What is Big History?

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> As they err who study the maps of regions before they have learned accurately the relation of the whole universe and the separate parts of it to each other and to the whole, so they are not less mistaken who think they can understand particular histories before they have judged the order and sequence of universal history and of all times, set forth as it were in a table.[1]

Big history represents an attempt at what E.O. Wilson has called "consilience," a return to the goal of a unified understanding of reality, in place of the fragmented visions that dominate modern education and scholarship.[2] Though it may seem new, the goal of consilience is very old. And even in its modern forms, big history has been around for at least a quarter of a century. So the publication of the first issue of the *Journal of Big History* provides the ideal opportunity for a stock take.

This article is a personal account of the field. It sees big history as the modern form of an ancient project. I am a historian by training, so my account focuses on the relationship of big history to the discipline of history. It reflects the perspective of a historian trained in the English-speaking world, and it focuses on big history's relationship to Anglophone historical scholarship. But not *just* to Anglophone historical scholarship, because the debates I discuss had their counterparts and echoes in many other traditions of historical scholarship. Nor do I focus just on historical scholarship as it is normally understood within the academy, because big history sees human history as part of a much larger past that includes the pasts studied by biologists, paleontologists, geologists and cosmologists. By linking different perspectives and scales, and many different scholarly disciplines, all of which try to understand the deep roots of today's world, big history can transform our understanding of "history."

However, to fully capture the richness and range of this vibrant new field of research, scholarship and teaching, we will eventually need the perspectives of big historians trained in many other disciplines. I hope this essay may encourage such scholars to offer their distinctive perspectives on big history.

The evolution of historical scholarship in the twentieth century

Historians will recognize that my title comes from a classic essay on history, studied by most Anglophone history graduates. It was written in 1961 by E.H. Carr, an English historian of the Soviet Union. Carr's book began as a lecture series given at Cambridge in 1961 in honor of George Macauley Trevelyan, a historian who, unlike Carr, saw history as a literary discipline, and quite distinct from the sciences. As a historian of Russia and the Soviet Union, Carr took seriously the Marxist insistence that history should be regarded as a branch of science, and that idea influenced my own thinking about history as I, too, entered the field of Russian history as a graduate student in the early 1970s.

In *What is History?* Carr tracks the evolution of the history discipline in England in the early 20th century. At one level, his story is of a sustained trend away from the confident realism, positivism

1 Jean Bodin, 16th century, cited from Craig Benjamin "Beginnings and Endings," in Marnie Hughes-Warrington, ed., *Palgrave Advances in World Histories* (New York: Palgrave Macmillan, 2005), 95.
2 E.O. Wilson, *Consilience: The Unity of Knowledge* (London: Abacus, 1998).

and even universalism of many nineteenth century historical thinkers, towards increasing fragmentation and skepticism. He begins by citing Lord Acton's confident vision of historical scholarship from the 1890s, as Acton presided over the first edition of the *Cambridge Modern History.* Acton saw the *Cambridge Modern History* as "a unique opportunity of recording, … the fullness of the knowledge which the nineteenth century is about to bequeath…." He added: "Ultimate history we cannot have in this generation [but] … all information is now within reach, and every problem has become capable of solution."[3] Acton's view of history is confident, positivist, and optimistic, and it assumes that history is part of the larger project of increasing human knowledge in general. His vision of history is also broad. He assumed that historians should aim at some kind of "universal history," though he seems to have understood that phrase to mean, not an early form of big history, but something closer to modern "world history" or "global history." Acton defined universal history as "that which is distinct from the combined history of all countries."[4]

In the early twentieth century, English historical scholarship underwent a profound transformation, and when Carr wrote, the discipline was more fractured and less sure of itself. These shifts were part of a sea-change that affected most scholarly disciplines, from the humanities to the natural sciences, as specialization and professionalization broke scholarship into ever-smaller compartments, each offering its own pin-hole view of the world. Specialization proved a powerful research strategy, but it was achieved by severing ancient links among fields of knowledge, leaving them increasingly isolated from each other. The idea of a single world of knowledge, whether united by religious cosmologies, such as that of Christianity, or by scientific scholarship—the vision that lay behind Alexander von Humboldt's attempt to write a scientific universal history in his *Kosmos*—was abandoned.[5] In humanities disciplines such as history, which lacked the sort of unifying paradigm ideas characteristic of the natural sciences in the era of Darwin, of Maxwell and of Einstein, specialization also undermined Acton's confident epistemological realism.[6]

Carr captures some of these changes by citing the introduction to the second edition of the *Cambridge Modern History,* written by George Clark in 1957, more than half a century after Acton's confident pronouncements. After citing Acton's hopes for an "ultimate history," Clark writes:

> Historians of a later generation do not look forward to any such prospect. They expect their work to be superseded again and again. …The exploration seems to be endless, and some impatient scholars take refuge in skepticism, or at least in the doctrine that, since all historical judgements involve persons and points of view, one is as good as another and there is no 'objective' historical truth.[7]

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3 E. H. Carr, *What is History?* (Harmondsworth: Penguin, 1964), 7. 1st published in 1961, based on the George Macaulay Trevelyan Lectures, delivered in 1961 in Cambridge.

4 Carr, *What is History?* 150.

5 On Humboldt as a big historian before his time, see Fred Spier, *Big History and the Future of Humanity,* 2nd ed. (Malden, Mass.: Wiley Blackwell, 2015), 18-21, and Andrea Wulf, *The Invention of Nature: The Adventures of Alexander von Humboldt, the Lost Hero of Science*, (London: John Murray, 2015).

6 The distinction between paradigm and pre-paradigm disciplines was introduced by a book whose first edition appeared in 1962, just a year after Carr's book: Thomas Kuhn, *The Structure of Scientific Revolutions,* 2nd ed. (Chicago: University of Chicago Press, 1970).

7 Carr, *What is History?* 7-8.

The loss of confidence in a realist or naturalist epistemology in disciplines such as history, widened the gulf between the "two cultures" of the sciences and humanities that so worried C.P. Snow in a famous lecture delivered in 1959.[8] The gulf was particularly wide in the English-speaking world, because English, unlike most other scholarly languages, confined the word, "science," to the natural sciences. In English, the very idea of "historical science" began to seem absurd. By Carr's time, historical scholarship had lost confidence both in the "scientific" nature of historical scholarship, and in the realist epistemology that still underpinned research in the natural sciences.

Skepticism and intellectual fragmentation sapped confidence in the value of historical research, and undermined the ancient hope that history could empower us by helping us better understand the present. As historians became increasingly isolated from other disciplines and even from each other, they were left with increasingly fragmented visions of the past, and of the nature and goals of history. This growing sense of fragmentation was the scholarly counterpart of what Durkheim called *anomie*, the loss of a sense of coherence and meaning, an idea that Carr himself glosses in a footnote as "the condition of the individual isolated from … society."[9] Scholarly *anomie* arose from the growing isolation of scholars both from each other and from a unified world of knowledge. The one force that partially mitigated the growing sense of scholarly isolation was nationalism. Though tribal by their very nature, national histories, which had flourished since the nineteenth century, provided some sense of cohesion for historians working within national historiographical traditions.

Carr's own position falls between the robust scientific realism of Acton and the hesitant relativism of Clark. He explores brilliantly the complex dialectic between history as truth and history as stories we tell about the past. He takes truth and science seriously, because he believes that history, like science, and like truth in general, has a purpose: it can empower us. It empowers us by improving our understanding of the present, and it does that by mapping the present on to the past: "The function of the historian is neither to love the past nor to emancipate himself from the past, but to master and understand it as the key to the understanding of the present."[10] It followed that the maps of the past created by historians had to be good maps. Like good science, they had to give us a better grip on the real world. So Carr, like Marx, was a philosophical realist and saw no fundamental chasm between the humanities and the natural sciences. "Scientists, social scientists, and historians are all engaged in different branches of the same study: the study of man and his environment, of the effects of man on his environment and of his environment on man. The object of the study is the same: to increase man's understanding of, and mastery over, his environment."[11]

On the other hand, Carr understood more clearly than Acton that the past is not simply waiting to be discovered, "like fish on a fishmonger's slab."[12] History consists of stories about the past constructed by historians, and how we construct those stories changes as our world and our purposes change. We need empirical rigor to get at the truth about the past, but when telling *stories* about the past we will need the skills of storytellers, including what Carr calls "imaginative understanding," the ability to understand and

8 C. P. Snow, *The Two Cultures and the Scientific Revolution* (Cambridge: Cambridge University Press, 1959).
9 Carr, *What is History?* 32.
10 Carr, *What is History?* 26.
11 Carr, *What is History?* 84.
12 Carr, *What is History?* 23.

empathize with those who lived in the past.[13] In this, Carr was influenced by one of the great English philosophers of history, R.G. Collingwood, though he warned that Collingwood's emphasis on the empathetic role of the historian, if taken too far, could lead to extreme skepticism.[14]

Particularly influential on Carr's thinking was Marx's dialectical balance between science and activism. Marx insisted that there is an objective past. But making something of that past is a creative task, and how we approach it depends on who we are and the particular present in which we write and study. This is the dialectic that Marx described in a famous passage from the "18th Brumaire of Louis Napoleon."

> Men make their own history, but they do not make it just as they please; they do not make it under circumstances chosen by themselves, but under circumstances directly found, given and transmitted from the past. The tradition of all the dead generations weighs like a nightmare on the brain of the living.[15]

Historians, too, "make their own history," but they do so "under circumstances directly found, given and transmitted from the past." What they make of the past depends on the time and place in which they write. But the stories they construct about the past may, in their turn, influence the pasts studied by future historians. As an activist, Marx understood well that *how* we describe the past matters, because our accounts may shape the future. Indeed, he hoped that his own account of the evolution of capitalism would have a profound impact on the future, as indeed, it did.

Like Marx, then, Carr understood the complex and delicate balance between history as truth and history as story. History is, Carr wrote, in a passage familiar to many a graduate student in history: "a continuous process of interaction between the historian and [the] facts, an unending dialogue between the present and the past."[16] Like memory, history does not *recall* the past; it *re-creates* it.

But what past? Carr was even more committed than Acton to broadening the scope of historical research. He was, after all, a historian of Russia, and keen to demonstrate the significance of histories that had been neglected by English-speaking historians. As an admirer of Joseph Needham, he also insisted on the importance of Chinese history and the histories of many other parts of the world beyond Europe.

But, though Carr's past is broad, it is not deep. He shows little interest in human prehistory or in the histories of the biosphere and the universe. And that is surprising, given his interest in Marx, who saw history as part of a knowledge continuum that included all the sciences. Indeed, Marx, like von Humboldt, was a big historian before his time. But Carr wrote in an era of scholarly fragmentation, and the idea of universal history was not on his radar, or on the radar of any English-language historians of his generation. Strangely, though, it *was* on the radar of historians in the Soviet Union, the country whose history Carr wrote most about, because the Soviet Union's Marxist heritage ensured that the idea of "universal" or "general" history never entirely lost its inclusive Marxist sense. That is one reason why, today, there is a flourishing Russian school of big history research led by scholars such as Andrey Korotayev and Leonid Grinin.

13 Carr, *What is History?* 24.

14 Collingwood's work, like Carr's, was staple fare for graduates of my generation. His most important work was R. G. Collingwood, *The Idea of History*, rev. ed., Jan Van der Dussen (Oxford and New York: Oxford University Press, 1994).

15 Cited from Robert C. Tucker, ed., *The Marx-Engels Reader*, 2nd ed. (New York and London: W.W. Norton & Co., 1978), 595.

16 Carr, *What is History?* 30.

In 2001, David Cannadine edited a collection of essays called *What is History Now?* based on a conference held to mark the 40th anniversary of Carr's book.[17] Much had changed since Carr wrote. The history discipline had become even more fragmented, in both content and epistemology, and even less sure of itself. The universalist vision of Marx or von Humboldt or H.G. Wells seemed to have vanished completely, surviving only in the cut-down version of national histories. Many of the changes evident in Cannadine's collection reflect the post-war proliferation of universities, university students, historians, and historical sub-disciplines. This was a worldwide phenomenon, so similar trends can be found, with variations, in many different historiographical traditions.

Since Cannadine's book was no longer about a single history discipline, it was appropriate that it had multiple authors. More historians and more students seemed to mean more diverse ideas on the content, the meaning and the purpose of historical scholarship. Each chapter is about a different type of history, so there are chapters called: "What is Social History now?" "What is intellectual History Now?" and "What is Cultural History Now?" The absence of "What is Women's History Now?" or "What is Environmental History Now?" is striking, though Cannadine insists that his book reflects just a small number of the sub-disciplines into which history was then divided.

Fragmentation was accompanied by increasing skepticism about the objectivity and the scientific nature of the discipline. True, most historians continued to approach the details of their research with a robust, realist empiricism, so much so, that many caricatured the discipline as just a catalogue of facts. But, as the circle of questions widened, the confidence of historians seemed to dwindle, and few were comfortable with the idea of historical scholarship as part of a larger system of knowledge or meaning. Historians became increasingly isolated from other disciplines (the decline of economic history is a striking example of this process), and even from each other, and any consensus about the nature and goals of history seemed to evaporate. In an introductory essay to Cannadine's book, Richard Evans noted the increasing focus in a postmodernist era on the creative and subjective role of the historian and on the historian's role as storyteller. This approach had been epitomized in Hayden White's 1973 classic, *Metahistory: The Historical Imagination in Nineteenth Century Europe,* which focused almost entirely on the literary aspects of historical scholarship, rather than on the truth claims it made. Historical scholarship seemed to have splintered into multiple, incommensurable, stories about the past, each representing a particular perspective, and none confident about its claims on historical truth. Historians seemed to have taken on the deep skepticism towards grand narratives or meta-narratives that Jean- François Lyotard saw as a defining feature of postmodern thought.[18]

And yet, … though the tremors barely registered on the seismograph of Cannadine's volume, by the year 2000, the idea of a new form of universal history was already rattling the margins of historical scholarship. World history was flourishing in the USA, had a well-established scholarly organization and a successful journal (*The Journal of World History*), and was taught in an increasing number of universities and schools. But several scholars now ventured far beyond world history. They began to explore the possibility of a truly universal history that would embrace the whole of the past, including the pasts of the biosphere and the entire universe. By 2001, I had been teaching big history for 12 years, but I was just one member of a small but vigorous community of scholars moving in the

17 David Cannadine, ed., *What is History Now?* (Basingstoke: Palgrave/Macmillan, 2002).

18 Jean-François Lyotard, *The Postmodern Condition: A Report on Knowledge*, trans. Geoff Bennington and Brian Massumi (Minneapolis: University of Minnesota Press, 1984).

same direction. Eric Chaisson had been teaching astronomer's versions of big history for more than twenty years, and big history was being taught in Amsterdam by Fred Spier and Johan Goudsblom, in Dallas by John Mears, in San Rafael by Cynthia Stokes Brown, in Melbourne by Tom Griffiths and Graeme Davidson, and elsewhere. Big history snuck up on a history discipline that was looking in the opposite direction.

Today, fifteen years after Cannadine's volume, big history remains marginal, but it is beginning to shake up the history discipline.[19] There is an emerging scholarly literature that proves big history can be written with rigor and precision and can yield new, sometimes transformative, insights into the past.[20] Big history is being taught successfully in several universities, mostly in the English-speaking world, and even those history departments that do not teach it often include discussions of big history in their historiography seminars. There are several MOOCs (Massive Open Online Courses) on big history. There is a scholarly association (the IBHA), which has held three major conferences, and now there is a journal of big history. Macquarie University has established a Big History Institute, which has organized two research conferences. Big history is even being taught in hundreds of high schools, mostly in the USA and Australia, through the "Big History Project," a free, on-line high school syllabus in big history, launched in 2011 and funded by Bill Gates.

What seemed just decades ago an archaic, unrealistic, and perverse approach to historical scholarship is now beginning to look like a powerful, rigorous and even transformative form of modern scholarship, which can re-connect historical scholarship and teaching to other disciplines in both the humanities and the sciences.

Why the return to Universal History?

What happened?

Some of the crucial changes occurred within the history discipline itself. There had always been a few scholars, such as H.G. Wells or Arnold Toynbee, who kept alive the vision of a more capacious understanding of the past. But specialist research also laid the foundations for a broader view of the past, by generating a colossal amount of new historical scholarship and tackling subjects and regions and epochs that had been ignored by earlier generations of historians. Felipe Fernandez-Armesto, a world historian with extraordinarily broad interests, puts it nicely in a chapter in Cannadine's volume:

> Historians dig ever deeper, narrower furrows in ever more desiccated soil until the furrows collapse and they are buried under their own aridity. Yet on the other hand, whenever one climbs out of one's furrow, there is now so much more of the field to survey, so much enriching new work, which can change

19 One interesting example is *The History Manifesto,* by Jo Guldi and David Armitage, (Cambridge: Cambridge University Press, 2014), which offers an aggressive critique of short-termism in contemporary historical scholarship.

20 A start up list might include Eric Chaisson, *Cosmic Evolution: The Rise of Complexity in Nature,* Cambridge, MA: Harvard University Press, 2001; David Christian, *Maps of Time: An Introduction to Big History,* Berkeley, CA: University of California Press, 2nd ed., 2011; Fred Spier, *Big History and the Future of Humanity,* 2nd ed., Malden, MA: Wiley/Blackwell, 2015; Cynthia Stokes Brown, *Big History: From the Big Bang to the Present,* 2nd ed., New York: New Press, 2012; a university text, David Christian, Cynthia Stokes Brown, and Craig Benjamin, *Big History: Between Nothing and Everything,* New York: McGraw-Hill, 2014; anthologies of essays, such as Barry Rodrique, Leonid Grinin and Andrey Korotayev, eds., *From Big Bang to Galactic Civilizations: A Big History Anthology,* Vol. 1, *Our Place in the Univere,* Delhi: Primus Books, 2015; and a beautifully illustrated overview, Macquarie University Big History Institute, *Big History,* London: DK books, 2016.

> one's perspective or broaden one's framework of comparison.[21]

However, many of the changes that allowed a return to universal history occurred beyond the history discipline, and particularly within the natural sciences, which had always been more friendly than the humanities to the idea of consilience.[22] The quantum physicist, Erwin Schrödinger, had already anticipated new forms of scholarly unification in a book he wrote just after World War II on the nature of life.

> We have inherited from our forefathers the keen longing for unified, all-embracing knowledge. The very name given to the highest institutions of learning reminds us that from antiquity and throughout many centuries the universal aspect has been the only one to be given full credit. … We feel clearly that we are only now beginning to acquire reliable material for welding together the sum total of all that is known into a whole; …[23]

In the natural sciences, as in the humanities, specialized scholarship over many decades yielded a huge bounty of new information and ideas. Equally important was the emergence of new unifying paradigm ideas. The most important were Big Bang cosmology, plate tectonics and the modern Darwinian synthesis. The new paradigms were barely visible when Carr wrote. DNA had been discovered in Carr's own University of Cambridge, in 1953, but the full significance of that discovery would only become apparent over the next decade or two. The discoveries that clinched plate tectonics and Big Bang cosmology still lay a few years in the future. By 1970, though, the new paradigms were already encouraging hopes of a new unification of knowledge, at least in the natural sciences. Some scientists began to talk of "Grand Unified Theories."

Particularly striking is the fact that the new scientific paradigms were historical in nature. Gone was the static universe of Newton, replaced by a universe that operated according to historical and evolutionary rules. E.H. Carr was aware of the "historical turn" in the natural sciences, and its significance for history, though his insights would be ignored by most historians over the next fifty years or so. Science, he wrote:

> had undergone a profound revolution …. What Lyell did for geology and Darwin for biology has now been done for astronomy, which has become a science of how the universe came to be what it is …. The historian has some excuse for feeling himself more at home in the world of science today than he could have done a hundred years ago.[24]

In the English-speaking world, Big Bang cosmology encouraged astronomers such as Carl Sagan to recount the history of the universe, while plate tectonics encouraged geologists such as Preston Cloud to write new histories of planet Earth.[25] It turned out that many natural scientists were in the same messy business

21 Cannadine, ed., *What is History Now?* 149.

22 This section summarizes and adds to arguments I have presented in "The Return of Universal History," *History and Theory*, Theme Issue, 49 (December, 2010), 5-26.

23 Erwin Schrödinger, *What is Life?* (Cambridge: Cambridge University Press, 2000), 1 [first pub. 1944]; Schrödinger was also acutely aware of the barriers that specialization placed in the way of such ambitions.

24 Carr, *What is History?* 57.

25 Carl Sagan's television series, *Cosmos,* was first broadcast in 1980; Preston Cloud's *Cosmos, Earth, and Man: A Short History of the Universe* (New Haven: Yale University Press, 1978) was published just two years earlier; the Soviet Union already had a flourishing tradition of "biosphere" history, pioneered by the great geologist, Vladimir Vernadsky in works such as V. I. Vernadsky, *The Biosphere*, (New York: Springer-Verlag), 1998.

as historians—that of trying to reconstruct a vanished past from the random clues it had left to the present. The historical turn in the natural sciences brought the methods of scientists closer to those of historians. Controlled experiments on the origins of life on Earth or the Russian Revolution were out of the question. Instead, it turned out that many scientific disciplines faced the same methodological challenge as historians: that of collecting as many clues to the past as they could—from ancient starlight, to zircon crystals, to fossil trilobites—and using them to reconstruct plausible and even meaningful accounts of the past. This was territory familiar to historians. The knockdown dis-proofs favored by Karl Popper were rarely available, and other, fuzzier, skills familiar to historians, such as pattern-recognition or hunches bases on prolonged familiarity with a given field, acquired increasing salience in the natural sciences.[26]

Particularly important for the emergence of modern forms of universal history was the development of radiometric dating techniques that could provide a firm chronological skeleton for histories of the deep past.[27] When H.G. Wells attempted a universal history just after World War I, the early parts of his story sagged because, as Wells admitted, all his absolute dates depended on written records, so he could provide none before the First Olympiad (776 BCE).[28] Nineteenth century geologists had learned how to construct relative chronologies by studying the layering of ancient rocks, but none could tell when the Cambrian explosion occurred or when Earth formed.

This all changed with the emergence of radiometric dating techniques in the 1950s. In 1953, Claire Paterson used the half-life of uranium in meteorites to determine that Earth is 4.56 billion years old. His date stands to this day. When Carr wrote in 1961, radiometric dating was just beginning to transform the thinking of archaeologists and pre-historians. In 1962, at Kenniff Cave in South Queensland, John Mulvaney used radiometric techniques to show that humans had lived in Australia since before the end of the last ice age, and over the next few decades, the earliest dates for human settlement in Australia would be pushed back to between 50,000 and perhaps 60,000 years.[29] As Colin Renfrew writes:

> … the development of radiometric dating methods, … allowed the construction of a chronology for prehistory in every part of the world. It was, moreover, a chronology free of any assumptions about cultural developments or relationships, and it could be applied as well to nonliterate societies as to those with written records. To be prehistoric no longer meant to be ahistoric in a chronological sense.[30]

Eventually, radiometric and other dating techniques made it possible to construct rigorous chronologies reaching back to the origins of the universe. For the first time, it is now possible to tell a universal history based on a robust universal chronology.

26 There is a fine account of the real, as opposed to the idealized, methodologies of modern science in John Ziman, *Real Science: What it is, and what it means* (Cambridge: Cambridge University Press, 2000).

27 See David Christian, "Historia, complejidad y revolución cronométrica" ["History, Complexity and the Chronometric Revolution"], *Revista de Occidente*, Abril 2008, No 323, 27-57, and David Christian, "History and Science after the Chronometric Revolution", in Steven J. Dick and Mark L. Lupisella, eds., *Cosmos & Culture: Cultural Evolution in a Cosmic Context* (NASA, 2009), 441-462; and see Doug Macdougall *Natures' Clocks: How Scientists Measure the Age of Almost Everything* (Berkeley: University of California Press, 2008).

28 H.G. Wells, *Outline of History: Being a Plain History of Life and Mankind*, 3rd ed., (New York: Macmillan,1921), 1102.

29 John Mulvaney & Johan Kamminga, *Prehistory of Australia* (Sydney: Allen & Unwin, 1999), 1-2.

30 Colin Renfrew, *Prehistory: The Making of the Human Mind* (London: Weidenfeld and Nicolson, 2007), 41.

Some of these changes did just register in David Cannadine's collection of essays. In the last chapter of that book, Felipe Fernandez-Armesto argued that history had widened its scope, specialization by specialization, and now needed to embrace the natural sciences: "history can no longer remain encamped in one of 'two cultures'. Human beings are obviously part of the animal continuum."[31] In 1998, the great world historian, William H. McNeill, argued that historians needed to embed the history of humanity within the history of the biosphere and even the universe as a whole:

> Human beings, it appears, do indeed belong in the universe and share its unstable, evolving character.... [W]hat happens among human beings and what happens among the stars looks to be part of a grand, evolving story featuring spontaneous emergence of complexity that generates new sorts of behavior at every level of organization from the minutest quarks and leptons to the galaxies, from long carbon chains to living organisms and the biosphere, and from the biosphere to the symbolic universes of meaning within which human beings live and labor, …[32]

In his last years, McNeill became increasingly interested in the idea of big history, seeing it as a natural extension of his own broad vision of history. It was, as his son, John, has written: "the thing that excited him most (aside from grandchildren)."[33]

What is Big History?

So, what is big history?

In the final part of this essay I would like to explore several, overlapping descriptions of what big history is and what it could be. These are personal thoughts, and some are speculative. But I hope they may interest even those who are less persuaded by them than I am. And I hope they may encourage a broad discussion about big history and its future. My thoughts are organized, loosely, along a spectrum running from the 'truth' end of Carr's dialectic of history towards the 'storytelling' end.

The goal of big history, like that of all good knowledge, is to empower us by helping us understand the world we live in. Big history empowers us by helping us understand our world. Like all forms of history, big history empowers us primarily by mapping the present onto the past, so as to help us better understand how today's world came to be as it is. This claim about the purpose of history assumes a realist or naturalist understanding of knowledge. As evolved creatures, we interact with our surroundings with some degree of success, and that success presupposes that we (like all living organisms) can attain a limited but real understanding of our surroundings. Though aware of the limits to knowledge, big history, like science in general, resists extreme forms of skepticism or relativism. It builds on the same realist and naturalist foundations as good science, and has the same ultimate goal, of empowerment.

Big history is universal. But if understanding the past can empower us, shouldn't we try to understand the *whole* of the past? What distinguishes big history most decisively from other forms of historical scholarship is its attempt to understand the past *as a whole.* It aspires to a universal understanding of history. Big history is not hostile to specialist historical scholarship. On the contrary, it is utterly dependent on the rich

31 Cannadine, *What is History Now?* 153.
32 William H. McNeill, "History and the Scientific Worldview," *History and Theory,* 37, no. 1 (1998): 12-13.
33 *Origins* (Bulletin of the International Big History Association), VI.08 (2016), 7.

scholarship of specialists. But it tries to link the findings of specialist scholarship into a larger unifying vision, just as millions of local maps can be connected to form a single world map. These ambitious goals mean that big history swims against the tide of intellectual fragmentation that structured so much scholarship in the twentieth century. Big history aims at consilience, at what Alexander von Humboldt once called the "Mad Frenzy … of representing in a single work the whole material world."[34]

Many interesting consequences flow from big history's ambitious universalism. Big history recognizes no disciplinary barriers to historical knowledge. It presumes the existence of a whole range of historically-oriented disciplines, all of them linked by the same goal: that of reconstructing how our world came to be as it is. Indeed, I often wonder if we may not see, sometime in the future, a re-arrangement of university campuses, so that, instead of putting the sciences at one end and the humanities at the other, you would find a zone devoted to 'the historical sciences', in which astronomers, geologists, evolutionary biologists, neuroscientists, and historians would all be working together.

The universal aspirations of big history mean that it will embrace all areas of knowledge that have generated plausible, rigorous, evidence-based accounts of the past, and any discipline whose insights can illuminate the past. This means that, at present, it makes sense to draw a line between everything that happened just after the big bang—a past that can be reconstructed with oodles of evidence—and anything that preceded the big bang, territory where there is plenty of interesting speculation, but not, as yet, a taut, evidence-based story. This may change, of course, in which case, the big history story itself will expand to incorporate, perhaps, evidence for a multiverse or for string theory. Similar changes may occur in other parts of the big history story, as biologists probe the origins of life on Earth, or astronomers look for life around other star systems, or as neuroscientists and psychologists begin to get a grip on the 'hard' problem of consciousness, or historians get a better understanding of the role of religion and science in human history at multiple scales.

With these qualifications, big history aims at a comprehensive understanding of history, the intellectual equivalent of a world map of the past. Like a world map, the big history story can help us see not just the major nations and oceans of the past, but also the links and synergies that connect different scholarly continents, regions and islands into a single knowledge world. The broad perspective of big history also encourages us to move among multiple scales, from those of the universe itself, to those of humans, to those of individual cells, within which millions of precisely calibrated reactions occur every second. Big history encourages us to connect the dots in time and space, to look for the synergies between disparate entities, disciplines and scales. Russian scholars such as Andrey Korotayev have been particularly active in the important task of looking for mathematical patterns in the evolution of complexity at multiple scales.

By focusing on the ideas that link disciplines, big history can help us overcome the more extreme forms of skepticism characteristic of much twentieth century scholarship, particularly in the humanities. In Durkheim's hands, the idea of "anomie" referred to the absence of a clear sense of place or meaning, a condition of intellectual homelessness in which the world itself made little sense and individuals could feel isolated enough to contemplate suicide. The extreme fragmentation of twentieth century scholarship allowed great intellectual progress, discipline by discipline. But it did so at the cost of isolating disciplines from each other, which limited the possibilities

34 Andrea Wulf, *The Invention of Nature*, Chapter 18, "Humboldt's *Cosmos.*"

both for a larger, unifying vision, and for truth-checking between disciplines. Particularly in the humanities, intellectual isolation generated scholarly forms of anomie that sapped confidence in claims to generate meaning or to achieve a more general grasp of reality. The postmodernist skepticism shared by so many scholars in the humanities in the late twentieth century was a useful corrective to over-confident forms of positivism. But, when taken to extremes, it created a splintered sense of reality that could be profoundly *dis*-empowering, both intellectually and ethically. Some saw it as the scholarly equivalent of suicide.

Big history returns, with due scientific modesty, to the ancient project of trying to assemble unified maps of reality. By removing the partitions between disciplines, big history can help re-establish a more balanced relationship between specialist scholarship and large, paradigm ideas.

Big history is collaborative and collective. The big history story is being assembled, like a vast mosaic, using tiles from many different countries, epochs and scholarly disciplines. All scholarship is collaborative. But the extraordinary range of big history puts collaboration at the heart of the new discipline. A rich and reliable big history story will not be the product of individual scholarly minds, but the joint creation of millions of minds.

The extreme scholarly collaboration required to write big history should encourage a re-think of what we mean by expertise. Specialization encouraged the notion that, if you narrowed the field of enquiry enough, individual scholars could achieve total mastery of a field. They became experts. This view was always naïve because even the narrowest of experts drew on insights and paradigms from outside their fields of expertise. But the extraordinary breadth of big history means that, though it will build on the insights of experts, it will also require many other scholarly skills, not all of which are valued in today's fragmented knowledge world. Big history requires, above all, an ability to grasp and then link scholarship from many different disciplines. It demands breadth as much as depth, and a sharp eye for unexpected synergies among disciplines. And it requires an ability to tune into the different intellectual frequencies of multiple disciplines. Big historians will have to be interdisciplinary translators, sensitive to subtle nuances in the way different disciplines use similar concepts, words and methods. And they will also ask deep interdisciplinary questions. Are there ideas that work well across multiple disciplines, from cosmology to biology and history, ideas such as the "regimes" and "Goldilocks conditions" described by Fred Spier, or the "free energy density" rates that lie at the heart of Eric Chaisson's work? Can the idea of entropy, which plays such a powerful role in physics, illuminate our understanding of human history? Can the atomic level molecular machines being explored today by nano-biologists suggest new ways of managing energy flows in today's world?[35] Are there universal mechanisms (perhaps some form of universal Darwinism?) that explain the appearance of increasingly complex entities despite the second law of thermodynamics?

By focusing not just on the individual islands and continents of modern scholarship, but also on the many links between them, big history can provide a new framework for interdisciplinary thinking and research. Researchers familiar with big history's world map of the past will naturally seek out useful ideas and methods from beyond their own specialist disciplines. Transdisciplinary

35 Peter M. Hoffmann, *Life's Ratchet: How Molecular Machines Extract Order from Chaos* (New York: Basic Books, 2012), is a wonderful exploration of how molecular machines exploit the "molecular storm" created by the random energy of individual molecules to power the chemistry of cells; and why doing so does not breach the second law of thermodynamics, because it depends on additional sources of free energy, mostly supplied by the battery molecule, ATP.

research will become particularly important as more and more problems, from climate change to the study of cancer or financial crises, begin to depend on findings and insights from multiple disciplines. Indeed, the very success of research *within* disciplines explains why more and more interesting and important problems now lie *between* disciplines. As interdisciplinary research becomes increasingly important, big history can offer a new model of scholarly expertise, that demands breadth of knowledge and an alertness to unexpected interdisciplinary synergies.

The young discipline of big history has also shown that intellectual collaboration is a distinctive feature of our species, *Homo sapiens.* Though many evolutionary features define us as a species, our technological creativity seems to have been clinched by the evolution of an exceptionally powerful form of language that allows us to exchange ideas and insights with such precision and in such volume that they can accumulate in the collective memory. We know of no other species in which learned knowledge accumulates across multiple generations so that later generations know, not just different things, but *more* things than earlier generations. And this difference has proved transformative. The accumulation of learned information by millions of individuals across multiple generations explains our increasing control over the resources and energy flows of the biosphere. This accelerating trend has shaped much of human history, and has culminated today in making us the single most powerful force for change in the biosphere. In my own work, I have described our unique capacity for sharing and accumulating information as "collective learning." It has given us humans not only increasing control over flows of energy and resources through the environment, but also increasing insight into the world and the universe we inhabit. Modern science, as well as modern religions and literatures, are all the creations of millions of individuals, working within shared networks of knowledge. In just one century, the sphere of human mind, or the "Noösphere," as Vernadsky called it, has become a planet-changing force.[36]

My personal conviction is that the idea of "collective learning" offers a paradigm idea that can frame our understanding of human history and of the distinctive nature of our own species. Human history is driven by collective learning just as the history of living organisms is driven by natural selection. If this idea is broadly correct, it illustrates the capacity of big history to clarify deep problems by helping us see them against an exceptionally broad background, as part of the "world map" of modern knowledge.

Big history is a story. So far, I have discussed the nature of the truth-claims that can be made by big history, and its capacity to synergize collaborative, interdisciplinary research. But of course, big history also tells a story. It arises, as Carr wrote of all history, from "an unending dialogue between the present and the past." Its two poles are the past as a whole and the historians who view that past from a particular vantage point in the present. Like history in general, big history is very much a product of the historians who are constructing the big history story. That means, of course, that big history is evolving and will evolve, like all stories, as it is told by different tellers, writing in different contexts and with different preoccupations.

Big history is an origin story. But because of its universalist ambitions, big history is not just another story about the past. Its universal ambitions mean that big history shares much with traditional origin stories. As far as we know, all human communities have tried to construct unified accounts of the origins of everything that surrounds us. This is the sense in which I will use

36 On the idea of a Noösphere, see David Christian, "The Noösphere," from the Edge.org Annual Question for 2017 (Jan 2017), at https://www.edge.org/response-detail/27068

the idea of "origin stories." Origin stories attempt to hold together and pass on all that is known in a given community about how our world came to be as it is. They are extraordinarily powerful if they are believed, if they ring true to those who hear and re-tell them, whether we are talking about foraging communities of the Paleolithic world, or the great philosophical and religious traditions of major world civilizations, from Confucianism to Buddhism to the traditions of the Aztec world, of Christianity and of Islam. They are also powerful because they are shared by most members of a given community, who learn the rudiments of their origin stories as children, and then internalize those stories in the course of many years of education, with increasing detail and sophistication. As far as we know, origin stories can be found at the core of all forms of education. They have provided foundational knowledge in seminaries and universities, as well as in the rich oral traditions passed on by elders in all foraging communities.

In the light of this discussion it is apparent that Durkheim's notion of "anomie" can also be understood as the state of mind of those who lack access to a credible, rich and authoritative origin story. Intellectual anomie is a state of map-lessness and meaninglessness. Curiously, it is the intellectual state that became the norm in the twentieth century, as globalization and modern science battered confidence in traditional origin stories, both in the metropolitan centers of the world and at its colonial margins. Everywhere, modern secular educational systems ceased to teach within shared traditions of foundational knowledge.

Some found the decline of traditional origin stories exhilarating and liberating, and glorified in the multiple, free-floating perspectives of a world without a shared origin story. But many, both in the colonial world and in the metropolitan heartlands, experienced, and continue to experience, a deep sense of loss. Today, we are so used to a world without universal framing ideas (particularly in the humanities), that it is easy to forget how painful it was to lose the sense of intellectual coherence that goes with trust in an origin story. But that sense of loss is apparent in much of the literature, philosophy and art of the late 19th and early 20th centuries. Here are just two, more or less random, examples of what I mean. In his 1851 poem, "Dover Beach," Matthew Arnold writes:

> The Sea of Faith
> Was once, too, at the full, and round
> Earth's shore
> Lay like the folds of a bright girdle furled.
> But now I only hear
> Its melancholy, long, withdrawing roar,
> Retreating, to the breath
> Of the night-wind, down the vast edges
> drear
> And naked shingles of the world.

The poem continues with a terrifying vision of a future without coherence or meaning:

> Ah, love, let us be true
> To one another! for the world, which
> seems
> To lie before us like a land of dreams,
> So various, so beautiful, so new,
> Hath really neither joy, nor love, nor
> light,
> Nor certitude, nor peace, nor help for
> pain;
> And we are here as on a darkling plain
> Swept with confused alarms of struggle
> and flight,
> Where ignorant armies clash by night.

W.B. Yeats' "The Second Coming," was written in 1919, just after the Great War seemed to realize Arnold's haunting vision of the future.

Turning and turning in the widening
gyre
The falcon cannot hear the falconer;
Things fall apart; the centre cannot hold;
Mere anarchy is loosed upon the world,
The blood-dimmed tide is loosed, and
everywhere
The ceremony of innocence is drowned;

The poem ends with a famous and terrifying image:

what rough beast, its hour come round at
last,
Slouches towards Bethlehem to be born?

Specialization and the loss of traditional unifying narratives were symptomatic of the chaotic and incoherent world described in so much twentieth century literature, art and philosophy. Indeed, it has often been assumed that this world of isolated, even incommensurable, disciplines and perspectives is characteristic of modernity in general. The modern world threw together peoples, cultures, religions and traditions so violently that it created a growing sense of a single humanity, while undermining confidence in traditional visions of the world. In the *Communist Manifesto,* we read that, in the bourgeois era of human history: "All fixed, fast-frozen relations, with their train of ancient and venerable prejudices and opinions, are swept away, all new-formed ones become antiquated before they can ossify. All that is solid melts into air, all that is holy is profaned, …" In a book on modernity that takes its title from this passage, Marshall Berman writes that the modern world has created: "a paradoxical unity, a unity of disunity; it pours us all into a maelstrom of perpetual disintegration and renewal, of struggle and contradiction, of ambiguity and anguish. To be modern is to be part of a universe in which, as Marx said: 'all that is solid melts into air.'"[37]

But a different interpretation is also possible. Perhaps for much of the twentieth century, we have lived in a sort of intellectual building site, surrounded by the debris of older origin stories, while a new origin story was being constructed all around us, a story for humanity as a whole. The best evidence for this idea is the re-emergence of new unifying stories in the last fifty years. Seen from this perspective, big history is the project of trying to tease out and build a modern, global origin story.

Big history is an origin story for the Anthropocene Epoch. Perhaps, then, we can think of big history as an origin story for the twenty-first century. Big history builds on the intellectual achievements of modern science, but it is also the product of an increasingly globalized world, that is very different from the world of E.H. Carr. Scientific knowledge has advanced faster than he could have imagined, and new technologies such as the Internet have created a much more intertwined world. But perhaps the most important changes arise from the great acceleration, the astonishing increase in human numbers, human energy use, human control over the environment, and human inter-connectedness, in the sixty years since Carr wrote. In that brief period, we humans have collectively become the single most important force for change in the biosphere, the first single species to play such a role in the 4 billion year history of life on Earth. That is an outcome that Carr could not have imagined in 1961. These spectacular changes mean that questions about the nature and source of the astonishing power wielded collectively by 7.4 billion humans loom much larger today than they did in Carr's time. In this sense, big history can be thought of as an origin story for the Anthropocene Epoch of human history.

37 Marshall Berman, *All That is Solid Melts into Air: the Experience of Modernity (*New York: Penguin, 1988, 1st published 1982), 15.

We will need the broad scale of big history to see the Anthropocene clearly, because it is not just a turning point in modern world history, but a significant threshold within human history as a whole, and even in the history of planet Earth. Most contemporary historical scholarship studies the last 500 years. The danger of this foreshortened perspective is that it can normalize recent history, making the technologically and economically dynamic societies of recent centuries seem typical of human history in general. They are not. Their dynamism is extraordinary and exceptional. The very idea of history, of long-term change, is modern and, as John McNeill has shown, the scale of change in the modern era, and particularly since the mid twentieth century, really is "something new under the sun."[38] In contrast, most people in most human societies over the last 200,000 years lived lives whose structures and surroundings seemed relatively stable, because change was so slow that it could not be observed at the scale of a few generations.

Only within the capacious scales of big history is it possible to see clearly that the Anthropocene Epoch is strange not just on human scales, but also on those of the history of planet Earth. This is perhaps why, in a recent article, a group of paleontologists suggest that the Anthropocene Epoch counts as one of the three most important turning points in the history of the biosphere, along with the emergence of life, almost 4 billion years ago, and of multicellular life 600 million years ago.[39] Never before has a single species dominated change in the biosphere as we humans do today, and never before has the near future depended as it does today, on the decisions, insights, and whims, of a single species. Appreciating the strangeness of modern society is vital if we are to tackle the global challenges it poses for the near future. Understanding how strange today's world is may also give us a renewed appreciation for the insights and understanding of our ancestors, who maintained over many millennia a much more stable relationship with the biosphere as a whole.

Big history is the first origin story for all humans. If big history is an origin story, it is also the first origin story for humanity as a whole. Emerging as it does in a densely interconnected world, it is the first origin story constructed by, and available to, all human beings. While traditional origin stories tried to sum over knowledge from particular communities or regions or cultural traditions, this is the first origin story that tries to sum over accumulated knowledge from all parts of the world. That alone suggests the wealth of information and the astonishing richness of detail of a modern origin story.

Traditional origin stories provided a unifying vision for particular communities, by highlighting the ideas that different people shared, just as modern national histories provided a unifying vision for nation states despite internal differences of language, culture, religion and ethnicity. In a similar way, the big history story can start to provide a unifying vision for humanity as a whole, despite the many differences between regions, classes, nations and cultural traditions. The construction and dissemination of a global origin story can help generate the sense of human unity that will be needed as human societies navigate collectively through the global challenges of the next few decades. Though the national and cultural tribalisms that dominated Carr's world are still very much present today, he would have been astonished to see, emerging alongside them, an origin story for humanity as a whole.

38 For more on these claims, see David Christian, "History and Time," *Australian Journal of Politics and History* 57, no. 3 (2011): 353-365, and John McNeill, *Something New under the Sun: An Environmental History of the Twentieth-Century World* (New York: W. W. Norton, 2000).

39 Mark Williams, Jan Zalasiewicz, et. al., "The Anthropocene Biosphere", *The Anthropocene Review,* (2015): 1-24.

So interconnected is today's world that the idea of a unified humanity with a history of its own has a salience that it lacked in Carr's time, when the most significant human communities seemed to be either nation states or culturally cohesive regions such as "the West" or the Muslim world, or the zones dominated by great traditional empires such as China or India. Today, a sense of global citizenship, of belonging to the global community of humanity, is not just a matter of scientific precision. (Generically speaking we are, after all, a remarkably homogenous species, so that the category, *Homo sapiens*, has a scientific precision that the category of "Chinese human being" or "American human being" lacks.) Awareness of what all humans share is increasingly a matter of self-preservation, particularly in a world with nuclear weapons. E.H. Carr wrote *What is History?* one year before the Cuban missile crisis, when, according to President Kennedy, the odds of an all-out nuclear war lay "between one out of three and even."[40]

H.G. Wells' attempt to write a universal history in 1919, when the horrors of the Great War were still vivid in his mind, was driven by a similar sense of human unity. Peace, he argued, required new ways of thinking. It required:

> . . .common historical ideas. Without such ideas to hold them together in harmonious co-operation, with nothing but narrow, selfish, and conflicting nationalist traditions, races and peoples are bound to drift towards conflict and destruction. This truth, which was apparent to that great philosopher Kant a century or more ago . . . is now plain to the man in the street.[41]

More recently, the great American world historian, William McNeill, has made the point with equal eloquence:

> Humanity entire possess a commonality which historians may hope to understand just as firmly as they can comprehend what unites any lesser group. Instead of enhancing conflicts, as parochial historiography inevitably does, an intelligible world history might be expected to diminish the lethality of group encounters by cultivating a sense of individual identification with the triumphs and tribulations of humanity as a whole. This, indeed, strikes me as the moral duty of the historical profession in our time. We need to develop an ecumenical history, with plenty of room for human diversity in all its complexity.[42]

As Wells understood, a universal history is the natural vehicle for a unified history of humanity, because, unlike national histories, big history first encounters humans not as warring tribes, but as a single, and remarkably homogenous, species. And it is a story that can now be told with increasing precision and confidence, and can help us understand the place of our species not just in the recent past, but in the history of the biosphere, and of the entire universe.

40 Graham Allison and Philip Zelikow, *Essence of Decision: Explaining the Cuban Missile Crisis*, 2nd ed. (New York: Longman, 1999), 271.

41 H.G. Wells, *Outline of History,* vi.

42 William H. McNeill, "Mythistory, or Truth, Myth, History, and Historians," *The American Historical Review* 91, no. 1 (Feb. 1986), 7.