to humans who, unlike other animals, do not live in harmony with nature. For early-twentieth century thinkers, this war is marked by the moment humans master the ability to conquer nature, becoming an active agent and leaving the primitive, passive ways of our ancestors behind. This logic is seamlessly explained through a 1912 work called *The Conquest of Nature,* "barbaric man is called a child of Nature with full reason. He must accept what Nature offers. But civilized man is the child grown to adult statue, and able in a manner to control, to dominate—if you please to conquer—the parent."[20] That moment, in which the civilized man conquers nature and acquires political agency, is where the study of human history is focused.

The cultural and societal traumas and transformations of the twentieth century; including two world wars, the collapse of the European colonial order, and the threat of nuclear devastation, created a scholarly disillusionment with Enlightenment and Victorian-style ideas of social evolutionism. Historians, among other scholars, were disabused with these ideologies that had been historically used to justify racism, class privilege, and global imperialism. The move to create a more holistic narrative of human history meant expanding the themes, subjects, and evidence that history depends on. While this expanded the subjects and theme of historical study beyond the focus on elites and power relations conducted by mostly white men

[19] Jules Michelet, *Introduction a L'histoire Universelle, suivi du discours d'ouverture pononcé a la faculté des lettres le 9 janvier 1843.* 2nd ed. Paris: Hachette, 1834, 9

[20] Henry Smith Williams, *The Conquest of Nature,* (New York: Goodhue, 1912), 6

and towards the study of women, the working class, immigrants, and other subaltern subjects, modern cultural history narrowed its temporal focus of study. In an attempt to disassociate with the racist past of histories of social evolution, the study of human evolution and deep time was handed off to other disciplines including archeologists, paleontologists, and historical linguists.

The limits of the discipline of history have made the historians' tools insufficient to understand the current climate crisis.[21] Although not exclusive to the field of history, this insufficiency requires historians to consider a new expansion to a profoundly multidisciplinary approach and serious consideration of the implications of deep time, trends that have been separately begun to be used by the subfields of environmental and big history. To better understand what distinguishes our species' relationship to the environment since deep time, we need to look to the fields of paleontology, linguistics, and archeology The theories of the geographical beginnings of humans are largely influenced by the facts that the earliest hominid fossils have been found only in east and south Africa and that genetic and linguistic research coincides in placing the genesis of both hominids and Homo sapiens in this region of the planet. The evidence points to an origin story that is largely accepted about where our species originated and how it spread, but this scholarly consensus was not reached seamlessly and is not indefinite. The necessary evidence to uncover the origins and earliest developments of the human species is scant and scarcely spread across the Earth. Interpretation is based on fossilized bones that are rarely bigger than a tooth or poorly preserved symbols. Thus,

[21] Chakrabarty, Dipesh. 2012. "Postcolonial Studies and the Challenge of Climate Change." *New Literary History* Vol. 43.

deductions are difficult and often result in conflict between experts that have different explanations about the meaning of and relationship between the different but few remaining indicators of human activity in deep time.

A good example of the heated controversies that result from the scant evidence of remains is the debate between Villmoare *et al*[22] and Hawks *et al*[23] about the recent discovery of a fossil mandible and teeth in the Afar region of Ethiopia. A group of researchers affiliated with Arizona State University, Villmoare *et al,* found this fossil and after thorough analysis concluded that the remains likely were from a *Homo* species and they dated the fossil to 2.80-2.75ma,[24] which is extremely important because it "extends the fossil record of *Homo* back in time a further 0.4 million years."[25] As the authors rightly state, this conclusion has significant consequences on hypotheses about the origins of the *Homo.* This paper received a lot of attention as people from varying disciplines considered the implications of these findings on our understanding of the origin of our species. In a dissenting response, Hawks *et al,* a group of experts from the Institute of Human Evolution in Johannesburg, South Africa, argued that Villmoare *et al* failed to consider and accurately experiment the possibility that the mandible belonged to species known to have existed in that time period that are not of the genus *Homo.* Hawks *et al* argue that the characteristics of the remains could be attributed to a number of other species and should not be "unequivocally assigned to the genus *Homo*," since "at present

[22] B. Villmoare *et al,* "Early *Homo* at 2.8 Ma from Ledi-Geraru, Afar, Ethiopia," *Science* 347 (2015): 1352–1355, accessed February 11, 2017, doi:10.1126/science.aaa1343

[23] J. Hawks *et al*, "Comment on "Early *Homo* at 2.8 Ma from Ledi-Geraru, Afar, Ethiopia,"" *Science* 348, (2015): 1326, accessed February 11, 2017, doi: 10.1126/science.aab0591

[24] "Ma" is a unit of time used in disciplines such as geology and paleontology to represent one million years ago from the present time. 'Ago' is usually not explicitly included but it is implied.

[25] Villmoare *et al,* "Early *Homo* at 2.8 Ma from Ledi-Geraru, Afar, Ethiopia," 1352

we cannot be certain what the rest of the dentition, skull, or skeleton of LD 350-1[26] might have looked like."[27] In a strongly worded rebuttal, Hawks *et al* reaffirmed their findings that the certain characteristics of the remains were clearly not traits found in non-*Homo* species thus rendering "Hawks *et al*.'s objections to our taxonomic conclusions regarding LD 350-1 logically incoherent."[28] This debate points to the difficulty of dealing with an era of which little remains and our limited capacity to envision a time so drastically different from ours.

The tools we have to get closer to those answers – archeology, anthropology, linguistics, history etc. – are themselves products of a history of knowledge production that deals poorly with dissent. An excellent example from our past was the tension between eighteenth and nineteenth century thinkers about the possibility of species extinction, a concept that is now considered a fact. In *The Economy of Nature,* the botanist Linnaeus, whose system of species classification is still used today, outlined the perception that every species has an "allotted place" within the chain of nature and functions within the larger economy of nature.[29] This belief, based on the concept of natural theology – the study of the natural world to understand God's world design – was widely spread and had the consequence that for generations to come the nature was seen as static since everything had a purpose assigned by God himself. This influenced how great thinkers of ecology like Thomas Jefferson were unable to conceptualize

[26] LD 350-01 is the taxonomic classification of the fossil mandible fragment found in the Afar region of Ethiopia.

[27] Hawks *et al*, "Comment on "Early *Homo* at 2.8 Ma from Ledi-Geraru, Afar, Ethiopia,"" 1326

[28] Villmoare *et al,* "Response to Comment on "Early Homo at 2.8 Ma from Ledi-Geraru, Afar, Ethiopia"," *Science* 348, no. 6241 (2015): 1326-1326, Accessed February 11, 2017, doi: 10.1126/science.aab1122

[29] Linnaeus, "The Oeconomy of Nature," in *Miscellaneous tracts relating to naturalhistory, husbandry and physick: to which is added the Calendar of flora* by Benjamin Stillingfleet, 4th edition (London: 1791), 96

species extinction. Jefferson spent decades trying to find the 'incognitum' based on a fossil he had found, he described this animal to be similar to a "Mammoth, or big buffalo," and potentially "six times the size of an elephant."[30] His journey to track down this animal is an example of how religious fervor in early naturalists did not permit them to understand that, "species could not go out of existence or come into being without fundamentally threatening that natural order."[31] Similarly to Darwin's theory of evolution and the example of the Ethiopian fossilized mandible, when select thinkers began to surface the concept of extinction, they were met with harsh critiques because it radically challenged widely accepted truths about human origin.

In traditional pursuits of historical knowledge, human origin is not a starting point. Instead, the field of history tends to focus on the origins of specific civilizations, ideologies, or behavioral trends, not our whole species. But like traditional history, to understand a point in time, in this case our species origin, we must turn to the processes leading up to that specific point. In big history, specific moments in time that changed functions of the Earth System are called threshold moments, and each threshold moment creates an increased level of complexity.[32] For complexity to emerge, there must be exact conditions, this is what Fred Spier calls the "Goldilocks Principle."[33] Based on the famous fable, the Goldilocks theory means that each new form of complexity requires different conditions, for example, the conditions

[30] Thomas Jefferson, *Notes on the State of Virginia*, ed. William Peden (Chapel Hill: University of North Carolina Press, 1955), 45

[31] Mark Barrow, "Bones of Contention the American Incognitum and the Discovery of Extinction," in *Nature's Ghosts: Confronting Extinction from the Age of Jefferson to the Age of Ecology*, (University of Chicago Press, 2009) Chicago Scholarship Online, 2013. Accessed February 11, 2017. doi: 10.7208/chicago/9780226038155.003.0002, 24

[32] Spier, *Big History and the Future of Humanity,* 43

[33] Spier, *Big History and the Future of Humanity,* 43

necessary for the emergence of humans are not the same for the formation of stars. The Big History argument, then, becomes that we must analyze the 'perfect' conditions that allowed the development of life on earth in order to understand why environmental change can have irreversible effects.[34]

Homo erectus is considered the most direct ancestor of the modern species *Homo sapiens sapiens.*[35] Fossils of this ancestor species have been dated to 2-1.5 Ma and they include characteristics that "foreshadowed those of more recent *Homo sapiens* and included large, linear bodies, elongated legs, large brain sizes, reduced sexual dimorphism, increased carnivory, and unique life history traits (e.g., extended ontogeny and longevity) as well as toolmaking and increased social cooperation."[36] However, what are seemingly 'human traits,' like walking upright can be seen in fossils from as far as 3.5 Ma but the classification *Homo* has only been given to fossils from about 2.5-2.3 Ma. What makes the *Homo erectus* different, and why it is considered to be our species most direct ancestor, is the calculated brain size, which is larger than other species with the genus *Homo* and based on cranial fossils from 1.9 and 1.5 Ma, believed to be in the range of 546 to 1067 cm^3 (for comparison the *Homo sapiens sapiens* has a brain size of 1300 cm^3).[37] From the available archeological evidence, it is assumed that the *erectus* emerged in Africa and lived until 200,000 years ago, when we find the first remains of a species then called *Homo sapiens* and, subsequently, the more developed skeletons of the

[34] Spier, *Big History and the Future of Humanity,* 63

[35] "Homo erectus," In *The American Heritage Student Science Dictionary*, edited by Editors of the American Heritage Dictionaries, Houghton Mifflin, 2014

[36] Ernst, Mayr, "On the concepts and terminology of vertical subspecies and species," *National Research Council Committee on Common Problems of Genetics, Paleontology, and Systematics Bulletin,* 2 (1944): 11-16, 12; Susan C. Antón *et al*, "Evolution of early Homo: An integrated biological perspective" *Science* 345, no. 6192 (2014): 1236828.

[37] Antón *et al*, "Evolution of early Homo: An integrated biological perspective," Box 1, 1236828-2

Homo sapiens sapiens 30,000 years ago.[38] Understanding the geographical locations of these first groups is difficult given that they most likely depended on the gathering of nuts, seeds, and plants with some dead animal scavenging, which has not left sufficient ecological evidence to suggest that these small, thinly spread groups were anywhere beyond habitats from modern day Ethiopia to South Africa. Hunting and gathering was the way of life for all genus *Homo* until around 10,000 BCE with the emergence of agriculture. Experts have concluded that people lived in small mobile groups that permitted them flexibility and continued subsistence and causing little damage to ecosystems.

Despite this seeming as an evolutionary continuation of the animal kingdom, essential mutations occurred during the formation of *Homo Sapiens sapiens*, making them distinct from other primates and their ability to interact with the environment unparalleled. These mutations permitted the species to begin spreading across areas, beyond the tropical African habitats where they first evolved, at rates that became uniquely human. Humans' ability to settle in the temperate, and even artic, belts of the planet, which had climates and environments markedly different from those of their native tropical habitats, differentiates them from all other primates.

A series of specific traits explain this phenomenon. Standing upright was the first to evolve. Bipedalism enable our ancestors to walk, unlike other primates, long distances. It also freed two extremities, which along with the evolution of opposable thumbs, enabled toolmaking and thus access to the wider range of foodstuffs that permitted the disproportionate growth of our brains. An unintended biological byproduct of

[38] Louis Leakey *et al*, "A New Species of the Genus Homo From Olduvai Gorge," *Nature* 202 (1964): 7

erectness/bipedalism (the narrowing of the pelvic opening of females) and of bigger brains (bigger heads) combined to turn us into an altricial species, basically premature fetal apes.[39] This led to most cranial development happening outside the womb, and thus while experiencing the outside world, and to long longer-term infant dependency making childrearing an increasingly social process.[40] This combination explains our unmatched capacity to learn and transmit that learning, the emergence of complex language, symbolic and abstract thinking, allomaternal care, and high levels of social cooperation.[41]

The exact form of social organization of the earliest peoples has not been distinctively deduced but is inferred given that, as one of the first specialists of early human populations Gordon Childe wrote, "a creature so weak and poorly endowed as man could not in isolation successfully hunt the large or fierce animals that quite early provided an important item in his diet."[42] Next, is the ability to communicate through speech allowed complexity in social organization and simplified the spread of cultural advances. Although it is not clear when speech first emerged given that it could not be preserved, symbols give a good indication of when communication methods started to become more complex. As to tools, while primates and other animals do have the capacity to use them, only humans create them. Archeologically, tool use and making has been traced to 2.58-2.0 Ma.[43]

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[39] Laura Tobias Gruss and Daniel Schmitt, "The Evolution of the Human Pelvis: Changing Adaptations to Bipedalism, Obstetrics and Thermoregulation," *Philosophical Transactions of the Royal Society B: Biological Sciences* 370.1663 (2015): 20140063, *PMC*. Web. 2 Mar. 2017, 2

[40] Gruss and Schmitt, "The Evolution of the Human Pelvis: Changing Adaptations to Bipedalism, Obstetrics and Thermoregulation," 9

[41] Karin, Isler and Carel P. van Schaik, "Allomaternal care, life history and brain size evolution in mammals," *Journal of human evolution* 63, no. 1 (2012): 52

[42] Childe, *Man Makes Himself*, 52

[43] Antón *et al*, "Evolution of early Homo: An integrated biological perspective," 1236828-8

The combination of these biological evolutions (bipedalism, freed hands, big brains, premature birth) and cultural traits (language, abstract thought, toolmaking, systems of cooperation) allowed our species to have a greater impact on the planet that any other even before the advent of agriculture. It is true that we still mostly lived, like all other animals, from what was in nature. But already we had an "artificial" capacity to hunt, not with claws and tusk, but with flints, arrows, traps; to fish not with our hands but with hooks and nets. By controlling fire and using pelts as clothing, we had been able to move beyond our tropical natural habitats, even though we had not evolved enough biologically to do so. As a result, by the eve of the Neolithic revolution, 10-12 thousand years ago, our primate relatives were still few in numbers and limited to the tropical belt of the planet, mainly to our common African cradle, but we had surpassed the four million mark and spread to all of Earth's continents and latitudes.

Chapter 2: From the Neolithic Revolution to the Industrial Revolution

Insofar as man's physique was concerned, nothing henceforth needed to become a fixed commitment to a certain climate. Whereas until then mutation had been the source of evolutionary adaptation, after this point invention had to fill its place.[44]

The practices of hunting, gathering, and herding were principal to a scattered human population for millennia before the emergence of new and intensification of other techniques to produce crops and domesticate animals. Many consider the transition of food production that occurred in a space of a few thousand years in the Middle-East, south-west Asia, China, and Mesoamerica, the definitive flashpoint of human history. What occurred in this transition, now referred to as the 'Neolithic Revolution,' was a mixture of human choices and environmental triggers that permitted the production of much larger quantities of food in smaller areas and the emergence of settled and complex societies, enabling population growth. Unlike other events that are labeled and studied as revolutions in history, the time scale of this 'revolution' is of a few thousand years. The radical transitions that took place to shift the global economy into an agriculture-centered one can only viewed through a lens of deep history and observing the changes from the perceived moment that practices began to change in certain places – not all at once – about 10,000 years ago over thousands of years. In addition, to truly understand how traditions that had been practiced by members of the human species for about 2 million years shifted to an arguably less energy efficient and less nutritious system of food

[44] Philip L. Wagner, "The Concept of Environmental Determinism in Cultural Evolution," in *Origins of Agriculture* ed. Charles A. Reed, (Berlin/Boston: De Gruyter, 1977) Accessed March 8, 2017, ProQuest Ebook Central, 60

production, the environmental context is inseparable.[45] There is scholarly contention over how much climatic and environmental changes catalyzed the transition given that climatic changes occurred differently in places across the world where intensive food production began to emerge in similar ways, but there is a consensus that those factors need to be considered.

Historical tradition defines a revolution as an event that happened suddenly, sometimes violently, and often as an overthrow of previous practices. With this in mind, 'Neolithic Revolution' might be the incorrect term for this period because it was not sudden or contained and it wasn't necessarily a break with the past, distinguishing hunter-gatherer societies from agricultural ones, but an intensification of practices that already exploited the environment for human benefit. Experts in the study of deep time have found evidence to suggest that some communities from the Upper Paleolithic practiced some forms of cultivation, and began the processes of plant and animal domestication characteristic of agricultural civilizations. What occurred between humans and their environment during this period has been summarized effectively by 'prehistory' archaeologist V Gordon Childe in his 1936 book *Man Makes Himself,*

> Throughout the vast eras of the Ice Ages man had made no fundamental change in his attitude to external Nature. He had remained content to take what he could get, though he had vastly improved his methods of getting and had learned discrimination in what he took. Soon after the end of the Ice Age man's attitude (or rather that of few communities) to his environment underwent a radical change fraught with revolutionary consequences for the whole species.[46]

The revolutionary consequences took shape as several phenomena; a transition to an intensified agriculture that majorly altered natural ecosystems, the growth of settled societies,

[45] Charles A. Reed, *Origins of Agriculture*, (Berlin/Boston: De Gruyter, 1977) Accessed March 8, 2017, ProQuest Ebook Central, 884

[46] Childe, *Man Makes Himself*, 66

the emergence of cities and craft specialization, and the rise of powerful religious and political elites.

Revolutions do not occur in isolation; they are the climax of long, pre-existing processes and written in history in regards to their causes and consequences. In the case of the Neolithic Revolution, much scholarship has centered around the specific conditions that created a single event of transition from hunting and gathering to agriculture-based food production, instead of observing the combination of steps, human and non-human, intentional and not, that allowed – in some cases forced – the transition. Hunter-gatherer practices did not alter the environment in the same drastic ways, but they did interfere with ecosystems to benefit humans in manners that set the stage for agricultural transformations. With the tools and skills that had become possible by biological evolution, the *Homo sapiens* adopted gathering and hunting practices, through which fire was used to clear ground, certain plants and animals were preferred for consumption, and primary forms of cultivation were used. Intervening with the environment to get food is not the particularity of the Neolithic, it is about the intensification of intervention. Many of the customs considered characteristically agricultural had been adopted by different groups spread across the globe at some point or the other before the start of what is now considered the Neolithic. Considering that food production in hunter-gatherer communities is much more diversified, requires less energy output from, and the diet is much more nutritious, there is nothing to suggest that a transition to agriculture was preferable.[47] Instead, humans found a way to create more food with less land.

[47] Peter J. Richerson, Robert Boyd, and Robert L. Bettinger, "Was Agriculture Impossible during the Pleistocene but Mandatory during the Holocene? A Climate Change Hypothesis," *American Antiquity* 66, no. 3 (2001): 388 doi:10.2307/2694241.

Human – and most other animal – generative levels depend completely on their environment; suitable environments are conducive to faster rates of population growth and vice versa. Archaeologists estimate that in 10,000 BCE there were 4 million people, spread across most of the world, it took *Homo sapiens* 200,000 years to reach this number.[48] By 1,000 BCE, it's estimated that there were 50 million people, a ten-fold increase, which just continued to grow resulting in the over 7 billion people of today. Although much of the increase has happened in only the last two centuries, these drastic rates of increase are a consequence of the intensification of agriculture with which a lot more food can be produced from a smaller land area than through hunting gathering practices. But population growth combined with environmental constraints is also argued to have been a cause for the Neolithic transition.[49] As the human species became more likely to survive because it could adapt to different climates and create tools to defend themselves, populations grew, and the amount of food yielded from only hunting and gathering practices became insufficient. In hunting and gathering societies, if a group reached its carrying capacity, some members would separate and create a new group. As population pressure increased, it meant that new groups would be forced onto less productive territories where they had to exert more effort and creativity to yield enough food. In time, to feed themselves, people used their increased ability for innovation, permitted by the unique biological characteristics of the *Homo Sapiens* (brain development, cognitive skills etc.) and started to use agricultural techniques.

[48] Edward S. Deevey Jr. "The Human Population," in *Man and the Ecosphere*, (W.H Freeman and Company, San Francisco: 1960)

[49] Bennett Bronson, "The Earliest Farming: Demography As Cause And Consequence," in *Origins of Agriculture,* ed. Charles A. Reed, 45

This moment coincides with the retreat of glaciers of the glacial period that lasted from around 40,000 BCE until 11,000 BCE, marking the end of the Pleistocene.[50] During the glacial period, precipitation and temperature fluctuation, in accordance with changes in carbon dioxide and methane levels in the atmosphere, occurred in time scales too quick for the sustenance of agriculture "because agricultural subsistence systems are vulnerable to weather extremes, and because the cultural evolution of subsistence systems making heavy, specialized, use of plant resources occurs relatively slowly."[51] Because of the Pleistocene climate, some scholars have concluded that "agriculture was impossible during the last glacial."[52] Once the glacial period was over, the climate stabilized, became warmer, and key regions dampened, creating favorable conditions for a sensitive but land-effective system like agriculture.

Considering only the climatic changes as explanation for the changes leading to the Neolithic has been criticized and labeled as "environmental determinism." [53] That theory argued that agriculture was a response to the end of the glacial age in 10,000 BCE and its consequential reorganization of plant and animal species. Its opponents point to the year 75,000 BCE, where records mark a similar drastic climatic alteration that did not catalyze any known radical change in human behavior. Also, the critics argue that this determinism does not account for the fact that different global regions were affected differently by the last glaciation, yet, in the span of a few thousand years, groups independent of each other transformed their food production similarly.

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[50] Reed, *Origins of Agriculture,* 882

[51] Richerson et al, "Was Agriculture Impossible during the Pleistocene but Mandatory during the Holocene? A Climate Change Hypothesis," 388

[52] Richerson et al, "Was Agriculture Impossible during the Pleistocene but Mandatory during the Holocene? A Climate Change Hypothesis," 387

[53] Wagner, "The Concept of Environmental Determinism in Cultural Evolution," 50

Determinism often surfaces in the field of history as an inevitable order of events. Marxist theory is perhaps the most familiar example of determinism, rooted in the belief that the productive system of society is the locus of historical determination. Specifically in Marxism, class analysis predicts historical progress. However, the idea of a directional historical progress, or theories of unilineal social evolution, are longstanding in their view of history as the growth of efficiency, economies, and technology. This unidirectional history of progress is the basis of capitalist and socialist thought. Environmental determinism further argues that progress, or lack of, is driven by environmental change. Environmental history often practices a fatalistic determinism, what McNeill calls declensionism, or "a single dreary and repetitive tale of woe."[54] Other historians find this tendency to only write of loss and degradation irritating.[55]

Especially in the 1970s, historians saw the environment as a great opportunity to write a degradation narrative, focusing on past societies that had better environmental restraint or a better time where ecosystems where intact, unaffected by the human touch. In the late 20th century and turn of century, however, the historical narrative has become more of environmental change and the intricacies of this change as it is sometimes good for some species and bad for others, and, largely, how humans cannot be removed the equation. Cultural geographer Philip Wagner, argues against environmental determinism and for a consideration of the varying degrees in which the environment might influence modern humans who have evolved to live beyond environmental limits and constraints.[56] While environmental determinism tries to show correlations between physical, natural changes and

[54] McNeill, "The State of the Field of Environmental History," 359
[55] S Schama, *Landscape and Memory*, (New York: Vintage, 1995) 450
[56] Wagner, "The Concept of Environmental Determinism in Cultural Evolution," 59

social change, Wagner argues that history cannot be so simplified and must recognize "the manifold number of possibilities…we can conceive now of societies possibly remaining altogether static in the face of either unchanging environment, an environment of sporadic and disarticulated variability, on an environment that evolves progressively in some direction. Alternatively, we may entertain corresponding possibilities of social systems undergoing articulated or chaotic change as a reflection of environmental influence of any of these kinds."[57] Basically, that it is much more complicated. In the space of a few thousand years, the human species – more or less – universally adopted agriculture in part as a response to their natural condition but also in an expression of agency despite the environment that is singular to this species.

Before we could pick the most productive crops to create the most amount of food, people hunted and gathered what they needed. Trade systems for tools, animal skins, and other items existed in hunter-gatherer societies, but food was not frequently traded because people did not accumulate food the way that they started doing once cultivation practices were intensified. Ability to have a food surplus reorganized communities so that not every single person spent the majority of their time searching for and cooking food. People began to pick up trades requiring skilled labor and specialization, expediting the emergence of technological developments and invention. This meant that certain people had larger quantities of items or items of higher value to trade; a class of merchants emerged to facilitate the exchange of goods, and quickly became influential and wealthy members of society. Wealth inequality and elite classes began to take form, and with it came the conflicts that a 21st century reader is

[57] Wagner, "The Concept of Environmental Determinism in Cultural Evolution," 59

much too familiar with. As society became increasingly complex, a political class emerged tasked with organizing the rapidly growing number of people, solving conflicts within a community and navigating increasing tensions with neighboring communities due to resource competition (a constant reminder that humans are, despite everything, still animals). The hierarchical nature that seems so inherent to historic societies labeled as 'successful' was hereto born. Hand in hand with social complexity came impacts like disease, decreased nutritional value of food, establishment of sedentary lifestyles, and creation of concepts of property and ownership.

This is obviously a simplification of the chain of events that followed the spread of agriculture but, nonetheless, helps as an overview to indicate the scale of its effects on a social evolution through which human "learnt to harness the force of oxen and of winds, invents the plough, the wheeled cart, and the sailing boat," among other technological and scientific breakthroughs.[58] Compared to the time periods that have been discussed this far, the brief period between the completion of settling of sedentary communities across most of the world and introduction of metal materials thus ending the Neolithic Era, in 2000 BCE and the start of the Industrial Revolution in 1760 CE seems ludicrous. However, in terms of invention, social reorganization, and impact on the environment, this is a period during which the pace of change was unprecedented. While the evolutionary time scale had largely dictated human and pre-modern human lifestyle for the millennia preceding, humans redefined the rate of change at the expense of the environment.

[58] Childe, *Man Makes Himself*, 105

If we look at the first groups of homo sapiens, we find evidence of how environmental factors limited the ability for people to overcome their surroundings. Israeli Historian, Yuval Noah Harari, offers one explanation of what has occurred to allow humans to cause environmental "havoc."[59] He argues that archeological and biological evidence shows how humans were originally in the middle of the food chain or food web of the ecosystem and through a series of "historical calamities," the human species has reached an unnatural place as top carnivore. Ascendance through the food chain normally occurs through an evolutionary scale. It takes time and that is why the result is a two-fold process: first, once at the top of the food chain, that species possesses a mastery that is naturally respected by a sense of majestic being (sharks, lions etc.); secondly, the evolutionary time scale allows for ecosystems to adjust to the action of the top carnivore for example, "as lions became deadlier, so gazelles evolved to run faster, hyenas to cooperate better, and rhinoceroses to be more bad-tempered."[60] Human ascendance to the top of the chain occurred outside the evolutionary scale. But this also means that the ecosystems around us have not had time to adjust. Probably, according to Harari, even our own species hasn't had the time to adjust.

The top carnivore theory is a compelling argument that speaks to an anthropocentric scholarship of humans as the masters of the ecosystem. Harari makes sure to not romanticize the human position of top carnivore as lions and sharks often are. Thus, he highlights the danger the human species imposes on the ecosystem and its own survival, making the position of top carnivore a regrettable trait both for the Earth and the human species. Harari's historical analysis is a useful framework because of its seamless integration of natural and cultural change

[59] Yuval Noah Harari, *Sapiens: A Brief History of Humankind,* New York: Harper, 2015, 11
[60] Harari, *Sapiens,* 11

and demonstrates the necessity for interdisciplinary collaboration. Work of non-historians can often undermine the assumptions of historians and at the same time refine our understanding of environmental history.

The two-part service provided by the inclusion of different disciplines into historical analysis of the top carnivore theory points to a different conclusion than Harari's, that strictly ecologically speaking humans do not hold a top carnivore position. Using classic ecological assessment of species' trophic level, Bonhommeau et al. calculated the human trophic level (HTL) using data from the UN Food and Agricultural Organization.[61] The first to do this, these researchers used a well-known scale which rates species from 1 to 5; 1 being a primary producer, an organism that converts light energy into organic matter, and 5 being an apex predator, that only eats other animals and has few predators. Their results indicate that humans are on average at a 2.21, the same level as a pig or anchovy.[62]

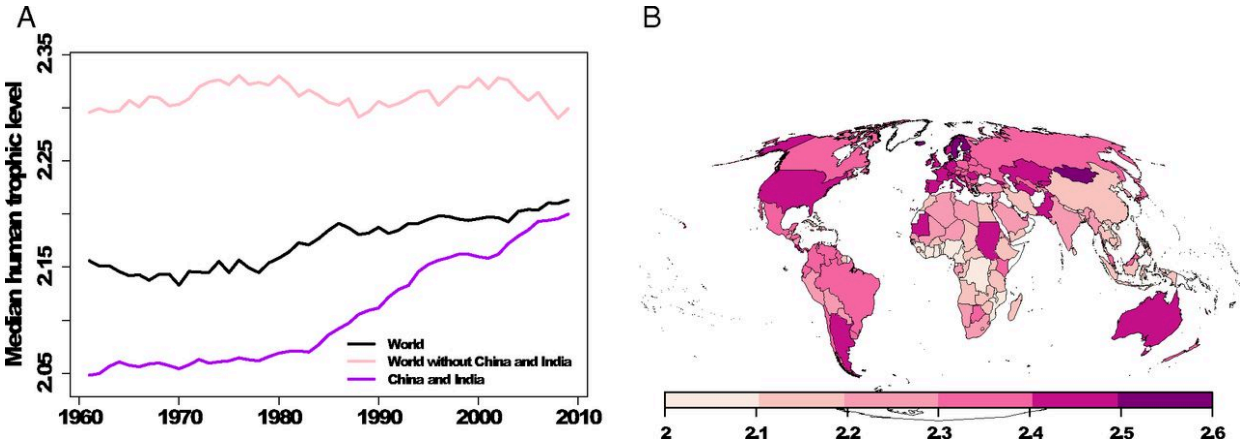

Figure 1 (A) Trends in the human trophic level (1961–2009) and (B) map of the median human trophic level over 2005–2009

[61] Sylvian Bonhommeau et al. "Eating up the World's Food Web and the Human Trophic Level," in *Proceedings of the Natural Academy of Sciences,* vol 110 no.51, 20617 - 20620

[62] Bonhommeau et al. "Eating up the World's Food Web and the Human Trophic Level,"20617 - 20620

These calculations are divided by country and the countries are grouped depending on their specific HTL, which largely correlates to GDP, urbanization, life-expectancy, and CO2 emissions.[63] However, even the country with the most meat consumption – Iceland – does not reach level 3. This maintains the 21st century human in the middle of the food web, not as a top carnivore. In their discussion, the authors point out that the results "quantifies the position of humans in the food web and challenges the perception of humans as top predators (2). Humans dominate ecosystems through changes in land use, biogeochemical cycling, biodiversity, and climate (11, 13, 14). It is not sufficient to separate humans from analyses of ecosystem processes, because there are no remaining ecosystems outside of human influence (15). Thus, investigations of ecosystems, without accounting for the presence of humans, are incomplete (13)."[64] This is an important conclusion because the authors of this paper urge to not focus on the trophic level taken by humans but, instead, how humans utilize the environment to live beyond what is available to an animal in a middle trophic level.

The statement that "there are no remaining ecosystems outside of human influence,"[65] is based on the developments and technologies that occurred in the period between the Neolithic Revolution and the Industrial Revolution. It is a time characterized by the intensification of human impact on the environment through the development of urbanization, colonization, resource exploitation, and influence on non-human species; processes that

[63] Bonhommeau et al. "Eating up the World's Food Web and the Human Trophic Level," 20618. Mongolia and Mauritania are some notable exceptions to the correlation between GDP and HTL in group 5, which represents the countries with the highest calculated HTL, but have a significantly lower GDP to the countries that fit the pattern of positive correlation, like Iceland and Sweden. In the study, this is attributed to diets based on fish, meat, and dairy with low vegetable consumption.

[64] Bonhommeau et al. "Eating up the World's Food Web and the Human Trophic Level," 20619

[65] R Gallagher and B Carpenter, "Human-dominated ecosystems," *Science* 2, 1997, as referenced in Bonhommeau et al. "Eating up the World's Food Web and the Human Trophic Level," 20619

permitted the conditions for the inventions that revolutionized energy use and extraction during the Industrial Revolution. That belief, that all planetary habitats have been somehow impacted by human behavior, is a 21st century, 'post-colonial' era one that challenges the driving forces of imperial expansion and puts into question the narratives used to justify it.[66]

One of the early environmental history texts, Crosby's *Columbian Exchange*, provides one of the first combined analyses of the environmental and human effects of colonization. It is a global perspective that did not fall under any existing historiographical categories of the 20th century. Around the world, environmentalism became an intellectual trend in the 1960s and 1970s. Politically and intellectually, the environment became a popular focus for many fields.[67] For historians, this generated interest on the topic of the natural world. One of those historians was Roderick Nash who was the first to use the term 'environmental history' in his book *Wilderness and the American Mind.*[68] Unlike Nash, Crosby's work, written in 1972, transcended a nation-state narrative and afforded agency to the non-human world. It explores the environmental consequences of the Atlantic crossing of 1492 and the undeniable connection that they had with the social and political events that occurred. Now, the title of the book is part of the intellectual vocabulary and its findings have become popular knowledge. But, Crosby's detailed explanation of the transmission of pathogens, crops, weeds, and livestock back and forth across the Atlantic was foundational to environmental history as a similar project had never been completed. What Crosby did successfully was weave the non-living,

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[66] William M. Denevan, "The "Pristine Myth" Revisited," *The Geographical Review* 101(4):576-591 Oct, 2011, 576-591

[67] J. McCormick, *Reclaiming Paradise: The Global Environmental Movement*, (Bloomington: Indiana Univ. Press, 1989), 278

[68] Roderick Nash, *Wilderness and the American Mind*, (New Haven, CT: Yale Univ. Press, 1967), 426

environmental factors of the exchange with the human actions, arguing that the natural world was both a cause and a consequence of the European arrival to the Americas.[69]

Over the last 10,000 years human activities have brought about major changes in the ecosystems of the world. The universal expansion of settlement and the creation of field and pastures for agriculture, the continual clearing of forests and other wild areas, and the draining of marshy areas, have steadily reduced the habitats of almost every kind of animal and plant. The deliberate hunting of animals for food, furs, and other products and the collection of plants has drastically reduced numbers of many species. Humans have introduced new plants and animals into ecosystems often with the unexpected and near catastrophic results. There is more evidence, though still very patchy, for the period after 1600 but it is not until the present century that detailed research has been undertaken, largely prompted by a growing awareness of the increasing scale of the losses. There is no doubt though that the pace of degradation and change has been increasing, particularly following European colonialism and expansion.

[69] A Crosby, *The Columbian Exchange: The Biological and Cultural Consequences of 1492*. (Westport, CT: Greenwood, 1972) 268

Chapter 3: Towards the Anthropocene

were muscle loving muscle, drank
straight from the rivers ran the rapids threw
our axes at the trees rode the back of every moose
we caught mid-crossing put our campfires out
by pissing on the flames.[70]

The human species has spread around the world, and with it, it brought a series of changes and added weight to local environments. Human activity, from farming, hunting and fishing, to fossil fuel extraction and combustion, has altered the ecosystems it touches in ways that are not yet entirely understood. However, what is understood is that the impact of widespread human presence has had a great enough toll on this planet that human activity rivals geological forces to the degree that it warrants a new geological era, the Anthropocene, to be created to account for our present reality, and imminent future. The details of this new geological era are heavily debated, with technical arguments about earth strata and time markers being debated by scientists, as well as intense political scrutiny from the general public, governments, the press, fossil fuel companies, and others, who either see the recognition of the Anthropocene as a necessary step forward in our commitment to protect the planet, or a delusional display of hubris by humankind.[71]

[70] Don McKay, "The Precambrian Shield," in *Strike/Slip* (McClelland & Stewart: Toronto, Canada, 2006), 20

[71] Simon L. Lewis, Mark A. Maslin "Defining the Anthropocene" PERSPECTIVES doi:10.1038/nature14258

The historical frame most directly exposed to human action and rarely considered in historical scholarship, is made up of the present context and conditions, that without all the previous layers of history cannot be understood but also is not isolated from the environmental and anthropogenic conditions of today. The sources of energy available to human societies have played a major part in determining the activities that they can undertake and the way in which they are organized. For all but the last two hundred years the sources of energy were few and the total amount of energy that we could generate was small. The second great transition in human history, comparable in its importance with the adoption of agriculture and the rise of settled societies, involved the exploitation of the earth's vast (but limited) stocks of fossil fuels, a move that made possible an era of abundant energy for part of the world's population. All the forms of energy used until this transition were renewable. The last two hundred years have, however, been characterized by a massive and continuing increase in energy consumption from non-renewable resources.

History often focuses on the history of human achievement of freedom. In a lecture delivered in 2013, Dipesh Chakrabarty, outlined the historical irony of fossil fuel use. From the Industrial Revolution, the ability to burn fossil fuels liberated human beings from forced labor, now, the same process is the instrument through which humans have acquired the agency of a geophysical force. But, Chakrabarty states that being a geophysical force removes much of the celebrated autonomy and agency that humans had gained until the Anthropocene.[72] A force is defined is an object that has the strength or capacity to change another object. So, as a

[72] Dipesh Chakrabarty, "History on an Expanded Canvas: The Anthropocene's Inviation," Keynote, The Anthropocene Project. An Opening, Haus der Kulturen der Welt, Berlin, January 13, 2013

collective we have become another object and lost our autonomy, sovereignty and purpose. The creation of the Anthropocene, however defined, is a collision between three histories that have been considered separate until this point: the history of earth systems, the history of life (including human evolution) and the history of an industrial way of life.

The discussion of the beginning of the Anthropocene comes hand in hand with the discussion of the end of the Holocene. There are two origin stories of the Anthropocene that can be told; one is how we have arrived to this new geological epoch, the second is the story of the term itself. It is not a simple manner to proclaim a brand new geological era, it requires scientific evidence showing that the geological record has changed significantly and consensus from geologists that such change warrants a brand-new epoch categorization. The two origin stories are closely related because debating the definition of the term or even the validity of the claim for a new geological epoch, is ultimately debating on the history of our species. When the first proponents of the Anthropocene as it's understood today, Nobel Laureate and then-vice-chair of the International Geosphere-Biosphere Programme (IGBP), Paul Crutzen, and geobiologist Eugene Stoermer, published their seminal article in the 2000 IGBP newsletter, they sparked a conversation encompassing everything from the role of geology in climate change policy to the importance of big history in education.[73] In his next paper on the topic, Crutzen outlined the intellectual historical precedents of the idea that humans beings were having an increasingly important role in the geology of the planet.[74] According to him, the first recorded use of a similar term was "as long ago as 1873" by Italian geologist Antonio Stoppani, who

[73]Paul Crutzen and Eugene Stoermer, *IGBP Newsletter* **41** (Royal Swedish Academy of Sciences, Stockholm, 2000)

[74] Paul Crutzen, "Geology of mankind," *Nature* 415, no. 6867 (2002): 23

names an "anthropozioc era" where human actions compare to the forces of the Earth.[75] He continues naming other scholars like GP Marsh, Vladimir Vernadsky, Pierre Teilhard de Chardin and Edouard Le Roy the precursors to the current scientific use of Anthropocene.

The search for historical precedents for this line of thought is useful to because it shows a notice of the growth and continuity of human influence on Earth and even can suggest that it the scale of the current crises could have been avoided or its effects been minimized. However, in opposition, Jacques Grinevald and Clive Hamilton argue that there are no precursors to the Anthropocene as it is defined today because the scholars that Crutzen refers to had no understanding of *Earth Systems* and, that saying that there are, puts the seriousness and scale of the issue at risk.[76] In their words, "We suggest that in referring to precursors, perhaps to bolster the credibility of the new concept by locating it within a respected tradition ('on the shoulders of giants'), the original proponents of the Anthropocene unwittingly undermined the radical novelty of the concept and the actuality of the proposed new geological epoch."[77] They claim that the Anthropocene is unique because of the intellectual context in which it was created and involves a deep understanding on the convergence of human and natural history.

Other critics of the Anthropocene model championed mainly by Paul Crutzen, Will Steffen and JR McNeill, point to the dangers of the 'humankind' view of this ideology because it erases the deep inequality inherent to this epoch.[78] Malm and Hornborg quite determinately state that the Anthropocene is analytically flawed and antithetical to action because it tells a

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[75] Crutzen, "Geology of mankind," 23

[76] Clive Hamilton and Jacques Grinevald, "Was the Anthropocene anticipated?" *The Anthropocene Review* 2, no. 1 (2015): 60

[77] Hamilton and Grinevald, "Was the Anthropocene anticipated?" 61

[78] Andreas Malm and Alf Hornborg, "The geology of mankind? A critique of the Anthropocene narrative," *The Anthropocene Review* 1, no. 1 (2014): 63

determinist story of human evolution that naturalizes climate change.[79] Although well argued, Malm and Hornborg seem to simplify the dimensions of the definitions offered by Antropocene proposers without noting that most worthwhile accounts of the Anthropocene include the historically nuanced accounts of how power relations operate, both across the earth system as a whole and between human beings. The 'analytical flaws' they highlight leads them to ask a rhetorical question like, "If global warming is the outcome of the knowledge of how to light a fire, or some other property of the human species acquired in some distant stage of its evolution, how can we even imagine a dismantling of the fossil economy?"[80] This ignores much of the complex theory behind the ideology of the Anthropocene, which argues that the geological record has been noticeably affected by humans because, yes, humans were able to harness the power of fire, but, further, because humans have used their knowledge in such a manner that has forever-altered Earth systems processes. Indeed, not all humans are to blame because intrinsic to the Anthropocene is deep social and economic inequality.

Through epochal thinking and geological records, the Anthropocene illuminates the patters of human-caused environmental change. Unlike the characteristics of other geological epochs, many of these patterns are heavily political. The politics of the Anthropocene thus have become central to its very existence, and although much has been published, there is still a central challenge that was originally presented by historian Dipesh Chakrabarty that has not yet been solved. His argument is that there needs to be anti-capitalist resistance that overturns capitalist globalization and its profit-driven exploitation of disempowered communities and vulnerable ecosystems in order to transition to an environmentally just society. However, he

[79] Malm and Hornborg, "The geology of mankind? A critique of the Anthropocene narrative," 67
[80] Malm and Hornborg, "The geology of mankind? A critique of the Anthropocene narrative," 67

notes that our current environmental crises will exist for longer than capitalism as we know it just as it has been causes not just by capitalist Western powers but also by industrializing socialist states. So, resistance to capitalism is not enough. Chakrabarty's argument, based on history, is that the "boundary parameters of existence" that permit life on the planet and are being destabilized through climate change are independent of capitalism or socialism.[81] Confronting globalization is essential, but globalization and global warming are not intrinsic to each other. Global warming affects all human beings, although not all human beings are responsible for it but it has a logic of causality that is, Charkrabarty argues, intrinsically, not historically, indifferent to injustice between humans. The argument is that even in a socially just world that dependent on fossil fuels, we would have a climate crisis. In such a world the crisis might even be worst given that at the moment most of the greenhouse gas emissions are being produced by a fifth of the population, if no one were poor the environmental degradation could be worse.

What is clear though, is that this is a changing planet. As communities around the world increasingly face scarcity, natural disasters, and even complete destruction due to climate change and its effects, it is essential to understand the effects of this change. Capitalism is not the necessary process for climate change, that is not where the causality lays. Instead, climate change exacerbates and accentuates the inequalities created by capitalism. More often than not, it is those communities who contributed the least to greenhouse accumulation, environmental destruction, and climate change in general, that face the worst consequences of it, and find themselves in extremely vulnerable conditions as well as with less resources and

[81] Chakrabarty, "The Climate of History: Four Theses," *Critical Inquiry* 35, no. 2 (2009): 218; This is similar to Fred Spier's "Goldilocks Principle" discussed in Chapter 1.

ability to adapt and survive these changes, due to economic and structural inequality. As Steve Vanderheiden discusses in his work "Globalizing Responsibility for Climate Change", as catastrophes become increasingly frequent and drastic, reliance upon the structure of nation-states, operating independently is not enough to guarantee a safe future during the Anthropocene.[82] Therefore, it is increasingly necessary to devise a framework in which resources, both financial and material, can be distributed and allocated to allow for the survival of human communities in a global scale. This should be done along lines of responsibility, in other words, those nations who profited from economic and political activities that provoked damage onto more vulnerable nations, presumably less engaged and less beneficiated from the global capitalist economy, should allocate due resources to lessen and prevent suffering from environmental stress.

Vanderheiden further suggests that this liability should also be proportionally distributed amongst the citizenry, as not all citizens are equally responsible for contributions to climate change. Vanderheiden's proposed framework for liability and cost distribution creates structures based on the perception that not all human beings are equally participating in the chains of production and consumption that, perhaps irreversibly, damaged the planet.[83]

Some scholars suggest that we must analyze human relationship to the environment from a moment much before capitalism to understand the Anthropocene and human-induced climate change. Anthropocene proponents, Steffen, Crutzen, and McNeill highlight the moments in the last 150,000 years that changes in the climate affected human affairs and, vice

[82] Steve Vanderheiden, "Globalizing responsibility for climate change," *Ethics & international affairs* 25, no. 01 (2011): 65

[83] Vanderheiden, "Globalizing responsibility for climate change," 76

versa, humans affected the climate. They take the approach that the environment and that human path to "civilization and cities," are intrinsically connected. What made it possible for human to create buildings did not involve slave labor or bondage labor. It involved cheap and plentiful energy, which is fossil fuels.[84] Fossil fuel use is a commonly used origin point for the transition of the human species into a geological force. This view sates that once the human species learned to work collectively, one part of the species found a way to live 'better.' It began exploiting other people, taking other people's lands, colonizing them, and using them as slave labor eventually, slave a sun energy was insufficient to fulfill the energy needs of unabated growth. Robert Marks argues that humans have had a global environmental impact only since the beginning of the twentieth century, "where earlier environmental impacts of human activity were more local or regional and sometimes could be reversed whenever the human footprint eased."[85] This argument is based on the claim that the severe environmental impact of human actions only began once human populations were no longer bound by the limits of solar energy. Before fossil-fuel mode of production- practically, the Industrial Revolution - humans' expansion and access to energy was limited by the capture and use of solar energy and access to land.[86]

Historians' role in the definition of the Anthropocene is essential because, although some critics argue that the term reinvigorates a split between human and nature. Historical inquiry can show that intrinsic to the this new-epoch proposition is a belief that there is no

[84] Will Steffen, Paul J. Crutzen and John R. McNeill. 2007. "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" in *Ambio*, Vol. 36, No. 8 (Dec., 2007), pp. 614-621

[85] Robert B. Marks, "The (Modern) World Since 1500," in *A Companion to Global Environmental History,* (John Wiley & Sons, Ltd: Chichester, UK, 2012) 57

[86] Marks, "The (Modern) World Since 1500," 65

metaphysical divide between humans and nature, but humans are one more natural agent of chance within the Earth System. It outlines how intrahuman and extrahuman forces coproduce one another and it is the historian's job to provide evidence for that relationship production.

When scientists and politicians refer to climate change, the rhetoric often surrounds the idea of a "human species" as a homogenous entity, that is both collectively responsible for environmental collapse, and is collectively threatened by it. While this might be true to a certain degree, thinkers such as Dipesh Chakrabarty challenge this "species thinking", as it collapses important anthropological distinctions that need to be accounted for and understood in order to truly grasp the reality of climate change. Ultimately, no single individual can transcend their own personal experiences and their limitations- none of us can experience ourselves as a species, a collective human entity. In fact, all we do experience is a series of relationships and interactions that connects us to others, both human and non-human, both living and non-living. With the advent of fossil fuel powered technology, and a commodity chain that spans the entire globe, this web of relationships now connects us more deeply and in more far-reaching way to each other. Understanding this assemblage of relationships cannot come from a simplistic perception of a single human species. Instead by understanding the differences between individuals, and communities; how experiences shape perception, and structure affects experience, we can approach a more honest and accurate understanding of our world, and the profound changes that are underway. So, telling a 'species history' is not about generalizing one human history, but telling a detailed story of the local interactions between communities and their environments over time eventually leading to the Anthropocene.

Conclusion

Climate change itself is not a homogenous single entity. Instead, it is an amalgamation of particular experiences, relationships, objects, and natural processes. It stretches across individuals, space and time. According to Timothy Morton, global warming[87] can be defined as a "hyperobject" because of its myriad manifestations- always falling short of the object as a whole, which seemingly only exists in immaterial forms.[88] Its existence in a dauntingly large time frame, or "deep time", dwarves the individual human experience. Understanding climate change, requires one to see their responsibility in being a part of a system with such effects, and forces one to recognize how small each human life is. We have entered a period known to scholars as the Anthropocene, a geological epoch of unforeseen, human-induced, accelerated changes to the Earth's climate, oceans, land and biosphere.[89] This epoch has brought to light a new history of the human effect on the natural world that must be traced back to the beginning of not only our capitalist society, colonial projects, and resource exploitation; but, much further, to the beginning of settled societies, intensification of agriculture, and the very emergence of our species, the *Homo Sapiens sapiens.*

[87] Morton makes a point to explicitly use the term *global warming* and not *climate change* with the following rationale, "On the terrain of media and the sociopolitical realm, the phrase climate change has been such a failure that one is tempted to see the term itself as a kind of denial, a reaction to the radical trauma of unprecedented global warming. That the terms are presented as choices rather than as a package is a symptom of this failure, since logically it is correct to say "climate change as a result of global warming," where "climate change" is just a compression of a more detailed phrase, a metonymy." Timothy Morton, *Hyperobjects*, (Minneapolis: University of Minnesota Press, 2013) Accessed March 9, 2017. ProQuest Ebook Central, 8

[88] Timothy Morton, *Hyperobjects*, 2

[89] Will Steffen, Paul J. Crutzen and John R. McNeill. 2007. "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" in *Ambio*, Vol. 36, No. 8 (Dec., 2007), pp. 614-621

Historical inquiry is necessary for our understanding of the current moment and for imagining the future but history is facing the challenge of an unprecedented present. Historians should now must seek to bridge the divisions it has created between natural and human histories and apply it to a much longer timeline – the one of deep time. Once we understand what it has taken in terms of human effort and environmental conditions to arrive at this moment we can begin to create informed frameworks. As a species, *Homo sapiens*, transcend three geological epochs: the Pleistocene, marked by the biological evolution of our species; the Holocene, a time of class-stratification, environmental domestication and accelerated change; and our present Anthropocene, when humans have taken the role of a geophysical force, not the only one and maybe not even the most important one, but a force nonetheless. Even if future geological records don't show specifically that humans roamed the earth, it'll show a natural history of decadence. There will be evidence of a sixth mass extinction almost equal to the previous extinctions, of atmospheric levels and temperatures that even in times of climatic instability were not as volatile. The threshold moments, like the evolution of the species, our adoption of agriculture, and the use of fossil fuels for energy consumption, all encompass moments where the earth's history and the smaller, in terms of time scale, history of human life have collided and forever-changed the makeup of earth and its systems.

This chronological summary of historical inquiry of human development has the purpose of pointing to how historians have negotiated their place within the story of the planet, borrowing from and adding to the disciplines that highlight the encounter between humans and their environment. But these negotiations have not been seamless. Historical inquiry often must make choices between the specific events, actors, and things it chooses to study.

Traditional history has not sufficed to narrate the story of that which isn't human, written, or has been hidden by hegemony. As the complexity of the history of life – human and non-human – is exposed, we need to look further back in time and zoom closer to look at the creation of processes that now seem inevitable for human sustenance. Whether or not the term Anthropocene is adopted by geologists, the ideology behind it is not lost. Human activities are changing sea levels, climate tendencies, and the ability of species – including our own – to perform their functions in their habitats as they have done in the past. Thus, the story of the Anthropocene is not a human story, like its name would suggest, but the story of a changing planet.

The field of history, like its subject of study, is not static. It responds to questions and anxieties reflective of a moment in time. At this moment, history has the tremendous responsibility to respond to what looks like an impending crisis in which entire parts of the earth system, including those which we depend on, are being dangerously altered. Telling this story will inspire all sorts of responses across the social and political structures as people are confronted with having reimagine the assemblages that make human and nonhuman life possible in the planet and their own role in the processes. This might an unpopular project, as Gordon Childe masterfully put it in 1936:

> *"To survive, any society must attain an adjustment to its environment; it lives by exploiting the natural resources of its territory. But just in so far as the adjustment achieved is successful, the community concerned will tend to become conservative. When a group are enjoying a sufficiency of food in simple comfort with spells of rest, why should they change their behavior? They have painfully learned the tricks and dodges, the arts and crafts necessary to coax this modicum of prosperity out of nature; why do more? Indeed, change may be dangerous"*

Today, that need for change is no longer negotiable and it cannot be left to those few people in positions of power. Every day we are faced with a new catastrophe, from the decreasing size of fully populated islands in the Pacific, to droughts in California that are putting the food security of millions of people at risk. Our current models of resource exploitation have reached an impasse and our historical frameworks are insufficient.

The Anthropocene forces historians to look at where humans fit in the history of deep time. Within the entire history of the planet, the history of the human species is but a small part. In that time, the Earth's biosphere, atmosphere, lithosphere, and hydrosphere have performed their functions as human and non-human life profited from them and sometimes suffered from its unexpected changes. Today, those processes dating back further than the human mind can fully picture, are being interrupted and transformed in harmful ways. History now must reimagine human beings and nature not as a dichotomy but as forces in constant conversation. And climate change is essential to this conversation. Around 500 B.C.E. Heraclitus wrote "you cannot step twice into the same river for fresh water are ever flowing in upon you," and, today, our species is learning this lesson the hard way. As we've entered the river of the changing systems of the planet, we have transformed the flow altogether. Instead of joining the stream and being in harmony with the flux of life, we have dammed, polluted, and dried the river.

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