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# Big History and the End of History

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### Abstract

*I situate Big History in the context of the rise of religious fundamentalism in the last twenty years. While Francis Fukuyama in his 'The End of History' (1989) argued that the end of the Cold War would produce the end of grand narratives, the triumph of democracy, and liberal capitalism, in reality the world saw a resurgence of religious fundamentalism orchestrating a resolute attack on science and thereby coming into conflict with Big History. I argue that Big History emerged in opposition to the resurgent and often politically sustained religious fundamentalism. This oppositional stance presents some dangers for Big History. For example, the concept of modern creation myth, while useful in the debate with religious fundamentalism, hides the true character of Big History. Big History should not endorse the once fashionable triumphalism of science. As Thomas Kuhn warned, science goes through paradigm shifts and is not immune to shift in power/knowledge relations. I argue for understanding of Big History as a branch of history of science. The strength of science is that it is able to change and survive a paradigm shift. I also point out some inconsistencies in the fundamentalist challenges to Big History. While fundamentalists reject the human evolution, they also advocate the ideal of ever-increasing economic prosperity extending into the limitless future. This question of the future is something to which Big Historians do not pay enough attention. In this context I also call attention to Peak Oil theories. If some of the predictions made by Peak Oil 'doomers' were to come true, major chapters of Big History would need to be re-written. Big Historians should, in my opinion, analyze seriously various kinds of possible futures. Future, ironically, is also a major part of the map of time.*

One thing I like the most about history is that it puts everything in a perspective, a historical perspective. As a historian, I noticed that I look at things differently than the majority of non-historians. Take most trivial examples, when I shop for chocolate, coffee, or sausages, I wonder, what are the historical origins of this particular brand? What ingredients were put into it, where did they come from, and what is their history? Why should it be different with Big History? Can we put Big History also in the historical context? I believe we can.

*Evolution: A Big History Perspective 2011 49–70*

The context that we need to put Big History in is the end of the bipolar world represented by the Cold War and the triumph of global neo-liberalism as the only (remaining) collectively accepted grand narrative of history. In other words, if the Cold War era was a period when two grand narratives struggled, Karl Marx' grand narrative with Adam Smith's grand narrative, the post-Cold War era witnessed the end of the Marxist grand narrative and the triumph of liberal capitalism, the dominant economic doctrine of globalization and financial capitalism. At least, this was what Francis Fukuyama's famous article 'The End of History' announced in 1989. According to Fukuyama, once there were conflicting paradigms, but now the neo-liberalism paradigm has won. What happened in reality was something quite different and that requires to be put in a historical context, especially if Big Historians would like to avoid the triumphalism of Fukuyama and its consequences.

The end of the Cold War brought about many surprises. With the end of Soviet Marxism, we were led to believe that what triumphed at the end of the Cold War was the idea of progress achieved through democracy and free market competition, the victory of evolution over revolution, victory of Darwin over Marx, and the victory of Jefferson over the dictatorship of the proletariat. Again this was what Francis Fukuyama promised in his 1989 essay, 'The End of History'. While we were promised the triumph of the liberal ideas and ideals, what actually happened in the two decades following the fall of the Berlin Wall was the reactionary backlash, comparable to the Age of Reaction after the Napoleonic Wars. There was a resurgence of religious fundamentalism, which assumed a distinctly conservative, even a reactionary form. This post-communist religious fundamentalism attempted not only to counter the effects of Soviet official atheism, and the general indifference toward religion in the West, but also to roll back modern scientific achievements. This conservative moment was not just another religious revival such as many similar movements that the Western world experienced occasionally, movements which tried to rekindle popular interest in religion. The movement was global and its effects dramatic as it wanted to roll-back the clock of secular modernism (Marty and Appleby 1997: 1). For example, religion dramatically increased its appeal in the Islamic world. It also revived in the post-communist countries, as exemplified by the quick rebuilding of the Moscow's Christ the Saviour Cathedral in the 1990s, previously dynamited by Stalin in 1931. Most importantly, there was a religious revival in the Anglo-American world and this is important because of this world's global economic and cultural preponderance. All of these religious movements attacked classical Western secular and liberal values formed during the Enlightenment. It should be noted that these values were guarded carefully by both the Capitalist West and the Socialist East even during the Cold War period. Ironically, during the Cold War both the East and the West saw themselves as 'modernizing' political forces, advocating different paths, but having the same goal of moderni-

zation in mind (Huntington 1998: 19–21). However, this changed, and after 1989, like never before, many Anglo-American politicians felt that the fall of communism was an apocalyptic moment. Not only was it the triumph of democracy *vs.* dictatorship, or of free market *vs.* controlled economy. It was a triumph of good *versus* evil and God *versus* the Devil. Guided by these apocalyptic ideas so common among Anglo-American fundamentalists, and propelled by the ever increasing power of the radical right, many politicians stepped into the scientific debate over the details and mechanisms of the evolutionary process, arguing over human, cosmic, and social evolution. In particular, the main target was the idea of human evolution, what we commonly call Darwinism. After a century or more of scientific debates on the human evolution, and comparably long debates on the cosmic evolution, suddenly politicians wanted to force scientists to treat creationism and intelligent design as legitimate scientific theories. One of the way to exert political pressures on the scientific community was to attach the so-called intelligent design amendments to various pieces of legislation. For example, the Santorum amendment to the ‘No Child Left behind Bill’ of 2001 was interpreted as a federal requirement to teach the opposing view, both the evolutionary account and the so-called scientific creationism.

The main purpose of this paper is to analyze the Big History in the context of resurgent religious fundamentalism in the Anglo-American world. Not all aspects of Big History are equally challenged by religious fundamentalists. Cosmic evolution is the least problematic. Geology and earth formation are a bit more controversial; biological and human evolution even more. The most controversial is social evolution, since Fukuyama and his followers advocated the abolition of all paradigms not compatible with notions economic liberties. Therefore, in the following pages I will review these controversies, beginning with the cosmic evolution and astronomy, continuing with geology and Earth formation, then with biology and the theory of evolution, and finally concluding with the social evolution of humankind. When this is accomplished, I will look into the future, focusing on the ideas of possible futures which in most accounts of Big History are given as an appendage. However, some methodological remarks are due in the beginning.

Postmodernism, with its rejection of the objective truth and arguing that the scientific narrative was just another meta-narrative, unwittingly, unlocked the door for the onslaught of reactionary religious fundamentalism. This was especially ironic because many practitioners of philosophical postmodernism were not favorably inclined toward either religion or free-market capitalism and were generally located on the political left. Post-modernists were considerably surprised and enraged when Fukuyama and other neo-conservatives announced the end of history, or as I would put it here, the end of competing paradigms in history (Derrida 1994: ix). For postmodernists, the religious narratives of origins were just another example of culturally constructed grand narratives,

whose purpose was not to be true or false, but 'to establish powerful, pervasive, and long-lasting moods and motivations in men' (Geertz 1993: 93). Yet, with their highly original works, the postmodernists managed to dethrone many modern sciences from the politically advantageous position of philosophical objectivity. Anglo-American politicians were quick to exploit this weakness of modern sciences, by cleverly arguing that human evolution is 'just a theory' or as Thomas Kuhn would put it, just a 'paradigm' of normal science that could easily be overturned by a scientific, or in this case a political revolution. Postmodernism gave an opening to the religious 'counter-revolution' that many conservative politicians were advocating without ever them wishing to do so.

It is little known that postmodernism was not only studied at American departments of liberal arts, but also in many religious and divinity schools across the nation. For example, the curriculum of Fuller Theological Seminary, in Pasadena, California, arguably the most influential theological seminary in the US in terms of the number of ministers produced, shows to what extent the fundamentalists have engaged certain relativizing aspects of postmodernism. A good example of this theological postmodernism is also a book often used in many departments of religion and divinity schools all over the country. Called *To Each its Own Meaning* the book places the Bible at the unquestioned center of interpretation, and then allows all other interpretation to follow from the Bible itself as equally valid reading of various dimensions of the text (Mckenzie and Hayes 1999: 183–185). Such a radically relativistic version of postmodernism was never advocated by its founders, such as Derrida, Lacan, de Man, and others. In fact, the main point of philosophical deconstruction was to dislodge the text from its central place in hermeneutics. Theological postmodernism argued exactly the opposite. That is why President Ronald Reagan, who was always well-briefed, and who had substantial contacts with religious leaders, skillfully exploited this newly found vulnerability of sciences. During a 1980 press conference, then presidential candidate, Reagan was asked if he thought the theory of evolution should be taught in public schools. He answered that evolution is, 'a theory only, and it has in recent years been challenged in the world of science and is not yet believed in the scientific community to be as infallible as it once was believed' (*Science Magazine* 1980: 1214). This attitude was not limited to the politicians from the right. During the controversial 2000 presidential campaign, Albert Gore supported teaching both creationism and evolution, his running mate Joe Lieberman asserted that belief in a creator is instrumental to 'secure the moral future of our nation, and raise the quality of life for all our people' (Paul 2005: 4).

In reaction to this kind of religious fundamentalism propagated from the bully pulpits of power, there appeared a small but spirited movement often called New Atheism. Scholars such as Sam Harris and Victor Stenger wrote vigorously in defense of human and cosmic evolution, and against the rising

tide of creationism. Later they were joined by many other scientists, as well as public figures, such as Richard Dawkins, Sam Harris, Christopher Hitchens, and Michel Onfray. Breaking a long standing consensus of the Anglo-American culture that religion was to be tolerated but not debated, these scholars rose up in defense of science, and against claims that scientific grand narrative was just 'a theory only'.

I would, therefore, like to situate the emergence of Big History more precisely in this struggle between the 'scientific counter-revolution' advocated by religious fundamentalists and the new atheism of some scientific circles, which emerged as a reaction to religious fundamentalism of the last two decades. This is not to say that Big Historians are all atheists in the mould of Richard Dawkins. Yet, Big Historians firmly believe that the scientific account of the world and of history at the grand scale is not on the same epistemological level as the Biblical account of creation in the Book of Genesis. Big History was conceived from the beginning as the modern creation myth. In other words, Big History answers all of the question that were traditionally posed by religions, namely, the origins of the Universe (as in the Big Bang theory), the origins of the stars and planets, the Earth and life, human beings and societies. Like a typical religious narrative Big History ends with speculations about our cosmic future (Hughes-Warrington 2002). In short, Big History covers everything from Genesis to the Apocalypse.

This new branch of history, the Big History, represents an answer to the challenges presented by religious fundamentalist to modern natural and social sciences. In a convenient form of a one-semester-long course, historians, helped by other natural and social scientists, present a scientific version of the creation myth. The Big History, according to David Christian, the most influential practitioner of the genre, integrated cosmic evolution (or history if you prefer), evolution of the Earth, biological and human evolution, as well as, social evolution, emphasizing environmental history, and social history on the grandest scale. Therefore, Big History includes what sciences, such as astronomy, geology, biology, anthropology, economics, and history can tell us about the origins of everything, beginning with cosmos, and ending with human society. That is why many supporters of Big History, such as Bill Gates, underline the current crisis in scientific and humanistic education in the US, and see the Big History as one of the antidotes to the emergent religious fundamentalism which, encouraged by 'the end of history' apocalyptic ideology, pushes for more and more control over the school and university curricula.

Such religious dimensions of Big History involve some pitfalls. The main hazard for Big History is the danger of dogmatism and over-simplification. Such danger can only come from the lack of historical understanding of the Big History narrative. Strictly speaking, Big History is not the scientific narrative of 'creation', as it is often asserted, since such an approach would put Big History

on the same epistemological plane as any other narrative of creation. To use the words of President Reagan, Big History would, in that case, be just 'a theory'. In order to avoid these risks, Big History should, first and foremost, be a history of various sciences, not the final account of origins. Therefore, the sobriquet that Big History is a 'modern creation myth', often repeated by many Big Historians, is somewhat unfortunate. Though quite understandable in the context of the conflict between Big History and contemporary religious fundamentalism, the usage of the phrase 'modern creation myth' hinders the cause of Big History. First it tends to take us back to postmodern relativism, where all myths are constructed, all equally true, or all equally false. This is not what Big Historians argue. Big Historians acknowledge their narrative is a construct, but they also point to the enormous difference between the Big History narrative and the traditional narratives of origins, namely that Big History grand narrative is supported by the enormous amount of evidence accumulated in the last several hundred years. If not objectively true in the traditional sense, the Big History narrative is much more sophisticated than traditional religious grand narratives.

Thus, Big History is not just a survey of what sciences know about origins of the world, human beings, and society. It is, or should be, a history of science, thematically organized around the macro time-scale. This is a very important point. Sciences, especially natural sciences, have often been guilty of triumphalism, similar to the triumphalism espoused by Fukuyama. Before Thomas Kuhn's epochal work *The Structure of Scientific Revolutions* (1996), the dominant narrative in natural sciences was the narrative of perpetual progress, the same kind of progress that was advocated by Fukuyama in his 'The End of History' (1989) for social sciences and humanities. Kuhn turned this logic of progress around and said that we call all the disciplines that actually make progress sciences. Those that do not, such as literature, we do not call sciences (Kuhn 1996: 160–173). Yet, in spite of Kuhn, science textbooks are still full of heroic narratives of progress through science and technology and I am afraid that it could spill over into Big History. Such triumphalism is not needed in Big History and actually would hinder its development. The greatest strength of natural sciences has been their ability to change course, achieve a paradigm shift, as the scientific crisis become apparent and as scientific revolutionaries do their critical work. Postmodernists have also often pointed out to the shifting character of science and further developed this kind of analysis by advancing the concept of discourse and the power/knowledge relationship. To put it simply, dry dogmatic objectivity is a trap for Big History.

While postmodernists, specifically postmodernist theologians who were eager to adopt a simplified version of postmodernism, had gone too far in equating the scientific grand narratives with religious grand narratives, they were right in pointing out to the power/knowledge relations in the history of modern sciences. I will not re-hash here the well-known accounts of history of medicine

put forward by Michel Foucault and his followers. Instead I will put forward an argument on why have natural sciences declined in power after the Fukuyama's end of history, that is, after the end of the Cold War. As Fukuyama pointed out in his essay, the end of the Cold War was not just the demise of the Soviet Union, but a triumph of liberal capitalism and the consumer society that accompanies it. The form that the triumphant capitalism assumed was the financial capitalism and not the industrial capitalism Karl Marx was talking about. For the financial capitalism, branding is more important than producing. Financial capitalist focuses on investment in market speculations, not in investments in industrial production, which can now conveniently be done in the regions with lower wages and in the absence of union agitation for higher wages. Consequently, the role of natural sciences is diminished in the society based on financial capitalism in comparison to a society based on industrial production. For the last two decades, the industrial West, in particular Great Britain and the United States are going through a very rapid process of de-industrialization and this process has enormous social and cultural consequences. While during the Cold War, natural sciences were fostered and showered with funds to 'keep up with the Soviets', now this is no longer necessary. It is not even desirable, since scientist now have to 'advertize' and 'brand-name' their research in order to compete for the diminishing pool of funds. For example, Richard Dawkins is not just an atheist who out of personal conviction debates religious fundamentalism. As an Oxford Chair for the public understanding of science, he is a successful fund-raiser for science who can stand up to conservative and reactionary politicians who make decision on the funds for science. Therefore, the attack on natural sciences and their spirited defense, which is one of the main features of the 'end of history' period, should not be surprising. It was to be expected, since the power/knowledge dynamics have shifted away from natural sciences and toward finances, advertising, and management. Just a brief look at the salary survey in various academic disciplines should be enough to illustrate, if not prove the point. A newly hired assistant professor in business now earns more than a full professor in either natural or social sciences (CUPA-HR 2009–2010).

After this prolonged methodological digression, let us go back now to survey of all sections of Big History, cosmology, geology, biology, and economics, from the standpoint of their conflict with resurgent political conservatism and religion fundamentalism. Fukuyama believed that the era of Scientific Revolutions and paradigm changes was over. For Big History this means that sciences that underpin it, such as cosmology, geology, biology, and economics, should show no signs of an impending crisis. The readers should be reminded that, according to Thomas Kuhn, a crisis within a science is an indication of an impending paradigm change. Such a change could and would seriously affect Big History. For example, if some of the major theories that underpin Big

History, such as General Theory of Relativity, or the Gene Theory were to be proven wrong, and replaced with a different theory, this would have major consequences on Big History. In fact, I would here argue that all of these sciences – cosmology, historical geology, evolutionary biology, and macro-history – are, and have been for some time, in a state that Thomas Kuhn described as normal science, a kind of science that is focused on ‘puzzle solving’ and not on changing the basic presupposition of the scientific paradigm. It is this state of modern science, where paradigms are not being challenged, that actually made it possible for Big History to appear. However, I also believe that this ‘normal science’ period is mistakenly identified by Fukuyama as ‘The End of History’. This is above all obvious as we move away from natural sciences into social sciences and economics in particular, where one can see more signs of an impending crisis.

The fact that cosmic evolution does not present a significant challenge to religious fundamentalism is, at least in part, due to the moderating influence of Albert Einstein. Einstein is today simply understood as the greatest scientist who also believed in god. This popular image of Einstein, sometimes quite different from ‘real Einstein’, was in fact created during the Cold War when religious circles willingly overlooked Einstein criticism of revealed religions and focused entirely on Einstein's ‘belief in a god’. Thus Einstein's creation, the science of Cosmology is fairly safe from attacks from religious fundamentalism. Niceties about the non-anthropomorphic god of Spinoza, or his comments about the foolishness of revealed scriptures are seriously downplayed today. Popular culture and popular theology barely, if at all, mention the conflict between Georges Lemaître and Albert Einstein. Monsignor Lemaître, a catholic priest, offered a particular solution of Einstein's Field equations of General Relativity that we now call the Big Bang Theory, and for a while Einstein rejected that solution out of hand, for no apparent reason (Deprit 1984: 370). Similar controversies no longer plague modern cosmology. After the departure of Einstein, and with the demise of the Steady State Theory of the Universe, the Big Bang paradigm has been firmly established since the 1960s and has not been seriously challenged. Steven Hawking famously said that the discovery of background cosmic micro-wave radiation in 1965 was the last nail in the coffin of the Steady State Theory, the last serious challenger of the Big Bang cosmology (Hawking n.d.). It is also significant to mention that all three founders of the Steady State Theory, Fred Hoyle, Thomas Gold, and Hermann Bondi, are gone now. Reader should here be reminded that, according to Kuhn, the sure sign that the old paradigm has been replaced by the new paradigm is when the die-hard practitioners of the old paradigm literally die out, leaving the field open for the complete dominance of the new.

In the context of cosmology, I should also mention the so-called string theory, an attempt currently being made to unify the special relativity, quantum

mechanics, and the atomic standard model. If the attempt to create a unified theory of everything, as the string theory is often called, becomes successful, should that affect the teaching of Big History? I am convinced that this is not the case. Again, according to Kuhn, new paradigms only emerge as a result of a crisis and none of the three theories involved, special relativity, quantum mechanics, or the standard model show signs of a major crisis. The string theory seeks to unify these three separate areas, and, therefore, it seeks to incorporate previously mentioned theories into a single grand theory. According to Kuhn, the new paradigm replaces the previous paradigm; it does not just harmoniously unite the previously divergent parts. As it is currently conceived, I believe that the string theory does not offer much promise in terms of paradigm shift. Even if completed, it would represent the continuation of normal science. In order to represent the paradigm shift, the string theory would need to claim that Einstein's Theory of Relativity, Quantum Mechanics were 'wrong' in same way. One should not forget that Einstein's theory and Quantum Mechanics had shown that Newtonian physics was 'wrong' when applied to large speeds and on the atomic scale. The goal of the string theory is to harmonize, not to overturn previous scientific theories. Thus, by definition, it cannot represent a paradigm shift.

The evolution of the Earth presents more challenges to the practitioners of Big History. Currently historical geology is dominated by a single paradigm, the theory of plate tectonics, the theory that became commonly accepted in scientific circles in the 1950s and early 60s. However, the theory of plate tectonics can only reconstruct the history and geography of the Earth in the last several hundred million years, far short from the actually 'age' of our planet. For the rest of the geological past, we depend on the theories of planetary formation, which are currently in a state of flux. In addition, the theory of Milankovitch's cycles, that reasonably-well reconstructs the climate of our planet, takes us only several hundreds of thousands of years back in time. Furthermore, Milankovitch's cycles only work as long as we know and can calculate the moments of inertia of a particular configuration of the Earth's tectonic plates. If we do not know the position of the tectonic plates, we also do not know the position of the Earth's axis of rotation, and, therefore, cannot reconstruct the climate.

The theories of planetary formation had been formulated only on the basis of our growing knowledge of our solar system. This is obvious since the scientist only had access to the information about our solar system. The so-called 'nebular hypothesis', initially formulated several centuries ago by Immanuel Kant and Pierre Simone Laplace, with many changes and refinements accumulating over time, is still the main paradigm of historical geology. The discovery of many planetary systems in our galaxy, due to the powerful space telescopes, such as Hubble and Kepler, is bound to bring many surprises not only to as-

tronomers, but also to geologists. In short, the geological evolution of the Earth is not generally challenged except by a small fringe even among the fundamentalists that we call the proponents of the Young Earth theory. The greatest challenge for the history of the Earth comes from the discovery of new solar systems and new planets in our galaxy. It is the area that Big Historians should watch carefully, in order to keep their narrative of Big History up-to-date.

Furthermore, while the Young Earth theory is only a minority view even among the proponents of creationism and intelligent design, this does not mean that the theory that our planet is only a couple of thousands of years old does not engender support among the general public. There was always a gap between what scientist teach and what general public believes and one of the main goal of Big History is to somewhat bridge this gap. A recent Gallop poll suggests that 40 % of American believe in strict creationism and identify the Biblical 'day' in Genesis as one thousand years (Newport 2010). One can only expect that politicians, usually very sensitive to Gallop polls, will find a way to accommodate the views of the large portion of their constituencies. This kind of strict Biblical literalism was always strong in the Anglo-American cultural milieu and will continue to present a challenge to both Earth scientists and Big Historians.

Biological and human evolutions were always a very controversial subject in the Anglo-American world. One should be reminded of not only the controversies surrounding Charles Darwin and his writings in the nineteenth century, but also of legislation which prohibited or restricted the teaching of evolution in many states of the union following the so-called Monkey Trials in 1925. By 1927, 14 states, both in the North and the South, debated or introduced some kind of an anti-evolutionary laws (Halliburton 1964: 280). The opponents of the biological and human evolution changed their strategy in the 1960s and moved away from actually banning the teaching of evolution. As the government of the United States, after the Sputnik humiliation, began to push for increased spending on scientific education, in order to 'keep up with the Soviets'. Subsequently, however, after the Cold War ended, the proponents of fundamentalist Christian values suggested Creationism and later Intelligent Design as alternatives to Darwinian evolution.

As in the case of Earth sciences, the creationists are divided into moderates and radicals, in the so-called Old Earth and the Young Earth creationists. The Young Earth creationists, such as late Henry M. Morris, the founder of the Creation Research Society and the Institute for Creation Research, with their literal belief in the 6 days of creation, really represent a fringe in the creationist community, even though they often build 'museums' that are quite popular among the general public, and run 'graduate' courses in Christian apologetics and creation science. For example the creation museum in Petersburg, Kentucky, run by the Answers in Genesis religious ministry group, opened its

doors in 2007 and, according to its web-site, it celebrated the one millionth visitor in 2010 (Answersingenesis 2010). In contrast, when American Museum of Natural History, an institution of considerable prestige in New York and nation-wide, organized the Darwin exhibition in 2005, it, allegedly, had trouble finding corporate sponsors and had to rely on individual donations and the sale of merchandise. This was never officially confirmed by the American Museum of Natural History, but reports about it widely circulated in the press (Wapshott 2005). Having in mind that 68 % of Republicans and 40 % of Democrats do not believe in evolution, one might justifiably say that Darwinian evolution is very seriously challenged by the public opinion in the United States (Newport 2007).

The most sophisticated and, in my opinion, the most dangerous challenge to the Darwinian evolution comes from various relatively moderate creationist groups that are often lumped together as Intelligent Design. Important organizations such as Seattle-based Discovery Institute or Dallas-based Foundation for Thought and Ethics are fairly successful in their fund-raising activities and in seeking public support among politicians. These Intelligent Design organizations apply the so-called 'Wedge Strategy' the main goal of which is to drive the wedge 'into the heart of scientific materialism' (Mooney 2002). This strategy is tailored to the split of the public support for Darwinian evolution by portraying the scientists who support evolution as radical atheists, while at the same time offering a moderate 'alternative' theory which accept many points of the theory of evolution, but does not engender atheism. One of the strategies of the Intelligent Design groups was to publish textbooks, such as *Of Pandas and People: The Central Question of Biological Origins*, and then send copies to public and school libraries, hoping to have the books removed for inaccuracy, or because of the protests by the American Civil Liberties Union. In that way the proponents of the Intelligent Design could claim that they are a prosecuted minority, victims of a vicious campaign by radical atheists. The campaign has failed to convince the American Library Association to declare *Of Pandas and People* the Banned Book of the Year, but this had not dissuaded ID group to continue pursuing the same 'Wedge' strategy (West 2006).

Other initiatives of these kind was the Discovery Institutes' 'Teach the Controversy' campaign, presented as an action fostering freedom of speech and civil liberties allegedly curtailed by atheist scientists. Many initiatives, especially of the Discovery Institute, are very sophisticated public relations campaigns, and have drawn attention of the politicians. For example, as a candidate in the 2008 presidential election, John McCain made a high profile visit to the Discovery Institute, which is quite understandable, since the institute was founded by the former president Reagan's advisor Bruce Chapman and covers not only the issues of Intelligent Design but also is a major advocate of a libertarian free-market oriented economic policy (Discovery Institute 2007). Because of this mixed advocacy for Intelligent Design and free-market economy,

the Institute has been called, somewhat ironically, 'the intellectual love child of Ayn Rand and Jerry Falwell' (Wilgoren 2005).

One of the most sophisticated lines of attack on Darwinian evolution was to attempt to link it with the rise of Nazism. Considering the consequences of such a link, especially if the public opinion becomes convinced that the Darwinian evolution somehow generated Nazi racial policies and the Holocaust, one must admit that this is a very serious challenge. In a book called *From Darwin to Hitler* Richard Weikart attempted to show an intellectual connection between Darwin and Nazism, and to document 'the influence of naturalistic evolution on ethical thought, euthanasia, militarism, and racism – and ultimately Hitler's ideology' (Discovery Institute n.d.). Weikart's work is also a part of the effort directed by the Discovery Institute, in particular the branch of the institute called 'Center for Science and Culture'. In the book Weikart tries to show that Darwin and Darwinism were responsible for the rise of 'scientific racism' which was a quite popular phenomenon in the late 19<sup>th</sup> and early 20<sup>th</sup> century, but does not make a sufficient distinction between the positions of Darwin and his more racially minded followers, such as Leonard Darwin and the famous eugenicist Francis Galton, who was also Darwin's cousin. Both of these men were among the founders and active members of the British Eugenics Society, founded in 1908. While making connections in the intellectual history of the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, the book is unfair to Darwin, since it blames Darwin and Darwinism for all the excesses of the 19<sup>th</sup> century moment called Social Darwinism. The book has generated quite a controversy, including some excellent studies on Darwin's views on slavery, which convincingly argued that Darwin was a persuaded abolitionist and by no means a racist (Desmond 2009).

Common sense should convince the most observers that Darwin should not be held responsible for Darwinism. The fact, however, remains that there was a movement called 'scientific racism' or 'Social Darwinism' and that it had considerable influence in Europe and in the Western hemisphere in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries and that it has generated important intellectual links leading to the Nazi movement. What is often forgotten here is that neither Darwin nor early Darwinist had a clear model of evolution until the re-discovery Gregor Mendel's work in the early 20<sup>th</sup> century by three biologists, Hugo de Vries, Carl Correns, and Erich von Tschermak and their firm establishment of the laws of heredity. If one is to summarize this quite complicated history, one would say that Darwinists really did not understand mechanisms of the evolution, namely heredity, before Hugo de Vries' discovered genes, and many evolutionary scientists working before de Vries were prone to offer various suggestions that were often widely off the mark, including the aforementioned racial theories. In other words, Darwin and his immediate supporters, in order to disprove Lamarck's theory of the inheritance of acquired characteristic were often suggesting quite speculative theories before the establishment of modern genetics.

Theory of evolution does not have a goal toward which all life is evolving and it is no secret that many people find Darwin's theory quite disturbing. People in general find it difficult to operate in a cultural system which moves in no particular direction. Religion as a cultural system gives meaning to the chaotic Universe; the theory of evolution does not. Darwin and people after Darwin often borrowed the idea of progress from the contemporary culture and consciously or unconsciously applied it to the evolutionary process. In fact, the term 'survival of the fittest' was not even Darwin's. It was introduced by Herbert Spencer, who was comparing his own social theories with Darwin's. Herbert Spencer writes, 'This survival of the fittest, which I have here sought to express in mechanical terms, is that which Mr. Darwin has called "natural selection", or the preservation of favoured races in the struggle for life' (Spencer 1896: 444). In sum, Weikart's book *From Darwin to Hitler* is a fairly tendentious account of the development and the influence of Darwinism on European culture. Not only he often equates social Darwinism with socialism and Nazism, but more importantly, he never considers 'imperialism' as a context in which social Darwinist racial theories developed. Furthermore, his assertions that Darwinism necessarily leads to the lack of respect for human life, and that the only alternative is Christian ethics based on the sanctity of life, are unwarranted and untenable. There are many ethical systems that were not Christian and did not lead to racism and genocide.

Weikart's book raises some serious, and often unanswered, questions about the relations between the theory of evolution and social sciences. In this way we can seamlessly transition into the fourth part of our discussion of the fields of Big History, namely, the social evolution. Some practitioners of the field of Darwinian evolution have often tried to cross-over into the domain of social sciences. Darwin never showed such a tendency, even though he did write a book called *The Expression of the Emotions in Man and Animals*. This threshold between biological and social sciences was crossed by Francis Galton, Herbert Spencer, Madison Grant, and most recently by Richard Dawkins with his idea of memes, the cultural equivalent of genes. Meme is a cultural belief that is transmitted from one person or group of people to another (Dawkins 1976: 189). There is, of course, an obvious overlap between biology and social sciences, after all we, human beings, are animals, and we follow the laws of evolution as we must follow the laws of gravity. The crucial question is here as follows: can human and social behavior, what we in general call culture, be explained only by biology, or do we need a separate scientific field called social sciences. For example, population biology, a branch of biology that studies populations of organism, has serious influence of the study of society and culture. I will take here economic history as an example, since economic history is at the heart of the last segment of Big History, social evolution that I am considering here.

The same religious fundamentalists, who often have serious trouble accepting biological Darwinism, have no trouble advocating what I would call here the Malthusian economic model when it comes to economic history. By Malthusian economics I here mean the advocacy of the extreme form of the *laissez-faire* economy implemented without regard for the human cost, in particular the views that poverty and hunger are ultimately beneficial for the society, since they motivate the poor to work harder (Malthus 2008: 158). Naomi Klein has called this version of neo-liberal predatory capitalism ‘the disaster capitalism’ (Klein 2007: 355). Again, a good example is the Discovery Institute, which through one of its branches advocates Intelligent Design and opposes Darwinian evolution, but though the other branch, geared more towards economy and politics, advocates what I called above the Malthusian economics. I am here, of course, caricaturing the economic platform of the Discovery Institute, but not in order to create a straw-man argument, but in order to make a more subtle point. Namely, if according to Weikhart, Darwinism is responsible for the emergence of Nazism, how come the predatory imperialist capitalism, equally based on the principle of ‘the survival of the fittest’, is to be absolved of all responsibility?

Economic history is probably the most complicated part of Big History, because, as it is usual in social sciences, there is no single paradigm, but rather they are competing theories. However, this flies in the face of Fukuyama's suggestion that this struggle of paradigms in social sciences has ended with the triumph of liberal democracy and free-market capitalism. Without going into details about what capitalism is or should be, I would start with a very simple description. Capital needs to grow, or circulate, and at the end of the circle, there should be more capital than at the beginning. Adam Smith called this process ‘the progress of opulence’. Therefore, unless there is growth, there cannot be any capitalism. In the last two hundred years there has been a persistent average growth that we call the industrial revolution. Fukuyama never specifically said that this growth would continue forever and ever, but his point is that democracy and free-market are now triumphant in the larger part of the world. The new democracies will continue to grow much like the old democracies grew in the 19<sup>th</sup> and 20<sup>th</sup> centuries. Implicit in his argument is a vision that eventually the whole world will in terms of economic development and democracy will look like the West. This is actually a very noble vision of ultimate equality of the whole world that Fukuyama advocates. However, the question might be asked, what if this does not happen? Simply put, does our planet have enough resources to support this growth to its idealistic conclusion? Can this Earth sustain the life style of the whole world if everyone starts consuming natural resources like the West does?

For the relationship between economic history and Big History, especially interesting is the notion of complexity, so wonderfully explained by Eric Chaisson in his book *Cosmic Evolution: The Rise of Complexity in Nature* (2002). Human civilization is one of the most complex phenomena in the natural world, and therefore, it consumes the largest amount of energy per unit of mass. It is,

therefore, inevitable that at some point in the future the capitalist economy will consume all the available energy resource of our planet. Consequently, there are only two possible futures here. In one we discover a new source of energy, and continue doing what we are doing now. Various science-fiction scenarios have been suggested here, including expansion of the human race to other planets, or even other solar systems. In this case, there is no end to human progress and Fukuyama's vision of free market capitalism and liberal democracy continues for ever. In the other possible future, we do not discover a new source of energy supply and then the human race would need to adjust to existing and limited energy resources. We should be under no illusion that such an adjustment would be achieved by negotiations and by general consensus.

Economists connect growth with energy consumption, and this can easily be seen by comparing two graphs that compare the growth of the world's economy and the increase in energy consumption. Both curves linger in low ranges for centuries, if not millennia, and then rapidly jettison upwards in the last two centuries. In fact, economic historian Gregory Clark in his *Farewell to Alms* made an argument that there are only two periods in the whole history, the period of industrial revolution, and the period of Malthusian trap before the industrial revolution (Clark 2008: 1–18). The difference between the two is the lack of growth, pre-industrial economies did not grow for extended periods of time, claims Clark, because when they did, it was only for a short period of time, and even if they did, the growth was immediately reversed by the Malthusian trap, a biological mechanism of the evolution, which reduces the population numbers, and therefore, brings down the economic growth. The key to industrialization in England, claims Clark, is that England managed to grow, and yet it also reduced the population numbers. In particular the least desirable parts of the society were eliminated, namely the poor. This allowed for the accumulation of wealth to happen in tandem with the suppression of the population growth and it ushered in the second period in history, the period of growth.

Clark argument is fairly cruel towards the losers in the economic game, and represents in effect the old idea of the survival of the fittest now revived. I will not offer here criticism of this argument, but let us follow this argument further, because this is basically the same economic model that Fukuyama advocates for the whole world, free-market capitalism, or as Adam Smith had put it, 'the system of perfect liberty.' Presumably what is meant here is the system of perfect economic liberty. In order to achieve Fukuyama's vision of world economic prosperity, the world economy need to grow, the developing countries, such as China and India, need to grow more than the developed world in order to catch up. This is exactly what is happening. In fact, after Nixon's historic visit to China in 1972 and the death of Mao in 1976, Chinese Communist Party under the leadership of Deng Xioping has also adopted the free market economics of the West. Fukuyama claims that the end of history it not just about adopting values of liberal democracy, which he foresees happening in the future, but also about adopting of the 'winning' paradigm in economics. Name-

ly, Fukuyama claims that in the 1980s, both Russia and China embraced ‘the “Protestant” life of wealth and risk over the “Catholic” path of poverty and security’.

What does Fukuyama mean by ‘Protestant’ and ‘Catholic’ economic paradigms? Fukuyama’s ‘Protestant’ economy is what we normally call the neo-liberal, *laissez-faire*, or I would even call it the Darwinian model of economy. Each economic player, each individual, pursues his or her selfish goals. These conflicting interests are then balanced on the open and free market. Each producer is free to choose what to produce, and each consumer is ideally free to choose what to consume, but in the end the needs and the demands are all perfectly matched by the so-called ‘the invisible hand of the market’. The key to understanding economic models is to always have in mind that they are extreme simplification. Like in the case of the invisible hand, the model envisions that all the players in the market are of the same size. Furthermore, not only are the all players of exactly the same size before the market is balance, but there is no growth at all in this economic model. Since all the needs and the demands are met, there is no real increase in wealth. The system is perfectly balanced. Somebody’s gain is other person’s loss, so that the overall amount of wealth in the system is constant.

How is then wealth created according to this ‘Protestant’ economic model? Here I would go back to Clark’s book, the *Farewell to Alms*. Clark’s argument is perfectly clear; the wealth is created by eliminating the poor (Clark 2008: 272). This is how it works in an idealized model: all the subjects pursue their selfish goals; some are successful, while others are less successful; the big fish grow bigger, and the small fish grow smaller. This, however, does not create growth yet, no increase in average prosperity for the whole society, since the system is still in balance. The overall wealth increases only when some of the small fish, the less successful individuals, are no longer able to meet their needs, and according to the principles of natural selection, when they die out. Once they are eliminated, the overall average wealth of the society increases. Actually, that is one of the reasons why Clark’s book is called *Farewell to Alms*, because if the system is taken seriously, points driven to their logical conclusions, giving food to the starving poor actually just prolongs their agony, while, at the same time, it does not increase the prosperity of the society as a whole. Clark’s argument is really that only a society such as England, which was able to eliminate its own poor, was able to create sufficient economic growth to propel itself into a stage of the prolonged economic growth and the accumulation of wealth, moving decisively beyond the mere balanced equilibrium of needs and wants.

Before I get into the second kind of economy mentioned by Fukuyama, the ‘Catholic’ one, I would first like to point out that this ‘Protestant’ economic model is intrinsically anti-democratic. This is obvious from the model itself and is actually supported by historical evidence. The reader will remember that the neo-liberal system starts with the often unstated presupposition that ‘in the be-

gining' all the market subjects were equal, that is, of equal size. As the exchange of goods and services proceeds, some players become bigger, and some smaller. Yet, in Fukuyama's vision, the system is also supposed to be democratic, that is, to be governed by the principle one person, one vote. In this way, an imbalance is created between the wealth of individuals and their economic weight. Naturally, the economic big fish will try to limit the political influence of the small fish, since, according to Clark, the small fish will want alms, while the big fish would like to increase its wealth. This can only be achieved by eliminating the political influence of the small fish, reducing their demands for alms, thus hastening their elimination. In this way, one can better understand why during the nineteenth century the industrialized England consistently lagged behind less industrialized France, in terms of the universal male suffrage. It is a well-known historical fact that while France allowed universal male suffrage, albeit intermittently, from the times of the Revolution to the times of the Third Republic (1871), England only allowed universal male suffrage by the Representation of the People Act of 1918 adopted under a threat of a Bolshevik style uprising. This anti-democratic nature of the Darwinian economic system can also explain that from the standpoint of the Chinese Communist Party, the decision to abandon planned economy and adopt the *laissez-faire* system, was the right decision. The adopting of the *laissez-faire* business model actually prolonged the Chinese Communist Party's grip on political power. Fukuyama's assertion that the free market capitalism would eventually lead to the greater democratization of China is wrong, since most Chinese businesses are led by the Communist Party officials who now control them as business managers, not as party ideologues. Deng Xioping correctly reasoned that political freedoms do not mean much as long as the Party is in the managerial control of the economy. This is actually a point where Adam Smith and Karl Marx agree, lack of organized labor guarantees higher profit margins (Palast 1999). Even though most Western analysts predicted that the shift to the managerial style free-market economy in China would lead to greater political freedoms, it has not happened, even though over 20 years have passed since the end of history began in 1989. Capital investment will only come in a developing country if it is provided with a docile and compliant workforce.

Let us move not to what Fukuyama had in mind when he was talking about 'Catholic' economic model of 'poverty and security'. While the Protestant economic model promises wealth and risk, the Catholic offers poverty, but security. Fukuyama has in mind here various kinds of planned economy, where wants are planned in accordance with the needs. In the US, the most popular such model is the 'systems theory' introduced to the political sphere by the advisors to the Kennedy administration. For example, the economist Alain Enthoven, one of the pioneers of systems analysis worked on the particular problem of the increasing cost of military equipment and, later on, the increasing cost of pay-per-service medical plans. In a book called *How Much is Enough* Enthoven (2005) asked

some serious and unanswerable question about the 'Protestant' wealth and risk model. National defense and health care are areas in which we as a society are willing to pay any cost in order to provide security for the country and health for ourselves. In these two areas, Enthoven argued, neo-liberal economic model failed to bring down the cost. Outside political pressures on the economic system are just too big. We will pay any price to keep our country safe, and similarly pay for any procedure that will save our lives. The problem is that we cannot afford what we want. As a consequence, the United States is devoting higher and higher percentage of its income to defense and healthcare. These ever increasing pools of money are the sacred cows in the government budget, since no politician can afford to be perceived as vulnerable to accusations of jeopardizing national security and rationing health care. What is happening in the United State is exactly what Clark described in his *Farewell to Alms*. People who can afford to buy into the pay-per-service system are receiving technologically the most advanced health care available. People who cannot afford it are receiving no health care and are, therefore, consigned to the losing end of the evolutionary struggle for existence. Enthoven suggests a simple solution. Instead of trying to fulfill our every wish when it comes to defense and health, we should simply ask, what are the needs? We should analyze those needs and come up with the system that best meets those needs.

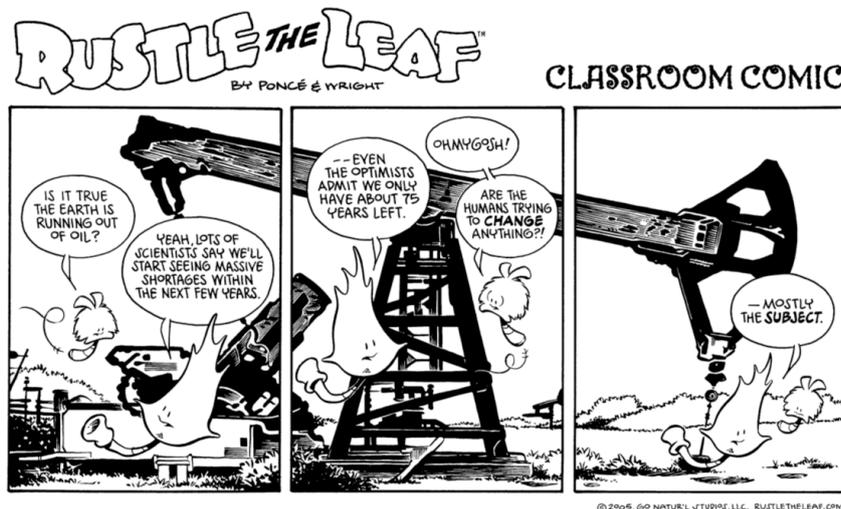
This particular logic has been expanded to the economy in general, above all by the so-called Green Movement. It is a well known fact that if the whole world is to achieve economic prosperity currently available to the citizens of the West, there will be not enough resources on our planet. Analysts estimate that the world will run out of some metals, for example, zinc in 2025 (Cohen 2007). Various peak-oil theories suggested that the production of oil in the world, has or it is about to reach its maximum, and after that moment it will only decline. The peak-oil theory, suggested first by Marion Hubbert in 1956, accurately predicted that the production of oil in the continental US would peak around 1970, and would thereafter fall into an inevitable decline (Hubbert 1956). There are many theories related to this issue of the depletion of Earth's resources by an economy that favors wealth and risk. Studies have been done on peak-gas, peak-uranium, peak-copper, peak-lithium, and even peak-cod fishing. There is little doubt that Earth's resources are limited and the question asked by Enthoven, how much is enough, is a very relevant question not only for Big History, but also for the future of the humanity. These issues are being discussed, and Big Historian, as historians of science should follow them closely. There might be some interesting paradigm changes in this area, in spite of Fukuyama's prediction. It is interesting to note that in 1992, twenty years after Enthoven published his book *How Much is Enough?* Alan Durning published a book with the same title *How Much is Enough: The Consumer Society and the Future of the Earth* (Durning 1992). In this book Durning calls for a 'society that lives within its means'. This is, I guess, what Fukuyama called the 'Catholic' economic model of poverty and security.

This debate is not going to be easy, particularly in the United States. Protestant fundamentalists take their beliefs in the 'Prosperity Gospel' very seriously. A great number of popular fundamentalist and evangelical churches teach the prosperity gospel as the core living principle. The teaching is fairly simple and has its deep roots among the more radical streams of the Protestant Reformation. It argues that God blesses the believers with riches. In a typical Calvinist fashion, those who are rich are those who are blessed. For many fundamentalists this teaching is as important as the doctrines that we most commonly associate with Protestant fundamentalism, such as the inerrancy of the Bible, or the substitutionary atonement of Christ on the cross. It is highly ironic that Anglo-American fundamentalists, while opposing Darwinism in biological sciences, endorse the crudest possible Darwinian economic model, thus condemning the poor not only to the margins in this world, but to a place of eternal damnation. In fact, these attitudes toward economy became so pervasive in the last twenty years that some journalist questioned whether or not such attitudes were ultimately responsible for the economic crash of 2008. Hanna Rosin in her December, 2009 article in the *Atlantic Magazine* directly asks the question, 'Did Christianity Cause the Crash?' There Rosin described an immigrant church in suburban Virginia, full of Latinos who converted to fundamentalist Protestantism, eager to fit in the Prosperity Gospel ideology. There the minister tells his parishioners, 'God is the Owner of All the Silver and Gold, and with enough faith, any believer can access the inheritance. Money is not the dull stuff of hourly wages and bank-account statements, but a magical substance that comes as a gift from above' (Rosin 2009). Even in these hard times, it is discouraged, in such churches, to fall into despair about the things you cannot afford. 'Instead of saying I am poor, say I am rich', writes Rosin as she continued to describe this phenomenon of American culture (*Ibid.*). It is hard to see how to argue with this kind of dogmatic thinking.

In fact, Fukuyama recognized that his logic of the end of history, as it manifested itself in the prevailing Anglo-American fundamentalism, was a mistake. He recently condemned politically active religious fundamentalism, of which he was an active part for over two decades. To a surprise of many, he compared Anglo-American neo-conservatism to Leninism, saying, 'Leninism was a tragedy in its Bolshevik version, and it has returned as farce when practiced by the United States. Neo-conservatism, as both a political symbol and a body of thought, has evolved into something I can no longer support' (Fukuyama 2008). Fukuyama should be applauded, in my opinion, for his honest change of mind. It is dangerous to try to impose 'paradigms' on sciences by the might of political and economic power. I believe that was exactly what was going on in the last twenty year and various aspects of Big History clearly illustrate it. Fukuyama's comparison of neo-conservatism with Leninism is, I believe, very appropriate. A group of influential, religiously motivated, political leaders, backed by some tycoons of the economy, tried to impose uniformity in the areas of

human investigation that we call natural and social sciences. They not only opposed the idea of human evolution, but also attempted to impose a single 'true' paradigm of free-market capitalism onto social and economic sciences. These imposed paradigms could or are already becoming so entrenched that there might be very few further challenges to them. Social structures could be built around the victorious paradigm which could possess mechanism to eliminate any inside or outside challenge. This is what is meant to have a paradigm which is victorious forever. This is why Fukuyama compared neo-conservatism with Leninism.

In the light of this fairly pessimistic review of contemporary politics, I would like to say that Big History represents a ray of hope. Historical understanding of the fundamental cultural concepts of human society, such as who we are, where do we come from, and where are we going, can only enrich our understanding of what is going on around us. That is why I argued in this paper against the notion of presenting Big History as the modern scientific creation myth. Quite to the contrary, Big History should be historical understanding of the basic notions of science. It is interesting that now, in the 'end of history' period, it is historical understanding that can serve as a guide on how to proceed forward, in the light of the financial crisis, and the growing environmental problems. Historical understanding of science, I believe, should be at the core of Big History. It is our only weapon against forceful imposition of uniform paradigms from the outside.



**Fig.** Is the peak oil a possible end of history? (URL: <http://ictlessons.wikispaces.com/Environment+with+cartoons+and+comics>)

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