



International  
Big History  
Association

# Origins

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# Big History's Expansion and Complexity

**B**IG HISTORY is expanding rapidly!

The [Big History Project](#)'s on-line course has been enthusiastically received. [ChronoZoom](#) is being developed by universities around the world. The new [Crash Course](#) series, still being released in installments, has attracted over a half million viewers in just its first month. [David Christian's TED talk](#), with four and a half million views, his appearance on Stephen Colbert's widely watched comedy show, and [articles in some of the world's major media](#), are a few of the pieces of evidence for the growing visibility of Big History.

The IBHA is proud about the decision at the 2014 conference at Dominican University of California to begin a new *Journal of Big History*. The editor-in-chief of the journal will be Fred Spier, President of the IBHA, senior lecturer in Big History at the University of Amsterdam, and author of *Big History and the Future of Humanity*. The editorial board will consist of Cynthia Brown, Dominican University of California, author of *Big History: From the Big Bang to the Present*, Esther Quaedackers, University of Amsterdam, Andrey Korotayev, Russian Academy of Sciences, Leonid Grinin, 'Uchitel' Publishing House, Volgograd, and David Baker, University of Amsterdam. Submissions of scholarly manuscripts that will go through double blind review will be requested soon. The journal, of which there will be two issues per year, will be available to all IBHA members.

If you have not already liked and regularly view / comment on postings on the IBHA [facebook](#) site, we invite you to do so. The site refers to and discusses all manner of Big History related materials. And please remember to follow the IBHA on [Twitter](#) to receive all the latest news about our association and the field of Big History.

[Origins](#) is issued regularly in order to share the work and thoughts of IBHA members about Big History, as well as to offer information about IBHA conferences, new projects of the IBHA, and other advances of Big History.

What these and other initiatives share is a commitment to analysis of evidence that leads to better understandings about what has happened since the Big Bang. The scientific evidence that has made this new story of the universe possible is leading us to reflect profoundly on so many aspects of our cultures, from our understanding of history, to art, politics, religion, society, psychology, . . . .

Big History is a new and fast-growing scholarly discipline. It faces the quite distinctive challenge of linking insights from many different disciplines, each of which has its own traditions, its own languages, its own ways of doing things. This means that the problem of translating concepts, ideas, methods and goals from one discipline into another is part of the challenge of Big History. Disagreements on all these issues are inevitable and healthy because Big History is not a monolith.

The discussions that follow bring out differences between some of the leading scholars in the field. Robust debate will be essential to maintaining the creativity, the integrity, and the scholarly rigor of the field. Our thanks to all who have contributed to this discussion, which we hope will be the first of many debates about future directions for Big History.

If the rapidly growing field of Big History seems to be bursting at the seams sometimes, well, it is. And that is good. We are currently witnessing only the first attempts at formulating Big History accounts, and the journey ahead will be an exhilarating ride! We're glad you are with us for it.

A scenic view of a coastal town, likely Pau, France, with a lighthouse on a cliff overlooking the ocean. The town features several large, multi-story buildings with red-tiled roofs. The ocean is blue with white waves crashing onto a sandy beach. Two people are visible in the water, possibly surfing. The sky is clear and blue.

## Call for Big History summer course proposal

The University of Pau in the south-west of France will hold its first interdisciplinary summer school at its Atlantic Coast campus (11-18 July 2015). The courses will be given in English with English-speaking instructors recruited outside the university. In particular we are seeking someone interested in giving a Big History course.

Contact [marc.artzrouni@univ-pau.fr](mailto:marc.artzrouni@univ-pau.fr) for more information and/or to receive a “Course Proposal Form” in which applicants will describe the content and organization of the proposed course.

[In #1](#), John Green, Hank Green, and Emily Graslie teach you about, well, everything. Big History is the history of everything. We're going to start with the Big Bang, take you right through all of history (recorded and otherwise), and even talk a little bit about the future. It is going to be awesome. In the awe-inspiring sense of the word awesome. In this episode, we walk you through the start of everything: The Big Bang. We'll look at how the universe unfolded at its very beginning, and how everything in the universe that we know today came into being.



The Big Bang: Crash Course Big History #1

[In #2](#), John Green, Hank Green, and Emily Graslie teach you about what happened in the Universe after the big bang. They'll teach you about cosmic background radiation, how a bunch of hydrogen and helium turned into stars, formed galaxies, created heavy elements, and eventually created planets.



Exploring the Universe: Crash Course Big History #2



The Sun & The Earth: Crash Course Big History #3

[In #3](#), John Green, Hank Green, and Emily Graslie teach you about our Sun, and the formation of the planets. We're going to focus on the formation and development of the Earth, because that's where people live. You'll learn about the Solar nebula, the birth of the sun, the formation of planets, and how the Earth and the rest of the solar system developed over the last 4.567 billion years.



Life Begins: Crash Course Big History #4

[In #4](#), Hank and John Green teach you about life on Earth. They won't be giving advice on how life should be lived, because this is a history series. Instead, they'll teach you about the earliest forms of life on Earth, and some of the ways that they developed into the types of life we know, love, and sometimes don't love so much (I'm looking at you here, opossums). You'll learn about prokaryotes, eukaryotes, panspermia, reproduction, a little about DNA, and even a thing or two about trees. Maybe.

# Big History's Risk and Challenge

ERIC J. CHAISSON

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SOME TWENTY YEARS AGO, a scattered few, intrepid historians began teaching courses on a wider, slightly precarious stage. They realized that much good and valid history extends far back in time, well prior to the ancient civilizations of Egypt and Sumer thousands of years ago, even beyond the onset of hominins millions of years ago. These “Big Historians” were thinking expansively, deliberately—in both space and time—identifying and linking many notable events in the deep past, from the origin of the universe to the present day on Earth.

It was as though, while trekking up a mountain whose summit holds true knowledge, the Big Historians began realizing there's much more to history than we had been led to believe by world, global, or traditional historians who have dominated historiography for decades. Pioneers like John Mears of Texas, David Christian of Australia, Fred Spier of Holland, and Cynthia Brown of California strove to grasp a broader view of who we are and whence we came. They were searching for humanity's sense of place in the larger scheme of things, attempting to understand how relatively recent happenings on Earth might relate to events that occurred long before any written records.

Yet hardly a decade ago, those same Big Historians, much enthused by their new story-telling agenda, discovered a different breed of scholars on the other side of the mountain. These were mostly astronomers, uncommonly eclectic researchers who had explored for much of the twentieth century much the same cosmology, relating it in articles, books, and classrooms well earlier than had the Big Historians. These natural scientists, who subscribe to the modern scientific method and who demand experimental or observational tests of their ideas before proceeding, often call their grand narrative “Cosmic Evolution,” but it's also sometimes known as universal evolution, epic of evolution, astrobiology, or simply as the late-Renaissance term natural history.

It doesn't matter who was first or is better equipped to describe the awesome story of our origins. In the metaphor above, most scholars generally advance while hiking the mountain of knowledge; there are many ways to learn about ourselves and our world, including art, music and literature, as well as history and science. Although some humanists on one side and scientists on the other draw nearer—not only as the lateral space dividing us literally lessens while approaching the peaked summit, but also as our subject matter and research methodologies increasingly overlap—neither party, indeed no one, will likely ever actually reach the peak; absolute truth is probably unattainable. Rather, the very act of questing for answers to deep and abiding inquiry means that serious scholars often gain better approximations of reality.

Meanwhile, philosophers and theologians, both amused and concerned, wonder wearily from mountainous ledges how the latest findings might impact their thoughts and beliefs that require no tests. Will neither thinking alone nor believing alone, as many scientists like myself profess, ever make the unknown known?

## *The Grand Scenario of Cosmic Evolution*

Evolution—ascend with change of nature's many varied complex systems—has become a powerful unifying concept throughout the sciences. In its broadest sense, Cosmic Evolution, which includes the subject of Big History, comprises a holistic explanatory narrative of countless changes within and among organized systems extending over about fourteen billion years from the big bang to humankind. Its working hypothesis is that all complex systems seem governed by common processes and properties, as though simple, underlying (perhaps unchanging) Platonic forms pervade the cosmos. This interdisciplinary scenario has the potential to unite the triumvirate of modern

learning—humanities, natural science, and social studies—thereby creating for people of all cultures at the start of the new millennium a consistent, objective, and comprehensive worldview of material reality.

A handful of natural scientists have long told the cosmic-evolutionary story based on the latest experimental and observational findings; most are scholastic mavericks committed to interdisciplinary research at the frontiers of science. They tend to de-emphasize humanity in the huge sweep of this lengthy and inclusive narrative, giving substantial coverage to galaxies, stars, planets, and other-life forms that surround us on Earth (and perhaps beyond). They are especially careful not to state or imply any kind of anthropocentrism, often stressing the “front” of this universal story that has little to do specifically with us yet is vitally important to the whole shebang. For the Cosmic Evolutionist, the unvarnished origins epic is not just about us—nor even mostly about us—although we are assuredly the current storyteller. In short, if humans did not exist, this grand narrative would still unfold, from quarks to quasars and from microbes to minds all across the universe. The arrow of time that maps this amazing scenario’s prodigious events is not likely pointing at us.

By contrast, historians, being humanists largely, emphasize humanity. It’s understandable, given the root *his-story*, much as Pope long ago declared “the proper study of mankind is man itself.” Accordingly, even Big Historians stress human accomplishments and their cultural achievements, relating more recent times near the “back” of the story: “human history in its wider context” (Christian 2005) or “an approach to history that places human history within the context of cosmic history” (Spier 2011). Yet they are also rightly intrigued by salient features of our Milky Way Galaxy, our parent star the Sun, our home planet Earth, and myriad life forms that specifically (yet meanderingly) led to our ancestors thousands of generations ago. In short, again, if humans did not exist, both Big Historians and their more limited story clearly starring us would evaporate. To most Big Historians, Big History itself is naturally

anthropocentric—to them, it’s unapologetically *our* story.

To compare and contrast this yin-yang take on anthropocentrism, imagine two movies that project the main events of the same big-bang-to-humankind plot, yet at different speeds. One movie portrays fourteen billion years linearly, treating each billion years of real time in a single minute of screen time; this is the way Cosmic Evolutionists model the cosmos—so many galaxies over so much time, Earth debuting with hardly a third of the film left, and humans appearing within only the last second of the movie. Yet some viewers despair; the story is so long, our existence so brief, how can it be? Alternatively, we could create for ourselves more than a cameo appearance by running time non-linearly (logarithmically) and here such a movie allows Earth and life to enter earlier, indeed ensuring that humankind plays a leading role; this is the way Big Historians typically view the cosmos—stressing events that are better known and closer to home in both space and time.

Actually, these contrasting movies need not be merely imagined, for they already exist as short films that are freely accessible at compressed-resolution over the Internet: [https://www.cfa.harvard.edu/~ejchaisson/cosmic\\_evolution/docs/fr\\_1/fr\\_1\\_intro\\_movies.html](https://www.cfa.harvard.edu/~ejchaisson/cosmic_evolution/docs/fr_1/fr_1_intro_movies.html)

I helped make both of them as part of a course that I’ve taught for nearly four decades, mostly at Harvard University. In the mid-1970s, astrophysicist George Field kindly invited me to join him in co-creating a course on Cosmic Evolution that quickly became a huge and popular offering often filling the largest lecture hall on campus. Students were clearly “voting with their feet” while searching for an intellectual worldview, and they were also rewarding us for taking the fine art of teaching seriously in a place where that’s not often done. Nowadays, I enjoy teaching this same course (suitably revised and updated) in Harvard’s Extension School, which appeals to smaller audiences of mature adults in interactive seminars.

The essence of this cosmic-evolutionary course has been taught at the Harvard Observatory for

nearly a century. Harlow Shapley, who began teaching what he called “Cosmography” in the 1920s, was one of the first to recognize the widespread evolution of animate and inanimate systems throughout the history of the universe. For several decades, he conveyed this scientific story to legions of undergraduates (in the same auditorium where I still teach it now), after which the torch was passed to my observatory predecessor, Carl Sagan, who famously taught much the same broad theme, initially at Harvard and then at Cornell, entitling his course “Life in the Cosmos.” He was not alone; Hubert Reeves in France, Iosif Shklovsky in Russia, Erich Jantsch in Austria, among a few other pathbreaking scientists in the 1960s and 70s, expansively described the evolutionary epic in words, if not its technical ways and means.

Sharp students and intelligent taxpayers alike, both seeking rational worldviews that made some sense in today’s rapidly changing, secular times, have warmed to this scientific story even more than many science colleagues, some of whom thought we were hardly more than dabbling dilettantes—or as my department chair told me pointedly in the 1980s, “you’re misallocating your time and effort.” Sagan, who was a valued mentor while encouraging me to research broadly and teach enthusiastically, nonetheless warned me of the precariousness of testing the tolerance of university deadwood who value almost exclusively specialized, disciplinary work.

Academic attitudes haven’t changed much during my forty-year passion for Cosmic Evolution. The ancient and honorable community of scholars is still composed of splitters and lumpers—the former, majority specialists and narrow-minded, who toil daily while advancing science incrementally by discovering myriad facts that bolster the bigger picture; and the latter, minority generalists and wide-eyed, who endeavor to synthesize those facts as integral parts of that bigger picture. Both philosophies of approach are needed, yet there remains an imbalance; the lumpers who seek unification widely respect the splitters who regularly strengthen their many varied disciplines, yet the

converse seems seldom the case, especially in research universities where specialists dominate in numbers, grantsmanship, and perceived value. When will interdisciplinarity become more than a buzzword for central administrators who in principle embrace it yet in practice almost always fail to honor it?

### *New Tales of Big History*

The Big Historians, too, struggle with interdisciplinarity while their more established history colleagues watch, wait, and lightly probe what’s going on. Some compatriots seem interested in the fresh genre of Big History and most condone it, yet few eagerly commit. Are these traditional scholars myopic, lazy, or jealous—or perhaps merely judging it a waste of time?

On the contrary, there’s no time to waste. Along comes, this year, Big History’s first textbook, *Big History: Between Nothing and Everything* (2014). And what a marvelous explication it is by Christian, Brown, and Benjamin. As befitting such experienced authors, the book is mostly well written, organized, and packaged. The writing style is inviting—not too pedantic, yet not too breezy, rather just right for innovative courses at the college/high school interface. Each chapter begins with a set of learning goals (posed as questions), bold-faced key terms are found throughout, and the illustrations are colorfully rendered; a brief summary and a few more questions complete each chapter, although the book would have benefitted from more end-of-chapter pedagogical materials. Overall, it’s a credible first edition, and I recommend it.

Having published a similar textbook some twenty-five years ago (yet emphasizing ancient times at the front of the story), and now as an experienced co-author of a widely used text in astronomy, I predict, sadly, that this new Big History text will not likely be amply adopted. At the college level, as griped above, universities don’t much value silo-bursting of insular, sometimes archaic research disciplines, and traditional history departments, will be loath to teach this novel subject since they didn’t launch it; at pre-college levels, the

text doesn't make clear how it aligns with national standards. I hope that I'm proven wrong.

This new textbook undeniably emphasizes humanity, thus raising again the charge of anthropocentrism. It resembles the pacing of the non-linear temporal treatment in one of the above-mentioned films, heavily weighting humans and their cultural achievements; ten chapters address 0.05% of the full Big History story, while only three chapters address the story's other 99.95% (whose coverage of galaxies, stars, and planets would have benefited from a critical review by an astute physical scientist, thus avoiding dozens of minor errors). This extreme imbalance is perhaps natural for any Big History account, but it needs to be fully recognized; humankind does greatly dominate their exemplum.

These skilled authors rightly note that most organized systems display increases in complexity over the course of time, and that it's probably energy flows within those systems that cause the observed rise of complexity. All complex systems—from twirling galaxies and shining stars to buzzing bees and redwood trees—do seem to function optimally within certain boundary conditions, and not surprisingly also have optimal ranges of energy flows. Quantitative studies of Cosmic Evolution have shown that the vast majority of normalized energy flows for biological systems (including all plants and animals) fit neatly between simpler physical systems (like stars and galaxies) that utilize lesser values of energy (density) and more advanced cultural systems (society and its machines) that have higher such values. I am honored that these Big Historians have used some of my research regarding ranked system complexity as a main theme of their new textbook. Even so, literary annoyances occasionally muddy the description of major phenomena, notably the central role played by energy in fostering changes that select and reject complex systems embedding the Big History story. For example, energy optimality is a process that seems favored throughout nature—an empirical finding that I've championed for many years in numerous peer-reviewed publications (see: 2004, 2011a, 2011b)—not too little as to starve a system, yet not too much as to destroy it. Yet here is where

I differ from the Big Historians, for they (including these pioneering textbook authors) seem inclined to reappropriate such key optimization concepts under the wobbly guise of “Goldilocks conditions” or “Goldilocks circumstances.” Alas, there is no need to re-label the well-principled, scientifically based concept of energy-optimization by appealing to humanistically inspired fairytales.

Boundary conditions that are not too hot and not too cold, or physical dynamics that are neither too fast nor too slow, etc., but are rather “just right” to create and sustain complex systems, are synonymous with optimal energy ranges (also just right) that have long been employed by natural scientists. To give but one glaring example, some astronomers a few decades ago cast Earth's habitability in terms of Southey's dreamy Goldilocks fable—if Earth were nearer to or farther from the Sun, or if our atmosphere were thicker or thinner, or if it were abundant in this or that element, then Earth might be unsuitable for life. Shapley had originally called them “liquid water belts,” planetologists now term them “habitable zones,” yet some colleagues, hoping to bolster sales of books, felt the need to vulgarize. (Social media are also often implicated, such as when they recently and repeatedly softened the science regarding the discovery of the elusive Higgs elementary particle by tactlessly calling it the “God particle,” which in turn stems from another author's botched attempt to title his book *The Goddamn Particle*.) Goldilocks-laden descriptions of systems are hardly more than cute restatements that only certain amounts of energy are available to those systems, and that if conditions were different we might not be here. Environmental conditions per se are not an underlying reason for complexification; energy flows through systems likely are; energy is the cause, complexity the effect.

If Big Historians are to make headway, indeed to be accepted by traditional historians let alone natural scientists, they ought to ground their research scholarship in scientifically tested ideas and empirically derived results, where possible, and focus their story on the role of humanity in the one and only universe we know. Triple-distilling good, solid science will only unduly dilute the otherwise

powerful narrative that Big History has to offer. Why must Big Historians reinvent soft terms that invoke myth or fantasy, yet which cheapen the hard science describing real and complex systems observed all along the arrow of time?

### *Contention in the Ranks*

Confusion and misinterpretation often arise when carefully composed journal articles go unread amid today's harried world of hasty e-mails, biased internet blogs, and un-refereed papers posted on open-access outlets. Needless anxieties also surface when scientists write for non-science audiences (and likely conversely)—and my experiences with Big Historians are no different. Natural scientists often cringe at many of the qualitative assertions of humanistic and social scholars, while Big Historians often find daunting the quantitative propensity of modern science. As noted above, a prominent commonality among all complex systems is that energy always seems involved in any transaction that causes change; the origin, maintenance, evolution, and fate of all systems are infused with energy. No unambiguous evidence exists for any event in nature occurring spontaneously, alone, or without energy exchange; energy of some type, at some level, and for some time assures the viability of all physical, biological, and cultural systems. If fusing stars had no energy flows within them, they would collapse; if plants did not photosynthesize sunlight, they would shrivel up and die; if humans stopped eating, we too would perish. Energy's central role is also widely recognized in cultural systems such as a city's inward flow of food and resources amidst its outward flow of products and wastes; indeed, energy is vital to today's economy, technology, and civilization. All complex systems—alive or not—are open, organized, non-equilibrated structures that acquire, store, and utilize energy. Whether stars, species or societies, a unifying trend seems to link (and rank) all such ordered systems in a consistent, uniform manner. That is the true forte of Cosmic Evolution: Demonstrating quantitatively how everything is related to everything else even within a messy, imperfect universe.

Yet, when Big Historians chronicle humanity and its cultural inventions, they sometimes depart literally from the storyline—they start telling another story. Some Big Historians are skeptical about pursuing Cosmic Evolution into the realm of worldly culture, claiming that the nature of complexity for human society and its built machines differs fundamentally from that of other systems in the universe. They draw a subjective distinction between naturally evolving complexity and human-made “artificial” complexity, arguing that the former appears spontaneously (but it does not) whereas the latter is constructed by us and thus different (yet artificiality, like intentionality or directionality, are irrelevant in evolution). Is this merely anthropocentrism once more rearing its ugly head, hubristically placing ourselves yet again on a platform, a pedestal, or even alas at the apex of the natural world? Or might this be another case, much like Goethe's devil dressed in the gown of the scholar Faust who prefers to invent new ideas by creating new words, of some Big Historians opting to divide rather than unify?

In contrast, I have always maintained that we too are a part of nature, not apart from it; schemes that regard humankind outside of nature, or worse atop nature, are misguided. If we are to articulate a unified worldview for all known complex systems, then we must objectively and consistently model each of them identically. Complex systems likely differ fundamentally not in kind, but only in degree—i.e., degree of complexity manifesting ontological continuity. The critics' main anxiety is that cultural complexity often numerically (i.e., energetically) exceeds that of humankind, and they are apparently unable or unwilling to accept that some culturally invented gadgets might be more complicated than our biological selves. However, technological devices were not built by nature without intelligent beings, so it's not unreasonable that some cultural systems' complexity can sometimes transcend those of biological systems, just as life forms outrank simpler physical systems. Perhaps, to embellish Pasteur of yesteryear, chance and necessity do favor the prepared mind.

Cultural evolution is a product of biological evolution, the former building upon the achievements of the latter. Provenance counts; networks of bodies and brains within the human web assemble elaborate contraptions. And it is the rapid pace of cultural evolution, in addition to its ability to harness energy intensely, that makes cultural systems so remarkable. Accordingly, I expect many cultural products to be typically more complex, naturally so, than the biological systems that produce them. I am also comfortable with the empirical finding that some cultural systems, notably machines, computers, and cities that help in numerous ways to improve our health, wealth, and security are likely more complex than we are; jet aircraft operating in three-dimensions and computing extremely rapidly may well be a hundred times more complex than an actively thinking mammalian organism, as their energy-derived data imply. After all, it is the intricacies of our human brains and social networks that have made machines possible, so why should any machine—including vacuum cleaners and lawn mowers—be less complex or have, by design, smaller concentrated energy flows? Try gliding off a cliff with your body, mowing a lawn or vacuuming a carpet with your brain, or even beating an iPhone at checkers; machines perform functions that biota cannot, often impressively so, and more rapidly too. Function also counts; flying high and computing fast are qualities that humans do not possess.

This is not to say that cultural systems are smarter than we are; no claim links our complexity metric with intelligence, rather only cultural systems are arguably more intricate, complicated. For Big Historians to declare that sentient, technological society is not analyzable in the same way as stars, galaxies, and life itself is tantamount to placing ourselves in some special category or atop some exalted pillar, raising the age-old specter of mystical rulers and arrogant institutions. It would be as though nature adheres to a universal concordance, creating all known systems in a single, unified, evolutionary way—but only until the Big History story reaches us, at which time society and our cultural inventions are alleged to be different, or artificial, or privileged. I reject such

teleology, which has so often been detrimental to humankind during much of recorded history. My stance on Cosmic Evolution very much includes culture and civilization among all natural systems, indeed regards human society and our remarkable technology “on the same page” alongside every type of complex system known in the universe.

Why, in our Copernican-principled day and age, are Big Historians, much as some biologists and many anthropologists, prone to “split” (hence divide) efforts to “lump” (hence unify) all that we observe in nature, thereby requiring an assorted array of “just-so” stories, much like those of Kipling and his fanciful descriptions for each and every animal in the forest uniquely? I urge caution when professing, egocentrically or for reasons of personal belief, that the complexity of social systems differs in kind from that of any other organized system. There is no objective evidence for humankind’s specialness and no need to assert it subjectively.

### *A Challenge and a Risk*

Perhaps the biggest challenge for Big Historians is that much of their story is decipherable only by scientific means. Virtually all knowledge of what preceded written records (well more than 99.99% of the Big History chronicle) derives from the modern scientific method, including everything known about cosmos, Earth, and life. To their credit, many Big Historians aspire to include the latest scientific findings within their developing narrative—“using the best available empirical evidence and scholarly methods,” according to the mission statement of the fledgling International Big History Association ([ibhanet.org](http://ibhanet.org))—yet so many of them falter when computing, interpreting, or merely using numerical quantities.

Admittedly, some of the technical afflictions of Big Historians stem from poor presentations by scientists (including perhaps some of my own arduous journal papers). An example is a relatively recent book on energy and society that is widely referenced by Big Historians, yet which has caused

untold confusion by calling the very same energy-flow term noted above by at least six different names with six different units—the kind of incoherent scientific writing that often serves to “keep the beginners out” by creating frustration among non-scientists seriously trying to embrace science and technology in the course of their scholarly research. We scientists need to communicate better our subject matter with those not trained in it, yet our present science culture fails to honor such talents.

It does seem these days that everyone wants to be a scientist. I recently introduced an undergrad to a colleague as one who studies economics, but she scolded me by exclaiming that her discipline is “economic science.” A dean, who is a political scientist, blurted out defensively in my office last month, “I’m a scientist too, you know.” Behavioral science, sports science, library science, exercise science, psychological science, creation science; even guys who pick up trash by the roadside in my hometown, once called garbage collectors and then sanitary engineers, are now officially entitled sanitary scientists. I’ve always been puzzled why social scholars are so insecure about their subject being called, as it once was, social studies, demanding instead that it be rebranded as social science when they know full well that society is so complex as to make virtually impossible controlled experiments like those done by natural scientists. Social scholars should be proud of their research, without trying to repackage it as science; given the plethora of grave issues facing humanity today, social studies might be more relevant for our survival than the natural sciences.

In all fairness, I—an experimental physicist by training and empirical materialist by philosophical bent—also find troubling much of what passes for frontier physics today— string theory, superstrings, supersymmetry, multiple universes, eleven dimensions, none of which has even a shred of evidence to support it. A unified understanding of nature need not postulate metaphysical schemes in abstract cosmology or untestable ideas in theoretical physics. A coherent, phenomenological explication of what is actually observed in our singular, four-

dimensional universe populated mainly with galaxies, stars, planets, and life comprises a useful advance in comprehending, and to some extent unifying, the extended, diverse world around us. Besides, would any intelligent person actually be willing to cross a bridge or fly in an aircraft built on the untested ideas of 11-dimensional string theory?

The risk to Big History is that its followers, unable to distinguish between real science and pseudo-science, are occasionally fooled by the latter—if only because junk science is often easier to grasp, slickly presented, or matches personal persuasions. Today’s society is laden with charlatans propagating idiosyncratic beliefs, fringe elements, and wacky ideas that have absolutely no basis in science or even in logic and rationality. In the interest of inclusiveness (a good goal), Big Historians seem inclined to embrace all sorts of alternative worldviews that often amount to hardly more than subjective fluff run amuck (a bad outcome). The only Big History meeting that I’ve attended to date, in Moscow two years ago, was abundant in such New Age claptrap, with my own paper on energy-rich technological society surrounded by talks on global spirituality, evangelical religious cures, life extension techniques, and synthetic body-vessels for the mind (causing another scientist, also scheduled for the same session, to withdraw when he realized what was happening). Tension does persist among Big Historians and natural scientists, not from interpreting the big-bang-to- humankind story per se (for there’s much agreement among major narrators), rather from its basic facts and figures clashing with perceived meanings and intentions—the former I can handle, the latter I cannot. Why do so many Big History advocates associate natural events with “purpose,” “progress,” “magic,” and “meaning,” all of which slippery words are anathema to most physicists who feel they do not aid objective understanding of our material universe? It’s always dangerous when Big Historians jet about the country proclaiming that their new-found subject grants them the meaning of life—only to be struck mute when asked to articulate that meaning. Perhaps the hype is mere overt enthusiasm, as with scientists Watson and Crick, who, having discovered the structure

of DNA more than a half-century ago in the real Cambridge, ran straightaway to the local pub to buy a round of drinks—and to announce they had found life’s meaning; yet, when they couldn’t explain it, they consoled themselves (and everyone else present) by buying another round. Let’s hope, paraphrasing one of the Huxleys, that the slaying of a beautiful story by an exaggerated claim does not become Big History’s greatest tragedy.

Will Big History rise to the challenge of genuinely embracing modern science’s central dogma, thereby accepting the need to test ideas while soundly rejecting those that go untested—or will Big History fall prey to the risk of alienating the natural sciences that undergird its very own essence, all the while becoming the latest entry in a long line of learned ponderers struggling up the mountain to fathom who we are and whence we came? Which will Big History become when it grows up: A bright and shining light in the otherwise dark firmament of mysticism, or another mythical contributor to that very same dim and dreaded darkness?

### *The Promise of Big History*

Big History is not a recounting of imagined fables, magical powers, or belief-based accounts of our origin and evolution. In demonstrable contrast, this ambitious enterprise nobly aims to chronicle natural history writ large, from big bang to humankind, without assuaging potentially the grandest of all narratives with equivocal terms and fictitious notions that sow doubt and misconception, yet skirt serious understanding of how material systems emerge, mature, and terminate. If

Big Historians are to base their awe-inspiring, interdisciplinary story on the empirical evidence of modern science, then they ought to accept some objective, quantitative reasoning without recourse to pseudo-scientific nonsense and without pandering to those clinging to antiquated subjectivity; linguistic distortions intended to soften hard science and renewed calls to place humankind on a culminating pedestal will likely lead to qualitative confusion and needless controversy—ultimately to the detriment of what is perhaps the greatest story ever (to be) told. I for one, and despite the slightly intemperate tone of this essay, surely do hope that Big History spearheads a novel methodology that goes well beyond the lofty words of poetry and superficiality of metaphor, thus becoming a profound interdiscipline that genuinely transcends academic barriers and provides an exciting new way to view ourselves and our world in our richly endowed universe.

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This article was originally published in *Expositions*, at <http://expositions.journals.villanova.edu/issue/view/130> and is reprinted here with permission. IBHA members will also be interested in other recent articles by Eric J. Chaisson “[The Natural Science Underlying Big History](#),” *The Scientific World Journal*, vol 2014: 1-41, article ID 384912; “[Practical Applications of Cosmology to Human Society](#),” *Natural Science*, vol 6 (2014): 767-796.

# Rocket Science: Big History and Cosmic Evolution:

A review of some recent papers by Eric Chaisson

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[“The Natural Science Underlying Big History.”](#) *The Scientific World Journal*,  
vol 2014: 1-41, article ID 384912

[“Practical Applications of Cosmology to Human Society.”](#) *Natural Science*, vol 6 (2014): 767-796

[“Big History’s Risk and Challenge.”](#) *Expositions 8:1 (2014): 85-95*

*To do the same thing over and over again is not only boredom: it is to be controlled by rather than to control what you do.*

*Heraclitus*

IN THIS SERIES OF ESSAYS, astrophysicist Eric Chaisson, who says this might be his final pronouncement on the subject, presents Cosmic Evolution as the science underpinning Big History. He also offers some pointed criticisms of Big History’s aims and methods, and tries to show how Cosmic Evolution (and by extension Big History) might help guide humanity through the global problems we now face. Chaisson knows that some of his comments will make Big Historians defensive and attempts to frame his swan song as “constructive criticism,” but he does not always succeed.

Consequently, some may be tempted to retaliate with a point-by-point rebuttal and tetchy ad hominem arguments similar to the ones that Chaisson employs. (“If Big Historians are to base their awe-inspiring, interdisciplinary story on the empirical evidence of modern science, then they ought to accept some objective, quantitative reasoning without recourse to pseudo-scientific nonsense and without pandering to those clinging to antiquated subjectivity.”)<sup>1</sup>

There is also plenty for those of a more philosophical bent to delve into since the overall story – Cosmic Evolution as both prior to, and more scientific than, Big History – leaves things unsaid that are as significant as those that are. As I suggested, Chaisson’s attitude towards Big History is not entirely benign: there are buried motives here.

There are also some serious theoretical conundrums that should be unearthed and examined. This is fairly obvious and will be merrily debated for years.

However, I would like to address some deeper questions about the similarities and differences between the two fields. I also want to reflect briefly upon the nature of the relationship between the two: What do the practitioners in each field think they are doing? What are the audiences for Big History and Cosmic Evolution? What are the limits of each practice?

Chaisson’s principal complaints are that Big Historians: (1) place too much emphasis on human history; (2) get some of the science wrong; (3) fail to quantify and test their claims in significant ways; and, thereby, (4) “sometimes depart literally from the storyline.”<sup>2</sup> The “storyline” Chaisson refers to is of course the one he considers to be the true and scientifically quantifiable story of Cosmic Evolution. (This notion is problematic, but I will return to it later.)

He argues that when Big Historians arrive at human history, they begin making false distinctions between natural and social science. Then they head in the wrong direction by arguing that the complexity of human society and its machines is fundamentally different from that of other systems in the universe.<sup>3</sup>

He does not name the Big Historians he is talking about or identify specific ideas. However, I assume he is referring to: (1) David Christian’s notion of collective learning as a paradigm for Big History; and

(2) Fred Spier's belief that because "humans have learned to create, manipulate and exploit a great many natural circumstances to their own benefit . . . human history represents a fundamentally new phase in biological evolution."<sup>4</sup>

Not surprisingly, Chaisson finds this divisive and wants everyone to stick to the plot of Cosmic Evolution. "If we are to articulate a unified worldview for all known complex systems," he writes, "then we must objectively and consistently model each of them identically."<sup>5</sup>

He argues that: (1) humans are part of nature; (2) all of the natural world must be understood in the same way; (3) Cosmic Evolution does this supremely well by analyzing energy rate density<sup>6</sup> in all complex systems, including human systems; (4) because Big History, emphasizes the human part of the universe story, it is "provincial" and "anthropocentric" (which, by his definition, science must not be); and (5) Big Historians, therefore, are guilty of "teleology."<sup>7</sup> From his perspective, only Cosmic Evolution provides the full, objective picture; Big History is a smaller, newer subject that is "included" in Cosmic Evolution.<sup>8</sup>

As stated earlier, his critique has some theoretical difficulties. Nonetheless, there is an important sense in which Chaisson is surely correct. By insisting on its own objectivity and the idea that it is more scientific than other types of history, especially world history, Big History overstates its claims. In this regard, it is problematic to jump from discussing energy rate density to collective learning as a paradigm. In my view, this is not necessarily bad, but we should be explicitly aware that we cannot test this type of assertion quantitatively. By claiming we can (as Christian does), we depart from what is commonly considered a scientific approach.<sup>9</sup>

Chaisson also correctly argues that from a historiographical perspective, Big History gives short shrift to the scientific storyline. Whether the story should be Cosmic Evolution, something else, or a combination thereof is debatable. As Nasser Zakariya has recently pointed out, Big History: (1) tends to treat scientific facts as events; (2) unfairly downplays earlier universal histories and historical narratives that scientists themselves have maintained -- treating

scientists more as resources than as partners in an ongoing interdisciplinary dialogue; and (3) "threatens to represent the academic discipline of history as itself of singular importance with respect to cosmology before it has proven capable of playing that role."<sup>10</sup>

So far, so good. Chaisson is onto something here.

In other ways, however, even if their narratives differ, which is Chaisson's main point, Big History and Cosmic Evolution are similar in their insistence that everyone else stick to their particular version of events. They both err in the same way when trying to colonize other disciplines with their super story. (Big History wants to take over the rest of history; Cosmic Evolution wants to drag at its chariot wheels both Big History and the rest of knowledge.) By tenaciously sticking to their storylines, they break the laws of interdisciplinary common sense. They speed past crucial theoretical considerations precisely when they need to slow down and digress.

I take it as a given that Big Historians are familiar with: (1) the truth claims that Big History makes for itself as a universal worldview; and (2) the ways in which it wants to provide meaning, orientation and a pathway to a more enlightened future.

Cosmic Evolution, at least in Eric Chaisson's hands, does the same thing; but there is a contradiction at the heart of this project.

One cannot logically claim to be scientifically objective while simultaneously championing programs that: (1) tell the rest of us how to see the world; and (2) identify the steps we should take to save the planet. Such beliefs are held "within a context or framework of the taken-for-granted;"<sup>11</sup> they remain tacit, unacknowledged and are in no way demonstrable or defensible scientifically.

We cannot continue to treat science as monolithic and omni-competent. Chaisson's lifelong commitment to investigating energy rate densities is massively impressive, even in his analysis of human culture. I am not convinced, however, that a Cosmic Evolutionary approach adds anything new when it warns of climate change dangers and calls for solar energy use; or when it claims that the world economy is unsettled because of "economists' failure to recognize that

local, regional, and global economies are driven far from equilibrium by robust energy flows;” or when it suggests that if only biologists adopted a grand quantitative theory, like Cosmic Evolution, then medicine could perhaps find a cure for cancer.<sup>12</sup>

More than mere science is needed. Chaisson pays lip service to this idea, but rides roughshod over it in the aggregate, most notably in his rambling allegory about how Big Historians, while trekking up the mountain of knowledge, discovered that Cosmic Evolutionists were there first and already way ahead of them.<sup>13</sup>

For cosmic evolutionists to make genuinely valuable contributions, they will need to look hard at the underlying framework of their assumptions. Analyzing complex systems via energy rate densities is extremely useful – no argument there. However, dogged insistence on a singular approach favors: (1) form over the substance of what is being said; (2) the method over the aim of the activity; and (3) precision of detail over completeness of cover.

This is a type of Enlightenment thinking that after its initial successes has become overly simple and Procrustean.<sup>14</sup>

We are naturally attracted to overly simple intellectual systems because they contrast with the chaos around us. We do not sharply criticize them, because they offer short-cuts that fit in with a way of thinking we like. However, they obscure alternative possibilities. Ultimately, it is “just one more case where people who refuse to have anything to do with philosophy have become enslaved to outdated forms of it.”<sup>15</sup>

Understanding who we are, where we come from, and where we are headed is not rocket science. It is far more complicated than that.

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## Endnotes

1. “Risk and Challenge,” p. 94.
2. “Risk and Challenge,” p. 90.
3. “Risk and Challenge,” p. 90.
4. *Big History and the Future of Humanity* (Chichester, West Sussex, UK: 2010), p. 111.
5. “Risk and Challenge,” p. 91.
6. The amount of energy passing through a system per unit time and per unit mass.
7. “Natural Science,” p. 1; “Risk and Challenge,” pp. 86, 92.
8. “Risk and Challenge,” p. 86.
9. “Bridging the Two Cultures,” *Historically Speaking* 6:5 (May/June 2005): 21-26.
10. “Is History Still A Fraud?,” *Historical Studies in the Natural Sciences* 43:5 (November 2013): 637. My thanks to William Katerberg for sharing this article with me in such a timely fashion.
11. Charles Taylor, *A Secular Age* (Cambridge, Mass.: The Belknap Press of Harvard University, 2007), p. 13. See also Robert N. Bellah, *Religion in Human Evolution* (Cambridge, Mass: The Belknap Press of Harvard University Press, 2011), pp. 46-49, where Bellah makes the same critique in his review of Chaisson’s earlier work *Cosmic Evolution: The Rise of Complexity in Nature* (Cambridge, Mass: Harvard University Press, 2001).
12. “Practical Applications,” passim, but especially pp. 773, 777 (quote), and 790.
13. “Risk and Challenge,” p. 85.
14. Mary Midgley, *The Myths We Live By* (London and New York: Routledge Classics, 2011), p. 18. First published in 2004.
15. Midgley, *Myths*, pp. 44 and 33 (quote).



# Response to Eric Chaisson's *Big History's Risk and Challenge*

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FIRST OF ALL, I would like to say that I greatly esteem and admire Eric Chaisson as a true pioneer for everything he has contributed to Cosmic Evolution, Big History, and IBHA. I therefore very much regret it that as a result of Eric's sometimes acrimonious article we now find ourselves publicly discussing issues that quite possibly could have been resolved amicably in the personal sphere.

In the second place, I am not one of the authors of the textbook *Big History: Between Nothing and Everything* to which Eric addresses most of his criticism. I will therefore not respond to specific criticisms aimed at that book. I will address instead a few specific issues raised by Eric that touch upon Big History in general and some aspects of my work in particular.

Before doing so, a few general comments. Cosmic Evolution and Big History are both accounts from the big bang to humanity today. All of us have limited space, and words, to describe this biggest possible history. It is therefore not surprising that within these limitations, Eric, as an astrophysicist, emphasizes cosmic aspects, while he pays very limited attention to human history. But in consequence, his Cosmic Evolution approach may not resonate well with most people in terms of understanding their own lives and their own history within the cosmic context, because Eric's account does not offer sufficient information and connections to do so. But the advantage of Eric's approach is that he offers much more detail concerning cosmic history.

In Big History we emphasize the history of humanity within the story of big bang to humankind, because we think that is the most interesting part for most people, because it helps us to achieve a better understanding of our position in time and space on the grandest possible scale. This choice does not mean in any way that we think any of the other aspects of Big

History that we do not mention at all, or in a limited way, are not there, or are less important. In other words, I see these differences not as fundamental, but rather as different emphasis.

Currently, I understand, US geologist Walter Alvarez is writing his Big History. Would it surprise us if his account would feature geology prominently, similar to earlier accounts by US geologist Preston Cloud? Would we label such accounts as geocentric? To the contrary. I think it is great that academics from different disciplines are writing their own versions of the biggest possible history, so that we can learn from each other and improve all our accounts. The writing of Cosmic Evolution and Big History is still in its infancy, or so it seems to me, and we would do well to learn from each other's strengths and weaknesses.

## Specific comments

### 1. The scientific method

Eric seems to think that there is only one standard for the scientific method, namely the natural sciences' approach, and that all the rest of academia, most notably the humanities and the social sciences are, in fact, not real science because they do not use the scientific method as practiced within the natural sciences.

In my view, this amounts to both scientific arrogance and ignorance. Apparently Eric has never undertaken any social-scientific research himself, nor has closely observed what social scientists are actually doing. If he had, he would have discovered that any research into people on whatever scale, in present or past, shares with the natural sciences one fundamental aspect, namely that the approach is about empirical observations and theoretical, logical, interpretations of that evidence. That is what all the sciences share.

To be sure, the subjects of research are very different. Stars don't think, feel, or express themselves, or so we think. So all these very complex layers of interpretations with which students of humanity are struggling are entirely absent for natural scientists who study stars, galaxies, and other celestial objects. Seen from that perspective, the natural scientists actually have a rather easy job, because they are dealing with the less complex, more simple, aspects of Cosmic Evolution. It would behoove natural scientists to become aware of that, and not belittle social scientists who struggle to understand the most complex aspects of known reality. Of course the methods of study are different, because the subjects of study are different, but the general underlying method is the same. While studying stars, for instance, it does not make any sense to try to understand their intentions, because there are none, but one would need instead to perform precise measurements. But very few, if any, of these natural science instruments used for studying stars would be of any use for a scholar who is studying old documents and trying to reconstruct a bygone past.

## 2. Anthropocentrism

Again, I am not going to defend the textbook, but only my own approach, as evidenced in my book *Big History and the Future of Humanity*.

In my opinion, all accounts of Cosmic Evolution and Big History are anthropocentric, because we humans formulate them based on observations made from our particular point in time and space. Furthermore, because it takes time for light to reach us, the closer we come to the present, the more earth and human centered our cosmic account by necessity will be. There is simply no escape from this type of geo- and anthropocentrism. This may be hidden in Eric's accounts, but it is there.

As emphasized above, humans are the most complex entities in the known universe – a point that was strongly made by Eric in 2001 and later publications, but also in his earlier work. Is it therefore a bad thing to pay a lot of attention to the greatest known complexity, namely us? In that sense, there is

no fundamental difference between Cosmic Evolution and Big History as I understand it. One can, of course, argue about the amount of attention spent on certain periods of cosmic history. The textbook is quite far on the side of emphasizing human history, and may in consequence be suitable for students of world history who would like to understand their subject within the context of Cosmic Evolution / Big History.

## 3. Weakness of Cosmic Evolution: human history

Eric's writings are great, but they are not sufficiently convincing for students of human history, because they do not sufficiently recognize their own field of history. His books are therefore not very suitable for human history students, as I have found in my teaching. At the same time, human history is obviously part and parcel of Cosmic Evolution, so some sort of synthesis is called for. This is what Big Historians have been trying to do.

The argument that human history is only a very short episode of Cosmic Evolution and as a result does not merit much attention does not hold up for at least three reasons:

1. Human history is the level of greatest complexity in the known universe, as Eric emphasizes himself, and therefore requires special attention.
2. Human history is about us, and most people want to be able to place ourselves and our history within the wider cosmic context.
3. If elapsed time is a criterion, why spend so much time on big bang cosmology and the first 15 minutes of Cosmic Evolution, which is equivalent to the break in a soccer match? Of course this early period of cosmic history is important for understanding everything that follows, so it makes perfect sense to explain it at length. But so is human history, for the reasons just mentioned.

## 4. Goldilocks circumstances

Unfortunately, Eric does not seem to have understood what I mean by the concept of Goldilocks

circumstances, because he equates it with “optimized energy ranges” (his concept). First of all, I have never argued that this is the only aspect of Goldilocks circumstances. In fact I avoid the term “optimized,” because how would we know what optimized means? How could we measure with certainty what the optimum is? We may be able to calculate the theoretically possible optimum, but in practice that is never reached. So how would we know what the optimum in practice is?

In the second place, there is much more to Goldilocks circumstances than energy ranges, namely availability of resources of many different kinds, presence or absence of water, and for human history, social attitudes, knowledge, population densities, etc, in fact a long, almost unending list, depending on the situation that we are analyzing.

In order to understand the concept of Goldilocks Circumstances as I intend it, Eric might do well to read my entire book – I recommend the upcoming 2nd edition. And he might want to try to answer the question of what the Goldilocks circumstances have been that have allowed the rise of the accounts of Cosmic Evolution / Big History? If he attempted to do so, he would immediately see that Goldilocks circumstances include much more than only “optimized energy ranges.”

One final question: Why would “Goldilocks circumstances” be a vulgarized term, while the term big bang cosmology seems perfectly fine? That seems like rather selective negative rhetoric to me.

## 5. Artificial complexity

According to Eric:

“They [the authors of the textbook] draw a subjective distinction between naturally evolving complexity and human-made “artificial” complexity, arguing that the former appears spontaneously (but it does not) whereas the latter is constructed by us and thus different (yet artificiality, like intentionality or directionality, are irrelevant in evolution). Is this merely anthropocentrism once more rearing its ugly head, hubristically placing ourselves yet again on a

platform, a pedestal, or even alas at the apex of the natural world? Or might this be another case, much like Goethe’s devil dressed in the gown of the scholar Faust who prefers to invent new ideas by creating new words, of some Big Historians opting to divide rather than unify?”

Because I was the one who introduced the term ‘artificial complexity’ as a separate category, a few comments. First of all, I find this prose remarkably negative in terms of rhetoric, while it contains very little in the way of empirical observations. Yet it was written by a natural scientist who, apparently had not sufficiently reflected on why I make that distinction between naturally-evolving and artificial forms of complexity. Let me try to make clear what I mean.

First of all, with spontaneously emerging complexity I mean that no one else has created it. Unless one believes in forms of creationism, spontaneous emergence seems to have happened in almost the entire universe. So it puzzles me that Eric declares that all of this complexity has not emerged spontaneously. What does he mean with such a statement? How else did it emerge, I wonder? There seem to be very few other options left, if any, other than having been created by a higher power. And it seems very unlikely that Eric had that in mind. So his statement leaves me totally puzzled.

Artificial complexity is, in my definition, everything made by humans and other animals with intentions in mind, for serving specific purposes. That is, in my opinion, quite different from all the other forms of complexity, none of which has emerged as a result of intentions and serving purposes. Of course artificial complexity is also part of nature – everything is. I have never argued that it would be separate from nature. But the intentional creation of artificial complexity, in contrast to spontaneous emergence, is the criterion for the distinction.

Eric may not like this distinction, but he might want to represent my arguments correctly first. He surprises me even further by slotting together artificiality, intentionality, and directionality, while stating that they are irrelevant in evolution. The process of evolution may not have a direction – I fully agree with Eric about that--, because we

cannot detect a goal. But flatly stating without any empirical evidence that artificiality and intentionality are irrelevant in evolution, while there is actually a wealth of evidence that these aspects exist, seems unwarranted to me. Is Eric, by saying so, taking us back to the scholastic Middle Ages, where the authority of the scholar mattered more than the available empirical evidence?

#### 6. The Moscow 2012 conference

This conference was going to be about Big History, or so the Russian organizers had told us. However, after having arrived we found that the purpose of this meeting was very different. The sponsor of this grand event, young Russian billionaire Dmitri Itskov, had hatched a plan to achieve immortality by 2045 by having his entire personality uploaded onto silicon, and our presence was meant to lend support to that effort. As a result

we found ourselves indeed in strange company. To my knowledge, I was the only one who, during the final meeting at the end of the conference, openly spoke out against this attempt to make use of our academic credibility.

In conclusion, I find it saddening that Eric has brought up all these, in my opinion, mostly unwarranted and erroneous views. I wonder why he did so, because they cannot serve any detectable positive academic purpose. There is so much in Cosmic Evolution and Big History that we share, and so little that should divide us, or so it seems to me. I would much prefer to enter into a congenial discussion with Eric and others, in which arguments based on empirical evidence and logical reasoning take center stage, while we leave the rhetoric and personal egos out. That would help us to move forward in our most difficult task of reuniting the sciences all across the board with the aim to formulate the best possible account of Cosmic Evolution / Big History.



*Please join us in welcoming - or welcoming back - our  
new and returning IBHA members!*

**September 26<sup>th</sup> – Frans Verstappen – New member**  
**October 2<sup>nd</sup> – Philip J. Hughes – Renewal**  
**October 4<sup>th</sup> – Jean Robinson – New member**  
**October 6<sup>th</sup> – Tariq Al Olaimy – New member**  
**October 6<sup>th</sup> – Jillian Evink – New member**  
**October 12<sup>th</sup> – Anthony Pavlick – Renewal**  
**October 13<sup>th</sup> – Greg Nielsen – New member**  
**October 21<sup>st</sup> – Kim MacDonald – New member**

# A Pithy Rejoinder: My Swan Song Revisited

*ERIC J. CHAISSON*

*Harvard University and Smithsonian Institution*

**T**HIS PAST YEAR, after 26 consecutive years as an academic center director, I had the pleasure of re-entering the research enterprise and thereby composing a “swan song” of three new journal publications containing a vast amount of material related to big history. I could have chosen to focus on other areas of expertise—radio astronomical exploration of supermassive black holes, extensive revision of the 9th editions of my two widely used textbooks, or ballistic-missile defense of sovereign nation-states on Earth, among other public-domain and dark-side projects—but I elected to spend my time and effort on our mutually beloved big history:

- I wrote a long, quantitative, peer-reviewed, scientific article that big historians would do me great honor to read, even if it’s the only paper of mine that they ever do read (including its final, elucidative section on Clarification of Key Concepts, which provides a technical rationale for my opinion piece above): <http://dx.doi.org/10.1155/2014/384912>
- I followed that up with a sequel, also peer-reviewed, suggesting how cosmic-evolutionary analysis might aid in solving some near-future problems troubling civilization—an “applications” paper that I never thought I would write or ever be able to write, and which is all about humanity (and nothing but humanity—my gripe is not with anthropocentrism): <http://dx.doi.org/10.4236/ns.2014.610077>
- and then I took the bait to concoct an invited essay of literary criticism on the current state of big history and to review a new big-history textbook (which I rather like, actually — and no amount of misquoting me, as within the added brackets in the above commentary, will change that): <http://expositions.journals.villanova.edu/article/view/1774/1607>

These three new papers, which appeared almost simultaneously in summer of 2014, total 64,181 words—effectively a small, dense book freely available online under open-access Creative Commons licenses; no one need pay a penny to read any of it. Since then, despite many e-mail missives ranging from passionate praise to inflammatory critique, and including the thoughtful, trenchant responses above by the outstanding social scholars Fred Spier and David Blanks, I am thus far unpersuaded to change a single word of my three recent papers. After careful consideration, I am prepared to defend what I wrote, yet I shall always remain receptive to any and all criticisms that might improve my evidenced-based knowledge of big history. That doesn’t mean that I claim to “know it all,” just that I am intellectually comfortable with my scientific interpretation of big history to date, and that I loathe being bombarded with new-age spirituality and untestable pseudoscience masquerading as fact—which is my principal big-history gripe, alas an intense, critical issue assiduously skirted by both responders above. Despite its own young history, big history itself is already poised at a pivotal fork in its road to greater understanding, all the while its practitioners seek guidance from its parent organization. Will the IBHA continue to tolerate, if not pursue, baseless expressions of meaning, mysticism and personal belief, or will it embrace its own mission statement to use the “best available empirical evidence and scholarly methods” to explore this newly emerging field that we all so treasure? With the publication of my three new papers, I have made crystal clear and transparent, with neither hesitation nor mental reservation, along which road I shall continue to trek. I warmly welcome fellow travelers, both within and beyond the big-history community.

