2014 IBHA Conference
Abstracts

International Big History Association

Walter Alvarez

"Geology in Big History: How Earth concentrates elements and makes them useful"

Carl Sagan said "We are stardust," because elements heavier than helium were made by nuclear fusion in stars and scattered through the galaxy by mass ejection and supernova explosions. Big Historians have paid less attention to the role of Earth in concentrating various elements and making them useful for life and civilization. Atoms scattered as gases or plasmas are at concentrations too low to be useful. Earth has made them useful through a large number of geological and geochemical processes. Silicon, for example, has been concentrated and made useful in three ways. (1) Organisms that extract silicon from sea water to make their hard parts have produced the sedimentary chert, or flint, used by Stone-Age people to make sharp tools for cutting, which made it possible for humans to begin eating energy-rich meat. (2) Geochemical processes in molten rock, followed by weathering of all minerals except quartz (SiO2), produced the silicon-rich sand deposits that provide the raw material for all the glass technologies we depend on. (3) Dissolution of SiO2 at depth and its precipitation near the surface from ascending hot waters has produced the high-purity quartz that is the source of the silicon which is the basis of the high-tech products currently transforming our lives. The elements essential to life have also been concentrated by Earth. Recognizing how critical this has been to the unfolding of Big History, we suggest that Sagan's formulation be amended, and that Big Historians stress that "We are stardust, concentrated by Earth."

Juan Alvarez de Lorenzana

"Towards a Possible Framework for Cosmic Evolution"

Under the assumption that everything is connected in our universe (U), only evolutionary processes seem feasible to bring about the diversity and complexity that can be observed. By necessity, those processes have to be linked in an essential way and, therefore, a thread connecting them, from the beginning of U all the way to the present and beyond, has to be found and proved. In a purely descriptive manner, a framework is proposed where evolution and development are the mechanisms in the sequence of links that materializes such a "thread."

David Baker

"The Darwinian Algorithm: An Extension of Rising Complexity as a Unifying Theme of Big History"

This paper will illustrate the deep connection between Universal Darwinism and the rise of complexity over all 13.8 billion years of Big History, and explain the role that random variation and non-random selection play in increasing free energy rate density. The paper will explore the presence of Universal Darwinism at the levels of stellar, mineral, chemical, biological and cultural evolution and explain how it ties together the physical processes of the entire grand narrative. The work will also tackle the likelihood of the presence of the Darwinian algorithm in quantum physics and the occurrence of multiple universes. Employing Big History concepts from Fred Spier's energy flows to David Christian's collective learning, we can begin to more closely identify the broad universal trend in which all these processes occur. At stake is further elaborating what many big historians deem the 'unifying theme of big history' for which Eric Chaisson's metric for rising complexity is already a big contender. Universal Darwinism has a causal relationship with Chaisson's free energy rate density, and it is extremely crucial that we continue to explore how. The paper will close with a brief analysis of what significance the continuance of cultural evolution and the rise of complexity hold for humanity, as well as reflecting on some future scenarios between now and Heat Death.

Rich Blundell

"Shakespeare in the Cave: A Big History of Art"

The universe is creative and the art we do extends this creativity. Shakespeare in the Cave: A Big History of Art is an excerpt from the culminating creative practice of my PhD in which I explore the artistic impulse in a cosmic context. It is a phenomenological lecture laced with science and radical hermeneutics. In this multimedia presentation, I explore the early history of the universe and interpret first emergences as the primary creative modes. I also consider the creativity of trilobites and bear witness to the emergence of metaphor in stone. As the story of the universe unfolds through the expressions and artifacts of we brainy primates, I question how our art, unlike that of trilobites, is expression of connection, and as such, can stave off environmental crisis and extinction. At specific thresholds throughout this presentation, I show how emergence leads to drastic change and this reminds us that our art is not only a product of cosmic creativity, but it is through our art that new drastic change can emerge. We can use this reality to redefine ourselves, inspire new art, and re-enchant the world.

Rich Blundell

"Introducing COSMOSIS 1: The Cosmic Background Radiation Explorer App"

This poster presents and demonstrates a new Big History educational app called Cosmosis 1: The Cosmic Background Radiation Explorer. This cosmo-spatial multi-media, augmented reality, app provides a phenomenological foundation of the cosmic background radiation upon which educators can build conceptual knowledge. Cosmosis 1 is the first in a series of "Epiphany Apps" that each provides a new experience corresponding to one of the thresholds of cosmic evolution. This app series is designed to integrate across multiple levels of Big History curricula, while allowing educators to customize their pedagogy. It is also available as a free-standing informal education experience. The creator of the app, Rich Blundell, will be manning this poster in the lobby at scheduled times to demonstrate the app and discuss the constructivist and phenomenological educational theory that informs the experience.

Rich Blundell

"Radical Hermeneutics: A Case for Big History's Interpretive Strand"

This paper presents the results of my PhD research to elucidate the transformative potential of Big History from personal to cultural levels. The project encompasses the theoretical and practical development of a conceptual framework for transformative learning in Big History. Concepts such as narrative psychology, cultural ecology, emergence, systems theory, ecological identity, disruption, and transformative learning are developed and a practical framework is synthesized. The result of this work is the proposal that novel interpretation should be a central task of Big History education. Several examples of this "radical hermeneutics" are presented within a nested narrative model of cultural ecology. This framework delineates and clarifies the role of Big History in education and will provide scholars and educators with the practical concepts, as well as a vernacular, for further research. Toward this end, several potential research agendas and related research questions are proposed.

Rich Blundell

"The Varieties of Big History Experience: A Study in Transformative Learning"

Abstract: There exists among Big History educators a widely held suspicion that engaging with Big History can result in transformative experience. While such claims of transformation may be largely founded on their own anecdotal experience, both as learners and as teachers, there is also an accumulating body of informal evidence that suggests this is true for students. However, there is as yet, no formal empirical data documenting these claims. This paper reports the results of a multi-year, multi-university, phenomenographical study that sought to reveal the varieties of Big History transformative experience. Transformative learning refers to a complex, interrelated suite

of cognitive, affective, and practical effects. These effects can be ineffable to describe scientifically let alone measure. This study adopts a Deweyan Constuctivist model of transformative experience in order to operationalize, measure, and describe transformative learning in Big History. The aim is to empirically document some of the varieties of how transformative experience happens, when it happens, in the context of a college-level Big History courses.

Cynthia Brown

"Panel: Meaning in Big History: A Naturalistic Perspective"

The Big History narrative seems packed with meaning, but just what is that meaning? Three Big History authors discuss their underlying assumptions, what the story means to them, and how the meaning of large-spective historical narratives has changed over time.

Cynthia Brown

"Panel: Writing the First Big History Textbook"

Description: Three first-time textbook authors will discuss the process and challenges of putting together---around the world from each other---the first Big History textbook. This will be a behind-the-scenes look at the history of a historic text, as well as reflections on student response. Roundtable format will be used rather than formal presentations. Topics for discussion include: Outline of chapters, conceptual tools, securing the contract and working with McGraw-Hill, revisions to make a textbook, what to leave out, relationships, instructor and student responses.

Thomas Burke

"Panel: Big History for All Kinds of Learners, A Pedagogy Workshop"

Following one semester of immersion in the Big History narrative students at Dominican University take a second semester course in which they experience the narrative through the focused lens of a discipline. This interactive workshop will demonstrate how the disciplines of Literature, Human Cultures and Aesthetics are used to revisit Big History. These varied lenses appeal to all kinds of minds. Students favoring a humanities 'way of knowing' can review the hard-science content of semester one through soft-science methods that reflect the learning styles of right-brain thinkers.. Students with a propensity for science may learn new ways to reconsider the big questions Big History raises. Through the Lens courses deepen the learning from semester one and foster a student's ability to use the Big History narrative as a scaffold for all the

content they will study during their undergraduate years. Panelists will present brief samples of their classroom approaches, acknowledge some of the challenges in making these connections, and invite conversation from the workshop participants.

Thomas Burke

"Panel: "Teaching Big History", A New Pedagogy Resource"

This interactive pedagogy panel discussion with the editors and contributors to U.C. Press' forthcoming Teaching Big History will introduce participants to this innovative new resource. The book is appropriate for all kinds of Big History classrooms and learners. Before fall comes, discover dynamic ways of approaching the content of Big History. The place of Big History in a liberal education will be discussed along with ideas about using Big History as part of a core curriculum. Teaching Big History uses an engaged and experiential approach; teaching materials and exercises will be described. Whether a seasoned teacher or a campus decision maker considering curricular options, this new book will be useful. Participants will dialog with the editors and contributors to discover the myriad uses of this resource.

Camelo Castillo

"Mind as a Major Transition in Big History"

A comparative analysis of the major transitions in Big History shows that the emergence of human language and mind are social, not individual, phenomena. Most of the cognitive and neuro sciences assume that the brain is the primary substrate for the unique cognitive abilities of humans. By expanding J.M. Smith and E. Szathmary's "Major Transition" paradigm (Smith, Szathmary, 1995) to include the cosmological major transitions, we see that the pattern of emergence that has alternately been referred to as the growth of complexity, information and/or negentropy is characterized by three features: 1) a group selection process 2) an emergent mode of reproduction 3) an emergent unit of selection. If the emergence of human language and mind are to be considered major biological transitions then these three features should apply. To be at home in this universe we need to integrate human emergence with cosmological and biological emergence. This integration results in a deemphasis on the brain as primary substrate for human cognitive abilities and a shift to a focus on human behavior and social networks.

David Christopher

"Panel: Meet the Artists: Creative Takes on the Big History Narrative"

In this panel, we will present different works that are based on the Big History narrative. The authors/artists will present their works, discuss their motivations for creating these works as well

as the core themes presented, and explore possible uses (as well as limitations) of their works in the classroom.

Jon Cleland Host

"Your DNA is a Door into Big History"

DNA tests have become common, inexpensive, and available to the general public. It is not often recognized that our DNA is a doorway into Big History, reflecting concepts from many billions of years ago until today. The early stages of Big History are shown in the hydrogen and other chemical elements which make up DNA, and the story of Big History is continued in the information DNA encodes. The record of the mutations that built life is shown in the DNA of any living thing, and our DNA is no exception. We'll get a chance to tour our own genomes, including the mutations that helped our Ancestors first metabolize, to move onto land, and to become human. We'll each meet our own inner pioneer, inner primate, inner fish, and inner eukaryote. DNA connects us all not just to our immediate families, nor just to each other, but to all life on Earth, and to the stars. Attendees are encouraged to bring raw DNA data or Ancestry results from popular testing companies (such as Family Tree, Ancestry.com, 23andme, and others). In addition to these, genomes will be used to show surprising aspects of gene transmission and gamete formation. When looked at chronologically over our 13.8 billion year history, DNA provides a guide and a theme to the learning of Big History, both as a semester or year class as well as for lifelong learners.

Jon Cleland-Host and Karen Kudebeh, co-presenters
"Bridging Vast Expanses of Time Using Kinesthetic Teaching Materials"

Teachers of Big History are challenged by the need to cover enormous expanses of time while also organizing and conveying important information at some depth. Optimizing both breadth and depth when teaching Big History invites the use of new tools that engage additional senses (kinesthetic) as well as taking full advantage of traditional audio-visual ways of learning (as enhanced by Alvarez and Saekow in Chronozoom and by Sagan in the Cosmic Calendar.)

Educators have long been aware that a typical classroom has students with a variety of learning styles. Although research has not supported the "meshing hypothesis" (that a teaching style should be matched, or "meshed" with a given student's preferred learning style,) research has shown that a mix of different teaching styles does enhance overall learning. With a subject as complex—and as basic-- as Big History, a mix of styles, methods and materials is optimal.

Big History Beads and Timespirals (spiral timelines) are tools that teach using often underrepresented learning styles. First, they incorporate kinesthetic learning along with audio-sequential and visual. Second, they layer meaning by adding color, texture, and 3-D shape. Third, they invite personalization of the Big History story such that the student's own preferences, genealogy, and life events can be built into the Big History narrative. Fourth, they

are portable—the student can wear or carry the beads/spirals wherever they go. Suitable for personal or classroom use, these tools can be helpful additions to other available materials.

Ralph Croizier

"ART IN BIG HISTORY?"

This will be a paper, or proposal, that raises questions about the possible place of art and art history in the emerging field of Big History. It is unlikely to provide a clear answer. Despite recent efforts to globalize art history, it remains largely structured around the focus on the particular artist, the cultural tradition, and the object. My own work, mainly focused on modern China's interactions with the West has been part of those efforts to go beyond national and particular cultural narratives. (See Croizier, Art and Revolution in Modern China, U. California Press, 1988 and, more recently, review article in May issue of the Journal of Global History , "Modernism(s) and Global Modernity(ies): What Can Historians Learn From Art History?") But my perspective has been more of a historian's than an art historian's , looking more at the social and political context of the art than "the object" itself. This may be a fruitful approach for slipping some art into conventional world history, but it seems too limited for the vast reaches of Big History. Therefore in this problematic paper I will just mention rather mainstream efforts (almost entirely within the discipline of Art History) to globalize, but my main thrust will be to introduce the field of "World Art" as pioneered by John Onians at the " School of World Art Studies" , University of East Anglia, with his emphasis on neurological universals and environmental particulars. I should add that I am not a convinced Ononianite, but this seems the approach best suited to a Big History way of thinking. Of course, there will be images and examples, not just "big theory".

Jim Cummings

"The Solar Dance: Cultivating a Three-dimensional Sense of Place in Space"

As the stories of big history take root, a larger sense of identity is also emerging: of a global society of diverse cultures on a biologically interdependent planet. As this planetary awareness matures, it will be helpful (perhaps crucial) to cultivate a concrete sense of our "big place" in space. Knowing conceptually that we are on a planet circling a star on the inner edge of one of the outer arms of the Milky Way is one thing; it's quite another to look into the night sky and feel our physical embodiment within the three-dimensional solar disc, and to maintain an awareness of the cosmic landscape of our nearby stellar neighborhood within our galactic body. This presentation will introduce some of the simple handles that can serve as initial three-dimensional stepping stones to understanding the earth's and sun's physical orientation and relationships to other planets and stars. Topics will include coming to know/feel the earth spinning beside the sun (rather than the sun arcing across our sky), using the quarter moons as a monthly signpost along earth's orbit around the sun, perceiving the solar disc's orientation within

the Milky Way, and knowing which direction is in/out/forward/behind our star as it travels within the Milky Way. Personal understanding of our regional, continental, and planet-wide landscapes has steadily increased; the next step is expanding this sense of place in the terrestrial landscape into a sort-of-palpable sense of our larger, earthly body's place within its solar and galactic surroundings.

Wendy Curtis

Emergent properties arising from the use of graphics in conveying Big History narratives benefit not just the reader but also the writer/researcher.

Big History, in any format, already provides a context that reveals trends, thresholds and major events but the addition of illustrations takes this to another level. Visual thinking is primal; humans are pattern seekers and we have been discerning and organizing information visually for much longer than we have been reading and writing.

The incorporation of illustrations into a book allows processes that operate on imagery to work on the writing process. For example, as the draft version develops, it becomes evident to the writer that some chapters have a visually dominant theme while other chapters contain a hodgepodge of images with no obvious pattern. The writer thus becomes aware which chapters lack an overarching theme or have several sub themes. With this knowledge in hand, it becomes easier to reorganize the themes within a hodgepodge chapter in a more systematic way or to seek out the dominant theme that may have been missing or buried in details.

At the GeobookStudio, we have discovered and used several such techniques in the process of writing The Biggest Picture , a Big History book that uses graphics to actively drive the narrative.
These techniques will be explained with before and after examples from chapters that have been overhauled. Other potentially emergent properties that might arise from the synthesis of imagery with the written word will be discussed; such as improved memory retention for the reader, ease of seeing how themes interact, ease of finding subjects without the use of an index etc..

Philip Day

"Rap History of the World"

The Rap History of the World (RHW) is an expression of Big History's Grand Narrative in syncopated rhyming verse. A live performance of the Rap History of the World, by its author Phil Day, might make an entertaining addition to the presentations at the opening reception of the IBHA Conference 2014. It takes about 18 minutes to perform in full. A video, lyrics, imagery and bibliographical notes can be found at www.raphistoryoftheworld.com. The use of rap in education, including the fields of science and history, has been explored successfully by firms such as Flocabulary (www.flocabulary.com), and by professional artists such as Baba Brinkman

(www.bababrinkman.com). At the time of writing, the author has successfully trialled the RHW with school children in the UK and is preparing a short high school course based around it, which will be delivered in the near future. The author would be available to discuss its reception in schools at a relevant panel. The RHW has been received positively by academic luminaries such as William H. McNeill, David Christian, David Baker, Esther Quaedackers and Peter Turchin, while Baba Brinkman has described it as 'linguistically very inventive'.

Michael and D'Neil Duffy

"A big question for Big History: So what?"

Big History and Cosmic Education share a common content based on the comprehensive origin story of everything from the Big Bang to today's human societies. Big History is primarily directed at a university / high school audience, while Maria Montessori developed Cosmic Education for elementary school students. In academia, the idea of asking the somewhat impertinent question "so what?" can lead to awkward forays into politics and public policy, ethics and even morality. Montessori had no hesitation in this regard. Her vision of Cosmic Education brought with it the ambition to change the world – leading to world peace, social justice, environmental stewardship, and a sense of belonging to the universe itself. Her ambitions for Cosmic Education may seem a bit extreme, but they offer suggestions for the Big History community to consider. Promoting Big History without thinking about its potential implications for the "cosmic task" of humans may prove to be self-defeating to the future of the movement. Montessori's vision, developed in the context of Cosmic Education, can help articulate those implications for Big History.

Todd Duncan

"Beyond Reductionism: Weaving Meaning into the Scientific Story of our Cosmic History"

Big History offers a unifying framework for orienting our everyday experiences within a modern scientific map of cosmic history. To realize its full potential, this framework needs to offer a clear place within its map of reality for all aspects of human experience. This is a challenge for a science-based story because of the way science is often entangled with an interpretation (the "reductionist narrative") of the universe as consisting of nothing but material particles and the mathematical rules that describe their behavior. This narrative seems alienating to some of the deepest aspects of human experience, as elucidated by Owen Flanagan when he wrote, "What sense can be made of my wish to live in a genuinely meaningful way, to live a life that really matters...if my life is exhausted by my prospects as a finite material being living in a material world?" In this paper we offer an alternative scientific narrative that starts with meaning as a core principle. Without sacrificing scientific accuracy, we argue that the universe can be viewed as a meaningful story that is writing its own language in order to tell itself. In this "meaningful universe narrative," the patterns we call material particles and laws of nature are like the letters and rules of grammar in a book. Rather than being evidence of the meaninglessness of reality, they are necessary elements that emerge as part of the expression of unfolding meaning.

Janusz Duzinkiewicz

"Teilhard de Chardin and Big History"

Over seventy years ago Teilhard de Chardin S. J. posited a directed evolution of life in which human history was but a part of the broader history of the universe. The growing complexity of matter drawn together by gravity, he observed, leads to life and the emergence and incremental expansion of awareness. As complexity grows so does consciousness. The human version of the force that synthesizes and promotes consciousness is love. Humanity is part of the process by which the universe becomes aware of itself. Human evolution is part of cosmic evolution. The core of history is growing complexity and deepening consciousness. Looking into the future, Teilhard de Chardin envisioned an increasingly conscious Universe striving towards a union with the divine "Omega Point". Teilhard de Chardin's bold fusion of science and religion in the history of humanity and the universe made Teilhard a proponent of "Big History" before the term was coined. This paper will examine Teilhard de Chardin's Phenomenon of Man and place his grand view into context of other megahistories.

Dustin Eirdosh

"Searching for Superorganisms: Towards a University-Assisted Big History of Civic Engagement"

By its very definition as a mythology for modern scientific culture (Christian 2004), Big History should serve not just the metaphysical, cosmological, and pedagogical functions of myth , but also the sociological functions (sensu Campbell 1969). That is, Big History implies the competent transformation of awe and understanding, into action for social good. In this regard, our discipline itself marks a transformative concept within the big history of civic engagement and education. As this article argues – this transformation can be taught both explicitly and experientially. This work summarizes two years of experimental innovation from the Positive Education Action-Research (PEAR) Laboratory at the University of Toliara in southwestern Madagascar attempting to integrate a Big History core curriculum within a scaffolding curricular pathway towards student-driven civic engagement across K-12 & undergraduate educational programming. While developmental and socio-cultural barriers to this work in Madagascar remain steep, significant lessons have been learned. Additionally, the generalized model from this work offers high relevance for educational communities in the developed world. A unique synthesis of existing practices, standards, curricular programming, and educational research directions are outlined as an opportunity for a collaborative and international action-research agenda within the Big History community.

Duane Elgin

"Deep Big History: A Living Systems Perspective"

The prevailing assumption in Big History is that the universe is fundamentally non-living at its foundations and that "life" is an emergent property of complex systems. Another paradigm is offered by Plato who said that, "the universe is a single living creature that encompasses all living creatures within it." This ancient view has persisted through thousands of years in the world's wisdom traditions and is now entering the mainstream of modern science. Because this perspective adds great depth and dimension to Big History, the "living universe paradigm" is worthy of inclusion as one track in the development of Big History. A rapidly growing body of scientific evidence points toward the view of the universe as a unique kind of living system; including: 1. "Materialism" accounts for only 4% of the known universe 2. Non-locality provides evidence the universe is a unified system 3. Phenomenal levels of energy support the universe as a regenerative system 4. Self-organizing systems are found at every scale of the universe 5. Sentience appropriate to the nature of systems is being discovered at every scale 6. The universe is probabilistic: Freedom exists at the most fundamental levels of reality These do not "prove" the universe is a unique kind of living system but they point strongly in that direction and the compelling merit of this paradigm. The consequences and benefits for Big History are enormous. A living universe perspective brings in: 1) purpose, 2) learning, 3) meaning, 4) inter-connection, and 5) an ethics of inter-connection.

Joshua Fisher

"Robert Smithson's Spiral Jetty and the Case for Big Art History"

Robert Smithson's Spiral Jetty, constructed out of rocks and earth in 1970 at the Great Salt Lake in Utah, is a masterpiece of modern art, cited in almost every art history survey textbook for its innovative use of natural materials and its unorthodox location. But the Spiral Jetty does not just represent a new way of making art; it uses art to stimulate a much broader discussion about our small, but consequential place in the universe. Smithson himself was something of a big historian, twenty years before the term was coined. He set his work in a broader spatiotemporal context to counter an increasingly restrictive art-critical discourse in the 1960s, which he felt isolated art from the rest of society, and man from nature. By placing the work in a natural environment, Smithson directs our attention away from the art object, to its expansive setting. We learn that the water around the jetty is colored red by algae, but that those algae are only there because of the construction of a railroad causeway. So the meaning of the Spiral Jetty is bound up in the ecology of the lake, the westward expansion of the United States, human migration, and so on back in time and out into space. The central theme of Smithson's work is also a central theme of big history: entropy. Art is normally a complexity-generating mechanism that fights against entropy, but Smithson left his masterpiece to be shaped by the elements, allowing art to enter the thermodynamic time stream. That, I argue, is its most important innovation. I will not only present the "little big history" of the Spiral Jetty, but also treat the work as an invitation for art historians to think on broader scales.

Robert Foxcurran

"A Little Big History of Transition in the Northern Borderlands of the U.S"

Tales of the northern borderlands of the U.S. include the Canadians, their metis descendants and priests: both the role they played in the sequential transition across the region from foraging into agricultural pursuits - including their Native American kin; and their serving as a precursor to the nation's 21st century demographic profile as a bi-cultural multi-ethnic people engaged in facilitating the socio-economic transition of their country. At the first IBHA Conference I spoke on the 19th century transition experience in the Pacific Northwest, focusing on the interim option adopted by the Indians, metis, and French-speaking missionaries in the Columbia Plateau region - ranching. At the second conference I propose to speak on the experience in transitioning from foraging to agriculture of the Ottawa Indians around Grand Rapids, Michigan, and the Potawatomi Indians straddling the St. Joseph River, just to the south, along what is now the Michigan Indiana border. Common to both regions, the natives had initiated the process before the arrival of the first U.S. territorial governors and the militia composed of their settler constituents. The latter proceeded to disrupt and cripple the transition well underway among the Indians, though failing to destroy it entirely. The use of the land by the Indians was never intensive enough to forestall the new authorities intensions to clear them from it. Though increasingly marginalized, many Indians and metis were able to persevere, by assuming ever lower visibility and withdrawal into the more remote corners of the backcountry. Some Canadians and metis even profited from the process, getting a share of the compensation associated with the treaty transactions for Michigan Territory.

David Gabbard

"Diversity on a Larger Scale: How Big History Helps Us Privilege Human Commonalities Over Human Differences"

This paper traces my movement into Big History before I even knew there was "Big History," before I discovered the works of David Christian, Fred Spier, and others. For the past 15 years or more, I have taught classes in human diversity/multiculturalism to students in Colleges of Education – teacher preparation programs. Most of my research and writing, however, has focused on the dominant institutions of our age and how they impact everything, including educational policy and especially what we mistakenly call culture, but what Takis Fotopoulos has more accurately called our dominant social paradigm. These studies led me to question just how truly "multicultural" our species truly is in this age of globalization. Doesn't the dominance of market institutions and the market values and beliefs that shape an increasingly global dominant social paradigm mean that we have far more commonalities than we have differences? From my vantage point two years ago, it certainly did. And once I made this recognition, I began to ponder how much else we share in common. So, I began introducing my diversity classes with a unit on our "cosmic commons," followed by units on our "terrestrial commons," our "genetic

commons," and our "social commons." This "big history" framework helped me develop new understandings of race, class, ethnicity, and gender to share with my students. It helped me situate them as ideological elements of our social history, separating them from our natural history. Most importantly, however, Big History helps me lead students / future teachers into a sense of deep humility. Not only does it highlight for them just how little they know of our common origins, but the grand scales of space and time on which Big History operates assists in helping them recognize how small we all are, and how brief our individual lives truly are. And in this space of deep humility, we work to build a new ethic, a new approach to our interactions with one another that render all differences superficial in the face of such tremendous commonalities never-before recognized. And it is precisely from this ethical space of deep humility that we must confront our common challenges, including the challenge of how we begin preparing today's teachers to prepare tomorrow's students for a future that is very uncertain.

Olga García-Moreno

"Roman gold from Asturia and Gaellicia (NW Iberia): A little Big History"

Gold, dispersed in space through stellar explosions and accumulated as our planet accreted, has been concentrated by Earth processes into minable gold deposits. One such area, in northwestern Spain and Portugal, was mined in antiquity and the gold minted as coins of the Roman Empire, which changed the history of a region with Celtic roots and Latin culture. These gold deposits were the major gold source for the Roman Empire, and in antiquity they were exploited by hydraulically removing and washing vast quantities of gold-bearing gravels, in a method called ruina montium by Pliny the Elder. This extraction method produced the dramatic landscape now protected in the Las Médulas World Heritage Site, where we can see the physical imprint of a cultural process. Roman mining at Las Médulas produced a great change in the way humans used the resources and the environment, as well as important changes in the social structure of the ancient communities. After collapse of the Roman Empire and the end of mining at Las Médulas, Mediaeval Spain had access to African gold via the Islamic world, and early modern Spain received gold from the New World. We discuss the importance of understanding the processes by which the relatively scarce element, gold, can be found in high concentration in minable gold deposits and how these can change the historical path of civilizations. The importance of gold deposits depends not only on the concentration of the precious metal, but also on the geologic, climatic, social and political conditions.

Ken Gilbert

"THE EVOLUTION OF COLLECTIVE VISION: HUMAN UNITY FROM PREHISTORY TO THE PRESENT"

This paper brings together the latest available evidence from a variety of disciplines regarding humanity's sociocultural evolution as traceable through a sequence of discernible ages unfolding

in world history from a comprehensive perspective over time. The Big History concept of "collective learning" is utilized for facilitating a synergistic combination and integration of the wide-ranging scientific and historical material. We will review and compare several previously proposed systems describing sequential transformations of human cognitive and sociocultural development. In relation to the world-historical record as we have it, the outlines of a synthesis for the Human Realm of Big History is developed and proposed that is notably comparable in overall pattern and theme to the other two Realms. Larger and more complex groupings emerge, each with their own characteristic Regime of collective learning. It is hypothesized that there is a natural force, energy or drive in evolution towards greater human community, demonstrating the power of cooperation and unity of vision. In conclusion we consider how this world-historical process can be seen to culminate in the Twentieth Century with, among other things, the growth of the modern ideal of human unity. This thematic context provides a telling perspective for comprehending and appreciating the extraordinary events, crises and challenges that have come to the fore over the last hundred years, and whose clear indications we find ourselves in the wake of today. The ongoing expansion and prospective importance of Big History's modern origin story for global education in this context can hardly be overestimated.

Lanier Graham

"TACTILE TEACHING: Models for Teaching Big History with Art Objects at two San Francisco Bay Area Universities - Dominican & CSUEB"

Traditional classroom methods are useful, but an enriched experience is provided by objects that can be looked at closely and ideally touched. CSUEB is developing a museum-like Learning Center with two wings. One wing will tell the story of cosmic history with meteorites, moon rocks, ammonites, & dinosaur bones. One wing will tell the story of human history with art objects from every major era. Dominican is developing a set of Teaching Kits that are miniature, portable "museums." They will contain tribal objects, ancient coins, and tiny statues from around the world - objects that every student can hold and dream about connections.

Sergey Grinchenko

"J.L.Shchapova, S.N.Grinchenko. Evolution of Complexity: Seven-layer Model of Anthropo-, Psycho-, Techno-, Socio- and Culture-genesis in the Archaeological Epoch"

Previously proposed in [Shchapova J.L. Material production in the archaeological Epoch. SPb.:Aletheia,2011.244 p.] (by analogy with Pennet's lattice) seven-layer model of anthropogenes combines following evolutionary anthropo-psycho-techno-socio-cultural characteristics of a human: a)brain, b)food strategy, c)locomotion, d)manipulation, e)ability to work, f)communication activity, g)physique. Binding of this model to the fiducial dates (1st row of the table, millenniums BC) anthropo/psycho/techno/socio/culture-genesis is as follows: T 6765 4148 2584 1597 377 89 21 5 abcdxyz Abcdxyz ABcdxyz ABCdxyz ABCDxyz ABCDXyz

ABCDXYz ABCDXYZ aBcdxyz AbCdxyz ABcDxyz ABCdXyz abCDXYZ aBCDXYZ … … … … … … abcdXYZ ABCDxyz Σ 1 7 21 35 35 21 7 1 The first four dates set three initial periods of Arhaeolith archaeological sub-epoch and dates in columns 4÷8 – initial archaeological markers of Lower, Middle, Upper Paleolithic, Neolithic and Bronze Age sub-epochs. Model inversion of the corresponding feature "manifestations/absence" in the evolutionary development of man falls on these times. Available empirical data validates support model are 7 signs. Additional considerations in favor of this can be attributed S.N.Grinchenko's hypothesis: human interaction with its specific external environment is most effective in a seven-dimensional information space. The basis of this hypothesis is the fact: the surface area of n-dimensional hypersphere of unit radius has a maximum at n≈7. Putting together seven-layer model and this hypothesis, we can conclude that primordial man peaked maximum of its information complexity to 5th millennium BC – mark of proper archaeological and archaeo-historical Epochs in the development of Humanity.

Anton Grinin

"The Technological Dimension of Big History: The World at the Threshold of the Revolution of Self-controllable Systems"

The paper outlines the course of technological transformations and breakthroughs in history and demonstrates a possible application of the Production Revolutions theory to explain the present and forthcoming technological changes. Technologies are an important constituent of the collective learning. They emerged much earlier than Homo Sapiens. Among all major technological breakthroughs in history the most important are the three production revolutions: 1) the Agrarian Revolution; 2) the Industrial Revolution; and 3) the Cybernetic one. Each of them is related to a certain threshold in human history and in Big History as well. At present the humankind approaches a new threshold. It will start in the 2030–2040s and will be associated with a transition to self-controllable systems in production, health care, and the sphere of controlling biological and social processes. This will be achieved through a synergetic effect of progress in health care, nano-, bio-, and info-technologies, robotics, and genetics. The present paper will provide numerous examples of future self-controllable systems.

Leonid Grinin

"The Star-Galaxy Era of Big History in the Light of Evolutionary Principles"

Big History provides a unique opportunity to consider the development of the Universe as a single process. Within Big History studies one can distinguish some common evolutionary laws and principles. However, there are much more such integrating principles, laws, mechanisms and patterns of evolution at all its levels than it is usually supposed. In the meantime, we can find the common traits in development, functioning, and interaction of apparently rather different processes and phenomena of Big History. It is important to note that many principles, patterns, regularities, and rules of evolution, which we tend to find relevant only for the biological and

social levels of evolution, may be also applied to cosmic phase of evolution. The paper attempts (within such a framework for the first time in the Big History field) at combining Big History potential with the potential of Evolutionary Studies. It does not only analyze the history of Cosmos. It studies the similarities between evolutionary laws, principles, and mechanisms at various levels and phases of Big History. Such an approach opens up some new points for our understanding of evolution and Big History, their driving forces, vectors, and trends; it creates a consolidated field for interdisciplinary research.

Lowell Gustafson

"Science and the Liberal Arts"

An increasing number of historians, who are traditionally placed within the social sciences or humanities, have done superb work in discussing how the natural sciences have transformed our understanding of time. Some in other disciplines in the Liberal Arts have begun to rethink how their own fields need to be reconsidered in light of the enormous change in the narrative of the deep past. Big Art, Big Music, Big Communication, Big Politics, Big Religion, Big Ethics, and others need to be developed within a Big Liberal Arts.

Tony Harper

"Global Volcanism as it Impacts the Integrity of the World System"

This paper investigates the relationship between the occurrence of global volcanic events (GVEs) and the integrity of the world system. Tree-ring data recording GVEs is used as a context for comparing the response of the world system one through four centuries after any given GVE. Data on changes in the ratio of rural to urban populations and changes in the log-transformed values of maximum urban area magnitude are compared with respect to the occurrence of GVEs. It is found that there is no significant effect of GVEs in the succeeding century, but two, three, and four centuries hence, there is. Further, this effect is counterintuitive, as the world system became more urbanized, not less. Rank size-frequencies were constructed of each data set to show that effectively all changes fit with in a linear series not uncharacteristic of systems exhibiting self-organized criticality. Finally, it is shown that a threshold effect with respect to the number of year equivalents of GVEs exists whereby reduction in world system urbanization does occur in the immediately succeeding century of such threshold events. These results are then put in the context of both physically induced and endemically induced societal collapses.

Tony Harper

"The Integration of History and Science as a Context for Big History"

This paper describes a previously co-taught course at New Trier High School, Integrated Principles of History and Science, in which students addressed the question, What does it mean to be human?, from four different areas of human experience, I. Communication. II. Competition and Cooperation. III. The triad of religion, science, and art. IV. The geological and biological baggage of our species. For each of these areas, students examined what it meant to be human through the interplay of evolutionary biology and historical and cultural influences underpinning human behavior. Individual classes consisted of addressing focused problems or on-going assignments in which large group, small group, individual activities, and teacher presentations were the medium for learning, and student evaluation was based on student performance in class participation, projects, presentations, and papers.

Paul Harris

"Panel: At Play in the Fields of Time: The Temporal Concepts and Politics of Big History"

Big history is, foremost and fundamentally, a narrative encompassing all of time. This single history is on closer view actually multiple: it includes particular eras or epochs, which are understood or accounted for with different discourses and instruments. For instance, the early history of the universe is told by cosmologists, the history of the earth by geologists, the history of life by evolutionary biologists, the history of cultures by historians. In integrating disparate and to some extent discrete temporal periods and durations into a single historical narrative, big history produces a metanarrative with a distinct arc and purpose—to situate humanity within a single story, in order to induce us to think about and shape our future, 'before it's too late.' This panel has two purposes: to undertake a critical analysis of the concept(s) of time underlying and informing big history, and to pose and probe the political questions that emerge around the temporal dimensions of big history. These questions include: How does the evolutionary view of time and humanity, in which we are all one and share a common history and destiny, jive with a materialist (in the Marxist sense) view of time and humanity? Within contemporary philosophy, a parallel debate is unfolding between speculative realists, who conceptualize the existence of a deep time known only through scientific and mathematical means, and materialist historians, who resist extrapolating the time of politics and human history into the time of evolution and the cosmos.

John Hasse

"Where in the World is Big History in University Gen Ed?: Integrating BH into Introductory Geography as a Cornerstone for General Education Reform"

This paper presents the past experience and future plans for incorporating the framework of Big History into introductory courses in the Geography curriculum at Rowan University, a public university in southern New Jersey. The integration of Big History into geography courses is a natural alliance and is emerging as a cornerstone for Rowan's General Education reform. We will highlight how Geography and Big History together make for a powerful combination with Big History providing the narrative of the process while geography provides the landscape, location, place and systematic interconnections upon which the events unfold. The uniting of both makes use of the idea of scale as both spatial and chronological and serves as a complete, holistic and interdisciplinary foundation that restores the "universe" to university education. We will also highlight issues that arise in such a marriage of ways of seeing, including the problem of covering all the necessary material of both Big History and introductory concepts of geography in a single course, or two semester sequence. Another issue is the engagement of departments other than geography in the development and production of both course and GenEd reform. Further issues would include the development of materials for such a course, both text and teaching aids, the appropriate methods for teaching such a large-scale course, and using the course as a way to overcome the prominence of narrowly focused goals in current educational philosophy of higher education.

Kate Hawkey

"Big History Across the Pond"

The arguments for Big History are compelling on both sides of the pond. The different contexts, however, give rise to different priorities, constraints and opportunities. History education in the UK has been, for the past 40 years or so, at the forefront of developing the epistemic distinctiveness of history as a discipline. Pedagogical tools to support the development of understanding concepts such as causation, historical frameworks, historical interpretations and significance are well developed in English classrooms. This is a strength that history education from England can bring to the 'new field' of Big History. On the other hand, the politicised direction in the content which the history national curriculum addresses presents clear constraints. The paper will present ways of working 'along the grain' of the curriculum in English classrooms, working from the occupied, yet generative, confines of a 'cramped space' (Deleuze & Guattari, 1986, p. 17) to develop Big History approaches which also build on the epistemic and pedagogic gains made in the discipline. Deleuze, G. & Guattari, F. (1986) Nomadology: The War Machine. New York: Semiotext.

Orla Hazra

"The Languages of Lineages and Their Educational Forms"

Jennifer Morgan has identified various lineages involved with education and the implications of a Universe Narrative. Unfortunately, the word education is now limited to schooling and with an academic silo dedicated to its analysis - pedagogy. The implications of this in examining our

cosmology -- our "educational philosophy" and the corrective of placing ourselves within a much larger context (through Big History) has be documented (Hazra, 2009). Education is a process much larger than schooling and includes three additional universal education forms -- family, work and recreation. Each of these educational forms has a particular style of language and form of speech appropriate for each -- academic, therapeutic and homiletic. Sometimes they overlap or seem in conflict and our conversation gets muddled because the underlying intent of the language is not clear. Understanding these languages and how each lineage uses them will help both distinguish the focus of each lineage and its value. We need each as we begin practicing our fledgling educational process in our families, school, work and recreation. Orla Hazra, PhD, gives Big History teacher orientation programs in Ireland and India.

Peter Hess

"Big History as an essential presupposition of Christian theology"

Theology is intelligible only in light of the 13.7 billion year history of life in the universe, but religious traditions often assume a historically naive perspective. The recent public debate between Bill Nye and young earth creationist Ken Ham of Answers in Genesis aptly illustrates this point. Ham defended the view (supported by millions of Americans) that the world is only 6,000 years old and revolves in every detail around an anthropocentric and literalist interpretation of the Judeo-Christian scriptures. The creationist fantasy is doomed to failure. But how do mainstream religious traditions compare? Many—while conceding a long evolutionary history—covertly assume a human exceptionalist view that renders the rest of the universe a largely incidental backdrop to the drama of human salvation. This is troubling, for as a living dialogue between the believing community and the world in which it is rooted, theology must always engage scientific rationality. If this vital conversation ends, theology is left a withered relic. This paper assumes that "Big History" is an essential foundation of a credible theological interpretation of reality. Through the lens of Roman Catholicism I trace the contours of a systematic theology that reflects an ancient, dynamic, and evolving universe. The Christian doctrines of God and creation, of incarnation and salvation, of suffering and eschatology and theological anthropology—all must be reimagined to reflect the long history and even longer future of the cosmos. In humans the cosmos is conscious of itself; religious believers should not suffer the amnesia of neglecting Big History.

Steije Hofhuis

"How to explain witch-hunting? A Darwinian attempt"

From the late fifteenth century until the early eighteenth century, Europeans killed tens of thousands of people for being a 'witch'. Yet, as we now know, witches didn't exist. So why did people do it? Historians and social scientists once tried to explain witch-hunting from a wide range of theoretical angles. Was it a means to defend ruling class interests (Marxism)? A

mechanism of scapegoating that released tensions within the community (structural-functionalism)? Or was it perhaps an instrument to oppress women and traditional folk culture (post-structuralism)? Most historians of witchcraft have, by today, drifted away from these approaches. Instead, they argue that witch-hunting was a dysfunctional and highly erratic phenomenon that did not substantially benefit anyone, thereby concluding that no general theory works. I disagree with this last conclusion. The empirical findings of historians on witch-hunting may actually provide vital clues for the validity of an exciting general theory: the idea of Darwinian cultural evolution. I will argue that the concept of witchcraft that gave rise to the persecutions was a Darwinian "design without designer" that spread in an almost virus-like manner throughout the population. The concept came to include many elements, such as the witches' Sabbath, the diabolical pact, a witch's hidden identity, nightly flight, and torture as a means of interrogation, that were all very well adapted to ensure the continuation of the concept of witchcraft itself. This theoretical approach bears upon several of the key issues in the comparison of biological processes and socio-cultural processes.

Jess Hollenback

"'The 'Immunological' Problem of Civilization'"

In his book The Human Condition William McNeill drew attention to parallels between microparasitism in nature and what he called "macroparasitism" in human cultures, the situation that exists when one group of people forcibly seizes the goods or services of another. He noticed that human macroparasites related to their "hosts" or "prey" in ways that exhibited surprising parallels to the ways that microbial parasites exploited and, at times, came to some degree of accommodation to their hosts. In this presentation I would like to explore how humankind's capacity for fashioning a variety of artificially created environments where a variety of self-replicating entities can flourish significantly transforms the age-old evolutionary struggle between predator and prey as well as parasite and host. In short, what I am going to investigate is the degree to which modern human cultures are beginning to develop CULTURAL analogs to genetically-based biological immune systems. Daniel Dennett once observed that "the process of natural selection is substrate-neutral." I am going to argue that this is also true of immune systems. It appears that any environment that nurtures self-replicating entities that exhibit variation and competition will eventually develop something analogous to what we would recognize as an immune system. Indeed, electronic environments with their anti-"virus" programs already exhibit the characteristic "arms race" between parasite and host that we see in nature. I am going to argue that humanly directed genetic engineering and the nanotechnological dream of creating self-replicating microscopic machines will require some kind of "immune system" to constrain them. The fascinating question is this---how would a self-replicating system that is created and guided by a human intelligence (benign or malignant) differ from ones that have evolved in nature? And how would the immune system analogs designed to constrain those humanly guided replicators differ from immune systems that have evolved "blindly" by natural selection alone?

David Hookes

"Cooperation-the key principle in the evolution of the Universe"

Abstract: Cooperation: the key principle in the evolution of the universe Life on earth is in great danger due to the present socio-economic system, based on dog-eat-dog competition, which is leading to the de-stabilisation of the biosphere. However, this competitive state can be viewed as temporary transitional state between stable cooperatives states. The principle of cooperation appears to be a truly universal principle in space and time and, ultimately, rooted in the local/non-local dualism of quantum physics. The formation of the very first stable baryon particles, protons and neutrons shortly after the Big Bang is a cooperative act of their three constituent quarks and mediated by gluon colour forces. The association or fusion of protons and neutrons to form the light nuclei of hydrogen isotopes, helium, and lithium followed almost at once. The later cooperative association of protons and with electron-leptons formed the first neutral hydrogen, helium, and lithium atoms were also made possible by the laws of quantum physics. The later aggregated, with help of dark matter, to form stars and galaxies. The synthesis of more complex multi-baryon nuclei during the life-time of stars and in supernova demonstrates higher levels of cooperation. The cooperation association of atoms to form diatomic and polyatomic molecules led to the possibility of the life itself, due to the further association of monomers into polymers such as proteins, RNA and DNA. These polymers combined with phospholipid molecules which, themselves naturally cooperate to form closed vesicles and sheets led to the evolution of the first cells through the close coupling of many chemical reactions within the lipid vesicles and on the sheets. The molecular coding system for the proteins embodied in the RNA/DNAs allowed inter-generational cooperation through natural selection. The subsequent close association and cooperative division of labour of cells made possible multicellular organisms that could better adapt to environmental changes. The eventual emergence of our species homo-sapiens was made possible by successful social cooperation with the aid of a new information system – spoken language. The transitions from hunter-gatherer to agrarian, to urban societies are examples of increasing social collaboration. The transition from one level of cooperation to a higher one may involve competition to find the most stable cooperative state. The transition is also associated with a new information system such as, genetic coding, spoken language, writing, printing, and in our present transitional epoch, digital communications. The latter will allow us to create a 'quantum' paradigm to replace the present Cartesian-Newtonian paradigm and, thus, the emergence of a cooperative pluralist commonwealth of productive associations in close cooperation, rather than competition, with nature, and free from the tyrannies of corporate or state bureaucracies- we can thus enter the 'quantum-digital' era.

John Hostettler

"Human Nature and Big History"

This paper asks some Big Questions about human nature. Does a human nature really exist? Do beliefs about it matter? What is its role in Big History? Regarding the first question, the paper

claims that human nature is a very useful concept, and it proposes a working definition based on biological evolution and neuroscience. With respect to the second question, it argues that different beliefs about human nature have big (and very different) consequences. The impact of differing Confucian ideas (Mencius vs. Xunzi) on early Chinese history will be offered as an example. Finally, the paper asserts that human nature has a crucial role to play in the Big History story – both as a connecting link and as a unifying theme. Human nature connects complex life forms to complex life-ways, biological evolution to cultural evolution, natural history to social history. It can also serve as an underlying theme to unify and deepen our various social histories. The paper concludes with a few brief comparisons from Chinese and Western histories to illustrate these points.

John Hostettler

"Off-Script and in Public"

This paper reports on the evolution of a Big History minicourse hosted by several Silicon Valley public libraries over the last three years. The diverse audiences have included scientists and engineers, historians, retirees and high school students, artists, teachers, business people, and homemakers. The mini-course consists of nine 90-minute sessions and is based on DVDs from the Teaching Company's Big History course taught by David Christian. In each session excerpts of the DVDs are introduced, shown, and discussed. Some "fill" is added to make the transition from one excerpt to the next smooth and coherent. The excerpts provide structure and a storyline for the minicourse, functioning like a script in a play. The "off-script" elements are the selection of excerpts and the creation of the associated introductions, transitions, and discussions. Two distinct advantages of this approach are: 1) it brings Big History to a public audience that might not otherwise be exposed to it, and 2) it offers the expertise (from David Christian) that an inexperienced presenter may lack. This approach also offers two major challenges: 1) the "off-script" elements and 2) the extreme heterogeneity of a public audience. Initially, the script (DVD excerpts) dominated, but on repetition the off-script elements have received more emphasis. This paper reports on the evolution of the minicourse and how the presenter has dealt with being "off-script and in public".

David Jones

"The importance of an explicit understanding of the nature of science for all Big History courses."

Description of International Baccalaureate Organization and its philosophy of delivering international minded students who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world. Details of IB science courses in general and in particular, a new course in Science for 16-19 year age students being developed for delivery in International Baccalaureate schools worldwide influenced and based partly on

Big History. Similarities and differences between the two. Explanation of the overarching theme of the Nature of Science for this science course. It will be argued that this is also vital for delivery of all Big History courses as research shows that Nature of Science has to be taught explicitly for a full understanding by students. Brief CV David Jones, head of science and mathematics in the IBO Dioloma programme - managing courses in all 5000 IB schools globally in physics, chemistry, biology, environmental systems and society; sport, exercise and health science; computer science and 4 advanced mathematics courses. Experienced curriculum developer and presenter.

Jennifer Joy

"The Physics of Love: Big History Meets Romantic Comedy"

For this conference, I'd like to present my Big History solo show, *The Physics of Love*. In it, I use the scientific history of the universe to frame a comedic love story. Lisa, a science teacher, is enthusiastically looking for romance. She compares her journey to the journey of the universe. At every bump in the road, she nervously seeks nerdy explanations from the Big Bang or geology or biological evolution. She believes she can solve any problem with a metaphor from science - any problem, that is, except her many food allergies. But Lisa's real challenge is that she has never gotten over losing her fundamentalist Christian family's love. For that, she'll have to turn to evolution to learn how life changes. The universe story provides Lisa – and us – with a paradigm for understanding not only our physical world, but also ourselves as human beings emergent from this cosmos. I seek to humanize a scientific story that is too often seen as abstract and distant. We are emergent from this cosmos; its journey has much to teach us about ourselves. My show relates to your theme, "Big History and Education. Theatrical techniques, such as humor and storytelling, are powerful pedagogical tools. The Physics of Love is ultimately about a woman overcoming her considerable fears of intimacy in her own quirky way – by following the wisdom of the universe.

William Katerberg

"Mythic Meaning and Scientific Method in Big History"

Big History involves both scientific study and efforts to promote modern mythologies based on this science. The centrality of both impulses—scientific and mythic—is evident in publications such as The Evolutionary Epic (2009) and at Big History conferences, where papers and panels of a sort familiar to scholars sit alongside those more akin to religious retreats. It is not clear whether these impulses are compatible or what the boundaries should be between them. Can scientific methods themselves yield meaning? Or are extra-scientific ideas and yearning—philosophical, theological, aesthetic and emotional—inevitably part of Big History myth-

making? If so, is there a Big History orthodoxy? Or can a variety of forms of atheism, theism, pantheism, etc., be part of Big History, whether rooted in one of the "world" religions or local "Native" spiritualties? If Big History is to succeed in both of its impulses, it needs to address these boundary issues. What is "science" in Big History? How does that science relate to Big History's "religious" expressions? How can Big History foster productive conversations that include diverse philosophical and theological perspectives, rather than exacerbate the "culture war" between "science" and "religion"? To address these issues, this paper turns to scholarship in science studies, debates on teleology and science, and conversations between theologians, historians and scientists. It argues that Big History—as a scientific project and a modern mythology—is not based on science alone. Nor can it be, properly, if it is to succeed in its dual impulses.

Sean Kelly (Please see Linda Sheehan)

Seohyung Kim

"Big History Pilot Program in Korea"

In this paer, I and Soyeon will present big history pilot program in Korea. Since 2012, the Institute of World and Global History at Ewha Womans University have began big history pilot program as the first non-English speaking country. Beacuse of strict educational system, we began big history project as an extra-curriculum for middle school and high school students. There were 5 schools that had participated in big history project in 2012. I taught 30 different highschool stundents at Ewha and Soyeon took this course at Hana Academy. This was the first big history class for middle and high school stdents in Korea. And it was the real convergence education, which could teach interrelationships between the natural sciences and humanities with a larger frame and stroytelling. So, in this paper, we can introduce big history curriculum in Korea and discuss possibilites of big history education in onther countries with different perspectives.

Seohyung Kim

"Convergence Education in Korea: Science and Social Studies"

Recently, convergence education is a trend in Korean education. Many people want interdisciplinary education like big history in regular course, like middle school and high school to find out and develop creativity of students for global society. So Korean Government tries to develop and expand interdisciplinary education system under the name of convergence education. This kind of education especially happend in science and social studies subject, and there are several textbooks for convergence education. In this paper, I will examine the convergence education textbooks to find out the purpose and usefulness for interdisciplinary

education and I will study the situation of convergence education in Korea. It can be useful to compare convergence education with big history education as an interdisciplinary studies in global society.

Robert King

"Some False Universals of Complexity Construction: Scale, Structure, and the Seductions of Quantitative Magnitude"

This paper highlights studies of universal complexity and pattern formation in cities (from Ancient to contemporary) performed by researchers at the Santa Fe Institute. An article published by Time Magazine (online edition) entitled, "What Ancient Aztecs Shared with Modern New Yorkers" forwards the thesis that all cities regardless of age and population obey laws of complexity and scaling to grow "in pretty much the same way." The article's thesis gives in to the seductions of universality (via improper application of quantitative magnitude to complex systems or networks). It is not the case, as the article claims that despite time, space, and culture, human settlements follow laws of scale. What is forgotten is that laws of scale based on increase of magnitude are dependent upon the organizational properties of matter: self assembly depends upon the composition of the "self," or, type of object under consideration. Scaling patterns only obey the more general laws of complex systems at the most trivial level and moreover neglect the importance of information's role in self assembly, organization, and complexity construction. Ineffective analysis of structure and organization remain threats to the viability of any universal history (including to Big History's claims to universality). This paper 1) reviews recent literature on the construction of cities (e.g., PlosOne's "The Pre-History of Urban Scaling") to criticize universalizing tendencies at play in popular and scientific models of scale, growth, and complexity in order to 2) suggest an alternative framework of analysis of universality in complex systems: one based in analysis of information's role in pattern formation.

Andrey Korotayev

"A Little Big History of the Big History"

Big History ideas did not appear from out of nowhere. They have deep roots in human spirituality, philosophy and science. In the 19th and 20th century one could observe an explosive growth of scientific knowledge accompanied by its deep differentiation. This made interdisciplinary borders much more rigid, whereas the research specialization grew by an order of magnitude. As Erwin Schrödinger justly noted: "[I]t has become next to impossible for a single mind fully to command more than a small specialized portion of it." However, he continued, there is "no other escape from this dilemma (lest our true aim be lost forever) than that some of us should venture to embark on a synthesis of facts and theories" (Schrödinger 1944: 1). However, such a worldview disintegration that peaked in the 20th century was not always prevalent in the history of the human thought. It was rather the aspiration for the

universal knowledge that tended to prevail. From the very moment of its emergence the abstract thinking tended to become global. Even the Abrahamic theological tradition (that was dominant in the western half of the Afroeurasian world-system in the Middle Ages) contains a sort of Big History, as it presents a unified vision of the Universe origin, development, and future, as the Universe has the single Creator and develops according to His plan. The classical Indian religious philosophy affirmed the principle of the unity of the world through the idea of reincarnation. Even delusions of astrologists and alchemists contained the idea of the universal interconnectedness (stars affect human fates; everything can be transformed into everything). Many interesting insights on the properties of the Universe can be found in pre-scientific worldviews generated by various human civilizations.

Karen Kudebeh

"The Big History Story of Northern California/San Francisco Bay Region"

Conferences typically start off by immediately focusing on subject matter of mutual interest, without first orienting people to Place. Every location on the planet is unique and has its own characteristic landforms, life forms and history. What Big History story can be told of this unique region of Northern California? Come to this presentation to learn about some of the notable geologic processes and sites within a one-to-two hundred-mile radius of Marin County such that you'll feel oriented in both Deep Time and Place.

Karen Kudebeh and Jon Cleland-Host, co-presenters
"Bridging Vast Expanses of Time Using Kinesthetic Teaching Materials"

Teachers of Big History are challenged by the need to cover enormous expanses of time while also organizing and conveying important information at some depth. Optimizing both breadth and depth when teaching Big History invites the use of new tools that engage additional senses (kinesthetic) as well as taking full advantage of traditional audio-visual ways of learning (as enhanced by Alvarez and Saekow in Chronozoom and by Sagan in the Cosmic Calendar.)

Educators have long been aware that a typical classroom has students with a variety of learning styles. Although research has not supported the "meshing hypothesis" (that a teaching style should be matched, or "meshed" with a given student's preferred learning style,) research has shown that a mix of different teaching styles does enhance overall learning. With a subject as complex—and as basic-- as Big History, a mix of styles, methods and materials is optimal.

Big History Beads and Timespirals (spiral timelines) are tools that teach using often underrepresented learning styles. First, they incorporate kinesthetic learning along with audio-sequential and visual. Second, they layer meaning by adding color, texture, and 3-D shape. Third, they invite personalization of the Big History story such that the student's own preferences, genealogy, and life events can be built into the Big History narrative. Fourth, they

are portable—the student can wear or carry the beads/spirals wherever they go. Suitable for personal or classroom use, these tools can be helpful additions to other available materials.

Lucy Laffitte

"Lycopod, cycad, and platypus: survival of the less fit"

Each of these species evolved a radically innovative morphology for its time. They are proof that evolution used trial and error in the design process for leaves, seeds and mother's milk Lycopod, cycad and platypus were like Edison's 2000 filaments or Norm Larsen's 39 water displacement formulas, early prototypes for a life strategy that would emerge in the future. But what's interesting is that they don't just live in the fossil record. They were able to persist through deep time. Even though they were overshadowed by the more successful inventions of megaphylls, gymnosperms and mammals, these less fit species remind us of the journey. During this presentation, participants will get a chance to hear about, hold, examine, and ponder the the living artifacts of the less-than-fits among the plant and animal kingdoms.

Cadell Last

"The Future of Big History: High Intelligence to Developmental Singularity"

The dominant hypothesis explaining the future of intelligence is the expansion hypothesis (e.g., Bostrom 2010). The expansion hypothesis posits that intelligence (either biological or post-biological) follows a natural pathway of organizing matter and energy on ever-larger scales of space-time. Expansion theorists utilize the Kardashev scale of civilization development to explain a potential expansion pathway (e.g., Kardashev 1964; 1997). This proposed pathway generates a narrative of humanity directing the evolution of intelligence among the stars (e.g., Kardashev 1997, Stewart 2000, Kurzweil 2005, Bloom 2008). However, with current data and theory we cannot assume that expansion is inevitable. The expansion hypothesis cannot account for Fermi's Paradox (Cirkovic 2009), and consequently has to evoke notions of a cosmic "Great Filter" between 'dead matter' and 'cosmic transcendence' to explain a complete absence of intelligent activity in our galaxy (e.g., Bostrom, 2010). However, a competing hypothesis explaining the future of intelligence is the developmental singularity hypothesis (or "transcension") (Smart, 2012). This hypothesis rests on the mounting evidence and theory suggesting our universe is on a developmental pathway towards increasing complexity at increasingly local scales of reality (Stewart 2010; Smart 2008; 2012). An empirically testable final energy development stage for this pathway has also been proposed in the form of a "starivore" (Vidal, 2014). However, a likely developmental pathway of intelligence based on energy, from the emergence of high intelligence to the developmental singularity, has yet to be explored and explained with the most advanced evolutionary theory. Here I propose the "Intelligence Pathway", which is a hypothetical pathway characterized by technocultural evolution (e.g., Last 2014a; Last 2014b), driven by self-aware minds, and situated within an

EvoDevo Universe framework for the future of intelligence (e.g., Stewart 2010; Smart 2012, Vidal 2014). The theoretical basis for understanding the entirety of human evolution in terms of energy extraction has already been developed (e.g., Niele 2005; Chaisson 2012; Last 2014b). The complexity of this pathway (both past and future) can be quantified using the metric of "energy rate density" (or "power density") (Chaisson 2010; 2011, Spier 2010). The benefits of clearly elucidating the pathway from high intelligence to developmental singularity offer us the potential to explore the "future of big history". This should further help us situate human existence within cosmic evolution, and help us understand the cosmic role of intelligence in a developing universe.

Simon le Jeune

"The next threshold in learning in Big History"

I note that learning complexity etc. are the perspective from which you work.... I have the vision of what the next human learning threshold will be. It is possible now... It WILL happen... In the right environment and perspective it could help your grandchildrens' world to catch up with the thinking required to prevent the misuse of the technology thinking that has been developed that is so easily capable of ending our world.

Jeremy Lent

"Life's Transitions: A Systems Approach to Big History"

This presentation offers a potential framework for teaching Big History by applying systems theory to the major transformation of life on earth. In each of these phase transitions we see the dynamics of reciprocal causality, where the whole affects each of the system's parts while each part simultaneously affects the whole. The presentation reviews how evolutionary theorists have recently employed a systems framework to gain insights into evolution through the concept of "niche construction," where a species creates its own environmental niche which then impacts the trajectory of the species' further evolution. The emergence of homo sapiens brings added complexity to this systems approach with the advent of culture as a separate driver of change, leading to coevolutionary processes between genes and culture. The human system is shown to be unique in comprising two different types of complex systems – tangible and cognitive – which exert nonlinear feedback on each other, thus creating a "ratchet effect," exacerbating the magnitude and speed of human transformations. This framework is used to evaluate some of humanity's most important transitions: the emergence of language, agriculture and science. In the rise of agriculture, for example, wheat mutation dynamics impacted the tangible system, while the emergence of new hierarchical social structures transformed the cognitive system. More recently, "niches" constructed by the human system have expanded to impact the entire earth. Our current global situation is evaluated within this framework: are we headed for another major transformation? If so, with what characteristics? And how can we affect the trajectory?

Shanshan Liu

"A Little Big History of Summer Palace : The landscape of the Universe"

In my presentation I would like to show how classical Chinese architecture is unified with particular metaphysic views of nature. Traditional Chinese garden was always supposed to mirror the structure and dynamic of the universe. Classic Chinese philosophy represents the universe in close analogy with classic Greek philosophy, in terms of balance between five elements, female and male principle. The male principle represents the social hierarchy and is represented in the Dwelling parts of gardens. The female principle represents the dynamics and the nurturing power of nature, which is mirrored in the landscape part of the gardens. The whole architectural structure of the Summer Palace garden follows the same principles. However Summer Palace is one of the few gardens constructed especially for worship Female Bodhisattvas. It was built by Qianlong Emperor to congratulate his mother's birthday and to supplicate a long life of his mother. For this purpose it also has the metaphorical structure of the human body as classic Chinese philosophy understands it. I would like to show that as a result the whole structure creates a particular aesthetic harmony, achieved by recursion. Thus the supposed analogy between the structure of the universe, the architecture plan of the Summer Palace and the human body, also bear a close similarity with classic western hermeneutic principle of "That which is below is like that which is above".

Davidson Loehr

"Growing Beyond Religion: Big History and the Meaning of Life"

We live in stories. And the hope we hold out for our grandest stories is that they may help us answer our two most enduring questions: who we are, and how we should live. But we weave our stories from the materials at hand, within and around us, and from within our understanding of the world. When our religions began, no one knew much about the origins of life, age of the Earth, or the hundreds of billions of galaxies, each containing hundreds of billions of stars. As our perspective became larger, our knowledge became deeper, broader, and more relevant. Put poetically, that fruit on the Tree of Knowledge began to ripen. Now sciences like ethology, biology and neuroscience are helping us understand who we are better than our religions. And Big History is revealing the meta-story of the universe: the growth toward more inclusive and dynamic complexity, at all levels. This meta-story looks like the origin of the "Golden Rule" we find in all religions, and the concept of justice in our best codes of law (and our favorite movies). Even if we can't always do it, we know how we should live. As we move farther into this 21st century, it is our sciences, married to our empathy and compassion, that constitute our best hope for establishing life "on Earth, as it is in the heavens."

Claudio Maccone

"Entropy as an Evolution Measure (Evo-SETI Theory)"

When SETI scientists will be able to discover a signal or just some signs of an Extra-Terrestrial (ET) Civilization, those ETs should turn out to be technologically advanced at least as much as Humans, if not more, or much more so. Comparing the technological level of two different Civilizations is then a key issue in SETI. But at the moment we only know about the development of life on Earth over the last 3.5 billion years. We thus need to mathematically model the evolution of life on Earth (RNA to Humans) and then apply our results to other extra-solar planets to find out "where they stand" along their evolution of life. In a series of recent papers and in a book (refs. [1] through [4]) this author introduced a new statistical model embracing SETI, Darwinian Evolution and Human History into a unified statistical picture and concisely called Evo-SETI (Evolution & SETI). The relevant mathematical instruments are: 1) The statistical generalization of the Drake equation yielding the number N of communicating ET civilizations in the Galaxy. Assuming that each input variable in the Drake equation was a random variable, rather than just a pure number, N was shown to follow the lognormal probability distribution having as mean value the sum of the input mean values, and as variance the sum of the input variances (ref. [1]). 2) Geometric Brownian Motion (GBM), the stochastic process representing Evolution as the stochastic increase of the number of Species living on Earth over the last 3.5 billion years. This GBM is well-known in the mathematics of finances (Black-Sholes models). Its main features are that its probability density function (pdf) is a lognormal pdf, and its mean value is either an increasing, or, more rarely (as in the Mass Extinctions of the past) a decreasing exponential of the time. 3) The probability distributions known as b-lognormals, i.e. lognormals starting at a certain positive instant b>0 rather than at the origin. These b-lognormals were then forced by us to have their peak value located on the exponential mean-value curve of the GBM (this is the so-called "Peak-Locus Theorem"). In the framework of Darwinian Evolution, the resulting mathematical construction was shown to identify with Cladistics (refs. [2], [3], [4]). 4) The (Shannon) Entropy of such b-lognormals is then seen to represent the "degree of progress" reached by each living organism or by each big set of living organisms, like historic human civilizations. Having understood this fact, Human History may then be cast into the language of b-lognormals that are more and more organized in time (i.e. having smaller and smaller entropy, or smaller and smaller "chaos"), and have their peaks located on the increasing GBM exponential. This exponential is thus the "trend of progress" in Human History. 5) But our most striking new result is about the well-known "Molecular Clock of Evolution", namely the "constant rate of Evolution at the molecular level" as shown by Kimura's Neutral Theory of Molecular Evolution. We showed that that the Molecular Clock identifies with Entropy in our Evo-SETI model because they both grew linearly in time since the origin of life. 6) Furthermore, we applied our Evo-SETI model to lognormal stochastic processes other then the GBMs. For instance, we showed that the Markov-Korotayev (2007-2008, refs. [5], [6]) model for Darwinian Evolution identifies with an Evo-SETI model for which the mean value of the lognormal stochastic process is a cubic (third degree polynomial) function of the time. In conclusion: we have provided a vast mathematical model capable of embracing Molecular Evolution, SETI and Entropy into a simple set of statistical equations based upon b-lognormals pdfs and lognormal stochastic processes Keywords: Molecular

Clock, Darwinian evolution, statistical Drake equation, lognormal probability densities, geometric Brownian motion, entropy.

Malcolm Mafi

"Family, Fatherland, and Self: Women Under Fascist Governance"

This historiographical paper examines the experience of women under the heel of fascist rule in four major European countries: Nazi Germany, Mussolini's Italy, Francoist Spain, and Vichy France. The prism through which these experiences are examined is the interplay between agency and structure, a theme that dominates the paper, and studied are the myriad ways in which women as individuals and in organized groups were able to operate in their own perceived or real interests within the stifling confines of misogynistic fascist rule. Traditional historical scholarship tended to portray women as helpless victims of fascist tyranny; in line with the advent of the cultural turn, the historians of the past three decades have instead emphasized the agency of women within structure of fascism in political, social, and cultural histories. Included in this paper are how women were treated qua women, their struggle with natalist policies concerning maternity and reproduction, their direct and indirect roles in influencing political change, their use of and reaction to the discourses on sex emanating from the dictatorships under which they lived, and their participation in active and passive resistance against the fascist regimes.

Samuel Malkemus

"Big History and Sexuality"

What does sexuality have to do with big history? Isn't sexuality something that happens within the confines of human experience? Or at the very least, isn't sexuality necessarily delimited to the evolution of biotic existence such that big history, with its span of time reaching back 13.8 billion years to the origins of the cosmos, has little direct relevance on the unfolding of our sexual lives? In this presentation, I suggest that big history and sexuality are in fact deeply linked, and that an understanding of big history may allow us to expand how we define sexuality far beyond reductive humanist interpretations. Teaching graduate courses in sexuality, I have found a big history perspective to be useful for approaching sexuality in an expanded context. It has enabled me to approach sexuality in two distinct and mutually enhancing ways. First, I present sexuality as we typically understand it in our culture. This involves examining our sexual dispositions, behaviors, and socio-cultural-historical contexts. And second, I expand this understanding by approaching sexuality as fundamental life force energy that subtends experiences of creativity and vital aliveness. In this later sense, sexuality reflects the creative pulse of biological evolution, a creativity inherent in the very structure of universal process. I have found this expanded understanding, what we might term big sexuality, to be an effective tool for helping students to connect with their vital creativity, a creativity that is often obscured

by a narrow and reductive understanding of sexual life. In this way, the focus of this presentation involves exploring an expanded understanding of sexuality, one that takes into account creative processes of cosmic and biotic evolution. To this end, I examine the way that this expanded understanding can be utilized to enrich and inform a standard interpretation of human sexuality.

Jonathan Markley

“"No meaning or intention." The problem of intent in Big History”

Scientists and historians seldom have a problem with the idea that the Big History of the universe, and of life on Earth, need have no intention or purpose behind it. When human history enters the story however, the idea of conscious intention is often assumed within historical arguments. Humans intended to migrate out of Africa, to domesticate plants and animals, to establish villages, to invent writing, and ultimately to massively alter the environment. The problem with this is that in most cases there was no conscious intent, and when there was, it was for short-term goals with no concept of the ultimate results. Studies suggest that conscious intent in individuals is far less important than previously believed, from sexual attraction, to simple split second decisions, where unconscious factors shape the behavior, even when the individual believes that they were exercising conscious choice. Since conscious intent at first sight seems to be something that separates human history from previous epochs, it is necessary to closely examine this idea, and to ask whether the gulf between humans and the natural world is as large as it first seems.

Anderson Martin

“Integrating Big History and Business”

One obvious benefit from Big History is its cross-disciplinary integration of the sciences and the humanities. Less immediately clear are the benefits of integrating business and Big History. This paper will argue that integrating Big History and business opens valuable vistas of learning for students in several areas. First, how stars and planets are formed and evolution here on earth tells us that chemicals, minerals, plant and animal life are randomly distributed across the globe. Consequently, trade is inevitable within and between human societies. Trade raises concepts of property, ownership, and fairness, questions addressed in business courses but not in a historical context as large as Big History. Business courses are generally presentist minded. Second, organization of trade raises questions about business forms, labor, capitalization and profitability. While these subjects are also taught in Business, Big History can more effectively teach how these ideas have changed historically. Third, the distance between resource locations and use locations requires the formation of transportation networks, a business subject, but again subject to historical change, more effectively taught through Big History. Fourth, many scientific inventions have been driven by the demands of business. Science and business are intrinsically linked through historical change. Finally, forms of business organization raise

moral questions about the exploitation of labor, the sustainability of resources, pollution, and the destruction of the natural world. These topics are addressed in business and Big History. Integrating Big History and business offers students a chance to think about all these important questions in a much larger historical context, which may modify their thinking in the practical business courses they take prepare for a professional career.

Daniel May

"Futures of Yesteryear"

This is a pedagogical activity for teaching about the modern world and the future in the context of a Big History course. Very simply, film clips from the past century of science-fiction are used to demonstrate how expectations and predictions regarding the future are rooted in the events of the present. Some examples: "Metropolis" (1927) Exemplifies the anxieties of the industrial revolution: the streamlined city of the future without a blade of grass or sign of life, supported by an underground workforce enslaved to the maintenance of factory machines and lives ruled by the clock. "Forbidden Planet" (1956) Supposedly set in a distant future, everything in this film screams 1950s: the robot servant, the flying saucer, the appearance and behavior of the starship crew plainly modeled on WWII military experiences. "2001: A Space Odyssey" (1968) A plausible vision shaped by the USA's space program, but the year 2001 has come and gone and we're still waiting for commercial space flight, a city on the moon, and a computer that can converse like the HAL9000 (no, your iphone doesn't even come close). "The Road Warrior" (1981) This superficially silly action-flick nevertheless gave shape to a very real fear for its 1980s audience: the end of cheap oil, with a domino effect of the collapse of civilization, warfare over scarce resources, and descent into savagery. A ten-to-twenty minute clip from each of these films (and many others) serves as an engaging prompt for classroom discussion, and sets the stage for exploring what students expect to experience in their own near future.

Daniel May

"Complexity by the Numbers"

This is a pedagogical approach to teaching the concepts of complexity and emerging property as used in a Big History course. Very simply, this is a collection of real-world examples in which a change in quantity can produce a change in quality. Each of these examples demonstrates an emerging property when a certain critical number is reached: The Early Universe: The falling temperature of the universe accounts for the emergence of hydrogen and helium, and their relative proportions. Elements: The difference in flammability between hydrogen and helium demonstrates that helium is not simply "hydrogen doubled," but has a qualitative difference. Evolution: Insect wings appear to have originally evolved for regulating body heat, and increased in size until reaching a critical body-to-wing ratio that made the insect aerodynamic. Human

Population: The number of individuals in a society correlates with the emergence of a number of features such as kinship, leadership structure, communal decision-making, bureaucracy, slavery, literacy, administration of justice, legitimate use of force, etc. None of the examples requires doing math, just following a numerical value: something gets hotter or colder, bigger or smaller, more or less numerous, etc. This is easily demonstrated in the early stages of cosmic and stellar evolution, and makes for a valuable continuing theme for students.

Elizabeth McAnally

"Meditations on Flow: Big History, Embodied Pedagogy, and Cosmic Energy"

"The uniqueness of being human is the intrinsic capacity of the mind to 'embody' (ti) the cosmos in its conscience and consciousness." (~ Tu Weiming) Energy flows. From the Big Bang until the end of time, energy is continually cycling throughout the universe, and we have the ability to feel cosmic energy in our personal lives. When teaching Big History, it is important to help students gain a felt sense of the cosmic energy that is flowing through their bodies. Through techniques of embodied pedagogy, students can relate to cosmology as a vibrant and transformative discipline. Embodied practices can help students learn about cosmology in a way that makes them feel their intimate connection to the energy of the cosmos. They are then able to see their personal lives as part of the larger story of the universe. This presentation will focus on "flow" as a way of engaging in the intimate intertwining of self and world. I will lead some embodied practices (including qigong, breathing exercises, and chanting) to demonstrate how to gain a felt sense of the energy that flows throughout the human body, Earth, and the cosmos. By feeling cosmic energy in our human bodies, we can see it more vividly in the world and can sense a greater responsibly to promote the continual flourishing of this energy. Cultivating a mindfulness of flowing energy is a crucial component of an integral ethic that includes personal, social, ecological, and cosmological dimensions.

Matthew McConnell

"Rethinking Big History Curriculum: The Challenges of a Research Based Approach"

With the aim of understanding how best to defend Big History's place in public schools whilst also defining its role as a discipline, this treatment of the subject examines a deceptively simple question: What is Big History? Special attention is given to implications for the value and practicality of implementing Big History in public schools. Big History's need to distinguish some ideas presented in its curriculum as well established and supported by current study, as opposed to others which are at present anecdotal observations and the subject of current study, is a central issue. A clear distinction between these types of information in their presentation is seen as not only furthering Big History's aim of entering the classroom, but also as critical to its academic integrity and the intellectual growth of those who study it. The case is further made

that, for those ideas considered well supported and accurate descriptions of the universe, Big History must carefully cite its supporting body of scientific work to justify inclusion in public education. In conclusion, some general challenges to Big History as a discipline in both education and research are suggested, with the hope that these might stimulate further valuable discussion.

William McGaughey

"An alternative scheme of thresholds and historical turning points"

This paper presents an alternative scheme of thresholds and historical turning points based on the idea that Big History is a story about three emergent types of being in the universe: matter, life, and thought. That story is told in successive chapters in the presenter's newly published book: A Cosmology of Matter/Life/Thought. (Thistlerose, 2014) The story of matter's development includes the Big Bang, the formation of stars, creation of heavier elements, creation of the earth and solar system, and related thresholds. (chapters 1 and 2) The story of life's development includes the origin of life on earth, appearance of prokaryotic and eukaryotic cells, the evolution of more complex forms of plant and animal life on land and sea, reptiles, dinosaurs, mammals, and primate species leading to Homo sapiens. (chapters 3 and 4) The story of thought's development from an interior awareness to increasing physical presence is told in three stages: (1) prehistoric times (before 3000 B.C.) when human culture embraced agriculture and spoken language. (chapter 5) (2) a civilization of written words and collective learning (3000 B.C. to 1500 A.D.) focused on government and religion. (chapters 6 and 7) (3) a civilization of printed words, electronically produced images, and machines (1500 A.D. to present). (chapters 8 and 9) The last two each have phases of material advance and mental regression. Looking to the future, we have electronic computers and robots whose development envisions replication of human thought processes and ultimately a new machine species. (chapters 10 and 11)

John Mears

"Using Marshall Hodgson's Concept of Transmutations to Advance Our Understanding of Thresholds in the Human Historical Experience"

The identification and analysis of thresholds has become central to the teaching as well as the scholarly investigation of big history topics, and the authors of an initial, recently published textbook (McGraw Hill) have properly identified the eight major thresholds with which we must be concerned. From the foundation they have provided, we are well positioned to enlarge our treatment of these various watersheds. My paper will explore how the concept of transmutations set forth by University of Chicago Islamicist and precursor of modern world history Marshall G. S. Hodgson a half-century ago might be used to enhance our description of the three thresholds that impart overall shape to the human historical experience: the advent of anatomically and behaviorally modern humans, the emergence of complex societies characterized by agriculture

and urban life, and the global integration of historical processes that defines our times. Drawing on specific examples, this paper will explain how Hodgson employed the concept of transmutations to establish the connections between far-reaching alterations that operate on an immense scale, rearrange virtually every aspect of existence in many different societies more or less simultaneously, and produce long-term consequences for humankind as a whole. It will also explain on what grounds he described the fundamental changes as "constitutive" in the sense that they altered the core institutions, belief systems, and behavior patterns by which humans structured their existence so dramatically as to make subsequent events transpire in remarkably different ways.

Sam Mickey

"Panel: Cosmopolitics and the Big Journey: Resolving Nature-Culture Dualisms"

In its research and teaching programs, Big History facilitates the integration of human and natural history into a multidimensional collective history. There is still much work that remains to be done to articulate collective history without falling back into longstanding dualisms that separate humans from nature. Along those lines, Big History can benefit from a dialogical encounter with others who are oriented toward overcoming the human/nature dualism, including those involved in the Journey of the Universe project and, in a very different vein, philosophers like Isabelle Stengers, Bruno Latour, and others associated with a theoretical movement called "cosmopolitics," which aims to overcome the separation between the natural world (kosmos) and the constitution of human civilization (politikos). Initially developed by Stengers following her work with Ilya Prigogine, cosmopolitics aims to articulate a collective history that affirms the intertwining of human societies with the evolutionary unfolding of the cosmos. Cosmopolitics draws more explicitly than Big History on philosophical concepts useful for overcoming the dualisms separating a realm of humans (subjects, values) from a realm of nature (objects, facts), including concepts associated with process philosophy (Alfred North Whitehead), philosophical biology (Jakob von Uexküll), and French post-structuralist philosophy (Gilles Deleuze, Jacques Derrida). This panel introduces the idea of cosmopolitics and situates it in relationship to similar approaches to collective history (e.g., Big History, Journey of the Universe), drawing particular attention to the importance of accounting for the axiological dimensions (e.g., ethics, aesthetics, and spirituality) of our collective history.

Robert Moore

""Getting to Big History: A Circuitous Route""

What makes an individual susceptible to the appeal of Big History? In many respects I have been looking for BH much of my life. I grew up with Cynthia Stokes Brown in a small coal-mining town in western Kentucky. As Cynthia has reported in her Big History she had "a bicultural experience right inside the USA." Unlike Cynthia's Wisconsin parents, mine were

natives of the area but I too found my self an outsider. My outsiderness reflected the influences of a black woman, Ola Graham, who was the most nurturing presence in my life and my association with the Stokes family thru Cynthia's younger brother Jimmy. Both Ola and the Stokes were regarded as "not one of us" but to me they were the people that I was most drawn to. Hence my introduction at a very early age to what Cynthia calls "multiple perspectives" that for us were "built in" the curious Kentucky world that we shared. From a very early age, I had a sense that our culture and the world at large were much more complicated than was generally acknowledged. This sense of complexity was reinforced when, at 14, I went away to a military boarding school in Tennessee -- and soon thereafter my parents were divorced. Driven by fundamental changes in family and every day environment, the world became even more confusing and multidimensional. It would be many decades before I arrived at the portal of BH. This was time that spanned years in academe (Wisconsin, West Point & elsewhere), an African work project, a stint in the U.S. military, Congressional staff service and working with some of world's largest corporations. This paper will explore how these various paths converged to prepare me to embrace some of the central tenets of BH and how BH might broaden its appeal to a wider audience.

Jennifer Morgan

"Panel: Distinguishing Big History from other Approaches to a Grand Universe Narrative in Education"

There are a number of lineages examining a comprehensive narrative of the universe and its implications for education. This panel will distinguish four lineages, among others -- Cosmic Evolution, Big History, Journey (Story) of the Universe, and Montessori Cosmic Education -- and explore how all of the approaches contribute to a multifaceted understanding.

Big History is one of several lineages looking at a comprehensive narrative of the universe and its implications, particularly for education. This presentation will compare Big History, Journey (Story) of the Universe, and Montessori Cosmic Education with respect to intention, methodology, assumptions, and group culture. The presentation will also discuss The Deep Time Journey Network, a new social networking site where people and organizations from different lineages can add profiles, connect with others, add resources and events, and start and join conversations and groups. The intention is to promote cross fertilization between lineages. Jennifer Morgan, president and founder of the Deep Time Journey Network, is an international presenter, storyteller and award-winning author of a Universe Story Trilogy for children -- Born with a Bang, From Lava to Life, and Mammals Who Morph -- which are used in classrooms around the world and have been endorsed by Jane Goodall, Thomas Berry, Brian Swimme, Nobel Laureate Leon Lederman, Neil de Grasse Tyson (Director, Rose Center, AMNH), and numerous others. Her work is inspired Thomas Berry, Maria Montessori, David Christian, Cynthia Brown and others representing the three lineages that will be discussed in the presentation. www.deeptimejourney.org. For more information about her programs go to www.universestories.com.

Kathleen Ochs

"A Big History of Technology: From Mousebirds to MacBooks"

The modern technological system has deep roots. A big history of technology begins in the stars that formed the Earth's elements. Perhaps mousebirds, the earliest birds appearing in the Eocene (c. 56-34 mya), were the first technologists. In today's sub-Saharan Africa, they build twig nests lined with grasses. Circumstantial evidence suggests the first hominins to create tools were Australopithecines who would have needed carriers for infants when they walked upright c. 6-4 mya. Stone tools originate in Africa c. 3.4-2.5 mya. Traditionally, historians of technology and science begin with archaic states (c. 3500 B.C.E. in the eastern Mediterranean). However, a complete history would include the beginnings, the lengthy developments before states, and contemporary oral foraging and horticultural societies. Such a history requires a framework that crosses the oral-written boundary of modern scholarship. In this talk, the technological systems and lifeworlds are briefly illustrated for several sociopolitical formations: the bands of animals and the earliest hominins, the egalitarian formation of 20th century Kalahari foragers, the hierarchical archaic states of early agriculturalists, the heterarchical formations of feudal systems, and contemporary democratic-capitalist industrialized states. In addition to the pure pleasure of the story, considering the diversity of hominin technological systems shows two things important for solving the current crises rooted in technology. Different technological paths are possible. And although returning to the earlier lifeways is impossible, some past solutions to the relationship between technology and the lifeworld can lead to insights for a better future.

Bridgette O'Connor

"History, Faith and Science: Teaching Big History from a Catholic Perspective"

A recent article published online in "Crisis Magazine" generated a small social media frenzy in our local community about how a Catholic school could teach a course like Big History. My assumption would be that this type of questioning could come up in any community, which prompted me to write about how Big History can be taught from a Catholic perspective. Over the course of last year, faculty members from the science, social studies, and religion departments met to discuss the challenges and solutions to teaching Big History at a Catholic school. We compiled a list of resources to use both in the classroom as well as to serve as a library for students and parents. In addition to sources, we also put together a "Fifth Claim Tester" to accompany the four claim testers (intuition, logic, authority, evidence) from the Big History Project course. The fifth claim tester is presented to students in order to use the teachings of the Catholic Church as one of their guides to analyzing and assessing whether a claim could be valid. Students thus use their intuition and logic coupled with the authority of scholars (including the Catholic Church) and evidence in order to test claims made about Earth, human evolution, and the Universe as a whole. One of the main goals of teaching Big History at a Catholic school is to explain to students that faith and science do not have to be kept in separate spheres but can be complimentary to one another.

Maarten Oranje

"The Nation State and its Borders from a Big History perspective"

Over the course of Big History, structures of matter and energy have become ever more complex, all the way from subatomic particles to modern human societies. During the 19th and 20th century, industrialization and revolutions in technology, communication and transportation changed the world to a great extent. These revolutions were met by a change in political structure: the nation state became the dominant form of political, economic and social organization, replacing both smaller entities and larger, multiethnic empires. From a theoretical point of view a national organization seems to have been more efficient in harvesting matter and energy than the preceding political structures. An important characteristic of the nation state is the obsession with its territory, and consequently with its borders. The exact demarcation of these borders, and the definitions of insiders and outsiders, play an important role in the story of all nation states. From a Big History perspective, these national borders can be seen as a way to protect pockets of complexity in a potentially destructive environment. I would argue that studying earlier pocket boundaries, such as the earth crust, the atmosphere, cell walls or membranes, the skin, clothing, walls, city walls, etc. might help discern the features of successful borders in general. Furthermore, it might shed light on the circumstances under which cooperation across these boundaries is possible. Answers to those questions might help assess the future of the nation state as a dominant political unit, and the viability of currently emerging forms of regional cooperation, such as the European Union.

Frederick Paxton

"Medieval North America: The Middle Ages in Big Historical Perspective"

The North American Southwest is one of the most thoroughly studied regions of the world yet it has little or no place in historical narratives. The reasons include the malign effects of nationalism and racism in the wake of the Mexican-American War of 1846-48 and the equally artificial late-nineteenth-century separation of history from "prehistory" on the basis of the absence of written documents. "Americans" did not want to grant a history to the native peoples of the Southwest, for that might suggest that they were not savages, and historians left the study of their history to archaeologists and anthropologists. As a result, in spite of over a century of intense study, the history of the people who lived in the American Southwest before the coming of Europeans (and who live there still) is described at best as "ancient" and at worst "prehistoric." I will argue that the way to integrate the history of their myriad agrarian societies (which span the period 400-1500 CE) is to treat them as "medieval." Doing so will both connect them to the modern world and give all Americans a medieval past.

Ted Peters

"Big History, Contingency, and Meaning"

This paper stresses that both natural history and human history rely upon a significant property of the physical world, namely, contingency. The principle of contingency recognizes that some natural events are not predetermined--that is, they are unpredictable. Underdetermined natural events make natural history possible; and recalling the past sequence of contingent events makes human history possible. In addition, human subjectivity at the meso-level relies upon contingency at the micro-level; and human subjectivity is the source of meaning, purpose, direction, and freedom. The telling of the Big History story of our universe should include the past history of nature's forks in the road plus its interpretations by differing histories of human subjectivity.

Andrew Peterson

"Big History and European Maritime Empires of the Sixteenth Century"

This paper outlines ways in which some of the macro concepts of big history—concepts such as complexity, entropy, and emergent properties—can be used to better understand the nature of European overseas empires in the sixteenth and seventeenth centuries. This paper will examine both the Portuguese experience in the Indian Ocean basin and the Spanish experience in the Pacific between 1500 and 1600 CE as examples of the larger phenomenon which I outline. It will be shown that European seafarers and their vessels faced tremendous obstacles when attempting to negotiate the hazards of long-distance voyaging and the challenges of establishing colonial footholds so far from Europe. For both the Portuguese and Spanish the difficulties experienced in reaching Asia and sustaining a colonial presence in the region forced a reorganization of the operating principles of what we would (stereo)typically call an "empire." I argue that Europe's overseas Empires in Asia constituted the emergence of an entirely new structural paradigm, wholly distinct from European empires in the Americas.

Anne-Marie Poorthuis

"Collective learning to handle 'self organization'"

In my daily work I am concerned with matters of organization. I reinforce the self-organizing capacities of people, schools, organizations, cities, neighborhoods and regions to handle complex issues. These days, the self-organization of local communities is a current theme in our society. It is my observation that government steering has become dominant in our regulated society and that the self-organizing capacities of the local communities are hardly addressed. Unfortunately, in this mindset 'self-organization' is defined in a rather limited way, as 'organizing without government interference'. Inspired by Big History, it is my ambition to develop a transferable

concept and to stir the collective learning of handling self-organization. I aspire to a concept that we can pass on to children in grammar school, that university students and academics can use for their research, that residents can utilize for the organization of their community and that continually evolves in relationship with all of these examples. In this paper I elaborate this concept for self-organizing from four starting points: subject, object, space and time. What I observe is that we can consider these starting points on their own, sequentially, interactively and as a whole, that the four starting points assume each other and that each starting point contributes in a unique way to self-organization, while relating to the others. Each starting point has its own ordering principle, positioning, connection and appearance. I draw some parallels with structures and patterns we as humans already know and use. Starting from the subject, I see the network as ordering principle. In my work I use a network analysis to order involvement. It begins with pinpointing the initiative of the subject as the core of the network. It is interesting to see how each network creates its own language so that involvement is defined and the different links learn to understand each other. Another example of network ordering is the linguistic material of Maria Montessori. Jos Werkhoven uses this material in cosmic education (see paper). Starting from the object, I see the human ecological regime transformations (by Fred Spier) as ordering principle. Together, they form a collective learning environment that shows us how we can relate to an object (for instance the earth) from different angles and how we can learn to both use and care for the object. I also see the four arithmetical operations (add, subtract, divide and multiply) that, as a pattern, show a surprising parallel with these regimes, inspiring in turn the definition of the next regime. It is my estimation that the next big regime will be about passing over the concept of self-organization as part of being human in relationship with everything that is. Starting from space, I see the ordering of the powers of ten (by Kees Boeke and by Charles and Ray Eames), that shows space both zooming in (our bodies) and out (universe) and that can give a sense of wholeness on each and every level. Starting from time, I see the ordering of a web in layers and lines. The four lines of life (by Jos Werkhoven) offer an interesting ordering of time, just as the big history thresholds do (by David Christian). By elaborating the starting points on their own as well as in relationship to one another, I start to see the difference between regimes and thresholds. An theory of Bateson (1979) helps me to connect the different starting points. He describes a connecting pattern as a dance of interacting parts.

Margaret Boone Rappaport

“Crossing the Latest Line, Part 2: The Emergence of Sentience in Science, Religion, and Art”

Co-presenters are Margaret Boone Rappaport, Ph.D., and Christopher J. Corbally, S.J. This is Part 2 following a published paper,* "Crossing the Latest Line: The Evolution of Religious Thought as a Component of Human Sentience," at the Big History and Global Evolution Symposium, Moscow, 2013. Here, within a Big History context, we refine the time, place, and nature of human sentience emergence especially in science, religion, and art. We recap the latest findings on the evolution of Homo sapiens idaltu and finally Homo sapiens sapiens in the Middle Stone Age. We review models of a Recent African Origin (RAO) and pinpoint – as closely as the latest evidence allows – when and where modern human sentient thinking arose. We contrast Out-of-Africa and Multiregional Theories, and then examine theories of a “leap” in human

cognitive evolution between older and more recent human remains. Can "sentience" be applied to members of the genus Homo besides modern man? And, where do Neanderthals likely fit in the evolution of sentience? When did hominins begin to mix paint and first make shell necklaces? When did they begin to bury their dead? When did they start to draw images, wear clothes, make compound tools, and engage in long distance trade? All these markers of sentient behavior are compared to timing of brain changes and other evidence from the cognitive study of scientific, religious, and artistic thought. Finally, we critically examine the notion that sentience is "crossing the latest line" within a Big History framework and address this question: What is it about sentience that qualifies as a major threshold?

Julia Shchapova

"J.L.Shchapova, S.N.Grinchenko. Evolution of Complexity: Seven-layer Model of Anthropo-, Psycho-, Techno-, Socio- and Culture-genesis in the Archaeological Epoch"

Previously proposed in [Shchapova J.L. Material production in the archaeological Epoch. SPb.:Aletheia,2011.244 p.] (by analogy with Pennet's lattice) seven-layer model of anthropogenes combines following evolutionary anthropo-psycho-techno-socio-cultural characteristics of a human: a)brain, b)food strategy, c)locomotion, d)manipulation, e)ability to work, f)communication activity, g)physique. Binding of this model to the fiducial dates (1st row of the table, millenniums BC) anthropo/psycho/techno/socio/culture-genesis is as follows: T 6765 4148 2584 1597 377 89 21 5 abcdxyz Abcdxyz ABcdxyz ABCdxyz ABCDxyz ABCDXyz ABCDXYz ABCDXYZ aBcdxyz AbCdxyz ABcDxyz ABCdXyz abCDXYZ aBCDXYZ … … … … … … abcdXYZ ABCDxyz Σ 1 7 21 35 35 21 7 1 The first four dates set three initial periods of Arhaeolith archaeological sub-epoch and dates in columns 4÷8 – initial archaeological markers of Lower, Middle, Upper Paleolithic, Neolithic and Bronze Age sub-epochs. Model inversion of the corresponding feature "manifestations/absence" in the evolutionary development of man falls on these times. Available empirical data validates support model are 7 signs. Additional considerations in favor of this can be attributed S.N.Grinchenko's hypothesis: human interaction with its specific external environment is most effective in a seven-dimensional information space. The basis of this hypothesis is the fact: the surface area of n-dimensional hypersphere of unit radius has a maximum at n≈7. Putting together seven-layer model and this hypothesis, we can conclude that primordial man peaked maximum of its information complexity to 5th millennium BC – mark of proper archaeological and archaeo-historical Epochs in the development of Humanity.

Linda Sheehan

"Panel: Big History: The View from Gaia"
Panelists: **Sean Kelly, Linda Sheehan, Bruce W. Thompson**

Panel Abstract

A major goal of Big History is to set the human project in its proper, overarching cosmological context. This goal is not only consistent with the convergence of scientific knowledge concerning the evolution of the universe, of life on our planet, and of the human species, but serves as well to correct what many see as a particularly pernicious form of anthropocentrism. Such anthropocentrism is arguably a significant factor in the failure of humans to address the ever-intensifying threat not only to our own species, but to the very fabric of life on this planet. This panel will examine the role of Big History in informing new paths we can take to live lives in harmony with the planet and its natural and evolutionary cycles.

Sean Kelly: Big History and the Possibility of a Gaian Civilization

Abstract

This presentation will contribute to the panel by offering two related themes that could assist advocates of Big History interested in grappling with escalating threats to people and planet caused by modern anthropocentrism:

1. The further reaches of Big History
   The emergence of a planetary humanity, the most recent threshold crossed in our neighborhood of the evolving cosmos, is quantitatively insignificant relative to the cosmic time-scale, yet its qualitative significance, in both theoretical and practical terms, is paramount. Climate change, loss of habitats, and the sixth mass extinction underway signal the potential unraveling of the fabric of life, and with it, the human organizational complexity that allowed for the rise of Big History in the first place. The shift in perspective from quantitative scales to the qualitative singularity of our moment invites us to engage in "deep" questioning about the goal of evolution, the nature of the good, and of our ultimate concern.

2. Toward a Gaian Civilization
   The human presence has now saturated the biosphere and given birth to what some scientists term "the Anthropocene." If humanity is to succeed in making the transition to the next threshold of complexity toward a truly sustainable Earth community, civilization will need to be regenerated along Gaian lines. Human social, economic, technological, and political activities must become synergistic with the principles of planetary ecology. Gaian or Earth system sciences have a leading role to play here in alerting us to key guiding principles, as do the related insights of Big History, which provide the longer-term perspective. In both cases, however, the urgency of our planetary moment demands that we grapple with issues that transcend the traditional limits of science-based inquiry: these include Earth Justice and Earth Law

(including the rights of nature and proper relations to the global commons), Gaian governance, and more broadly what might be recognized as Gaian wisdom.

Linda Sheehan: Big History and Earth Law

Our modern way of life is dangerously out of balance with the Earth. Overarching laws and governance strategies, driven by short-term rewards such as maximization of individual profits and unending economic growth, push back inexorably on relatively marginalized environmental statutes, to the increasing detriment of natural systems. Well-intentioned efforts to increase the efficiency of our use of the natural world may buy time, but they do not fix the underlying problem: that we treat the natural world as property to be exploited and degraded, rather than as an intimate ecological partner with which we have co-evolved. The result is ongoing degradation, with impacts threatening the fabric of existence as we know it.

To change this self-destructive path, we must recognize and correct our misguided world lens of "people separate from and superior to nature." What we do to our shared planet, we do to ourselves. Environmental laws by themselves cannot accomplish this transformation. Instead, we must reform our overarching laws and governance systems to recognize our shared connections, and to reflect the fundamental rights of both nature and people to exist, thrive and evolve together.

This goal will ultimately be achieved through movements that reject current, destructive legal and economic models, and instead advocate for governance that advances the fundamental, inextricably connected rights of both humans and nature, and drives lifestyles in harmony with these rights.

Accordingly, this presentation will add to the Panel by exploring the flawed assumptions underlying our modern laws and offering new legal and policy models that reflect our shared history with the Earth.

Bruce W. Thompson: Big History and an Economics for the Earth

A key assumption of this presentation is that the modern world is hypnotized by the myth of the scientific objectivity of economic theory into sleepwalking towards its own destruction. Our vision has been limited in focus to mechanistic and abstract economic principles that are based on the Newtonian worldview of the eighteenth century, yet still accepted as almost immutable laws of nature. These principles are inherently anthropocentric and present-biased. When we stretch our thinking on economics to the planetary and cosmological scale we find that new theories are required, grounded in a longer view of Big History—not just with our understandable celebration of the Modern Revolution.

From this perspective we accept the human species' need to find its way forward on its evolutionary trajectory on the Earth while also seeking to balance this with both the rights of and our interdependence with the rest of the Earth Community. To accomplish this, the chimera of permanent economic growth must end and a dynamic steady state economy that is aligned with the natural world must be built in its stead. This presentation explores an economics that supports the reinventing of the human—and the economic system—as

part of this larger Earth Community and its evolutionary impulse. Using ecology as a guidepost, this means privileging ecological principles and Gaian wisdom over the arbitrary workings of the market. It also means redirecting our lens away from the obsession with the short-term and onto deep time.

David Shimabukuro

"Reconstructing the history of the Earth from a fragmentary rock record"

Ex libro lapidum historia mundi: from the book of rocks, the history of the Earth. Like the written record of human history, the record of earth history—held mainly in its stratigraphic and tectonic record—is characterized by its incomplete nature. Missing, or destroyed, information is far more common than preserved record. In stratigraphy, depositional hiatuses and erosional unconformities are common features. Tectonic history, recorded in the geometry and chemistry of rock, is just as fragile. The very nature of mountain-building events—the creation of high topography—predetermines the eventual removal of the rock record by erosion. Large gaps in the geologic record hinder our ability to understand events of the past. However, unlike the written record where words can be permanently lost, the destruction of the record of stratigraphic and tectonic events is incomplete. Erosional detritus must flow somewhere and re-deposited mineral grains preserve information about their original provenance. Using geochemical tools, geologists are able to recover details of the temperature, pressure, and age of source rocks, reconstructing sedimentary environments and supercontinents. Two examples: Age dates on sand grains in Utah have made it possible to reconstruct a huge river system crossing North America from east to west, 200 million years ago, and several lines of evidence argue that piece of Scandinavia has ended up in northern California through plate movements. Our geological understanding raises a question for other fields of big history: What processes destroy the primary historical record and what methods are used to recover that lost history?

Hiroko Shiota

"Big History and Shinto"

Shinto is an ancient Japanese tradition that has flourished throughout the Japanese islands, and continues to nourish the soul of many people today. Shinto means "Kami way." Kami, briefly defined, are awe-inspiring presences found everywhere in daily life. Shinto has no founder or central scripture; instead, myths form its guiding stories and forces. When Shinto's myths are situated in the context of Big History, it can provide a profound sense of human embeddedness and participation in the grandeur of the dynamic universe, evolving now for over 13.8 billion years. Shinto ritual ceremonies provide opportunities to participate in the powers of the universe by revering kami who represent some of those powers. The violent destructive power is revered as Aramitama and the gentle and peace-generating power as Nigimitama. The example of a Shinto ritual called Shikinensengu shows how kami go through the process of birth, death, and

rebirth that pervades in the universe, through which their power to bless is renewed. This ritual makes Shinto a living cosmology within a changing universe. Using my own stories as a Japanese, I will illustrate how I have experienced and participated in the unfolding of the sacred universe. Based on the Shinto scholar Hamuro's insight, I will demonstrate how Shinto intuition integrates the Big History into their myths, and how this integration helps the practitioner to develop an identity of a cosmic being, embody the powers of the universe, and find cosmological meaning in Shinto practices.

Edward Simmons

"Big History, Meaning, and Paradigm Shift"

This presentation will begin to examine how Big History impacts human perception of meaning by exploring three points. (1) Human beings are a pattern-seeking species, which leads to mythologies, philosophies, science, religion, and historical interpretations. Some patterns can be verified, as in science, and many can't be verified as in religion. This desire for patterns leads to a desire for and search for meanings and meaning in the universe. (2) The professional discipline of history has been nourished in the soil of the human search for meaning; but has also needed to set itself apart from unverifiable explanations of meaning; and to recognize that the historical method itself is inherently biased and selective so that discovered meanings are not objective or always verifiable. (3) Big History represents a paradigm shift in the use of history for discovering meanings. It forces shifts in perception of how history and science interact with meaningful beliefs in contemporary culture, such as opposition to evolution. It proposes the equivalent of a mythology of creation and apocalypse that impacts deep cultural beliefs in many world cultures. These challenges must be recognized and dealt with in a manner that shows respect for long established cultural patterns of meaning. Big History should not try to support or undermine any religious or philosophical sets of meanings that are central to world cultures, but should recognize and respectfully engage those cultural meanings in exploring the full significance of the paradigm shift that results from embracing Big History.

Richard B Simon

"On Power II: Understanding Social Hierarchies"

On Power II: Understanding Social Hierarchies Richard B. Simon In "On Power", at IBHA 2012, we established that power is the ability to marshal flows of energy; that in human societies, individuals or entities that control energy flows become energy flow nodes; and that energy accumulates at such nodes. From a Big History perspective, social hierarchies are systems for the distribution of energy within human societies. But what happens when competing energy distribution systems, which may not be compatible, collide, overlap, or coexist? What does this understanding of social structures mean in the 21st century for political power and governance, for the labor-capital relationship, and for the structure of academic institutions?

Scott Sinclair

"The Christian Bible as the First Big History"

The Bible was the first Big History. It traces events from creation to the end of everything, is surprisingly accurate for an ancient document (though with major errors), and was compatible with what the authors could observe empirically. The primary difference between the Bible and modern Big Histories is that on the basis of spiritual experience the Bible postulates that God created the universe and life, and both will ultimately end in light and love.

Fred Spier

"How can we understand the emergence of morality in big history? A first exploration"

This paper is a first exploration of how moral behavior emerged in big history. While most of the cosmos is inanimate, very soon after the beginning of life the first traces of cooperative behavior can be detected. Throughout evolution, and also throughout human history, cooperation has come as a result of efforts to survive the struggle for life, which includes competing with other species. As a consequence, both cooperative (moral) and competitive behavior are rooted in our genes. Yet both types of behavior can be molded to a considerable extent by learned, cultural behavior, thanks to the large neocortex that is unique for humans.

Brian Spooner

"Social Interaction: An Anthropological Contribution to Big History"

Title: SOCIAL INTERACTION: An Anthropological Contribution to Big History Name: Brian Spooner Affiliation: University of Pennsylvania Email: spooner@sas.upenn.edu Phone/fax: 267 872 8746/215 898 7462 Brief CV: I am Professor of Anthropology and Curator for Near Eastern Ethnology at the University of Pennsylvania, where I have taught since 1968. I have done ethnographic research in Iran, Afghanistan and Pakistan, with a special interest in human ecology and language and culture. In the 1970s and 80s I was senior advisor to the Secretary General of the UN Conference on Desertification, and engaged in a number ecological programs under UNEP, UNU, UNDP and AID. My recent publications include Literacy in the Persianate World: Writing and the Social Order (edited with William L. Hanaway, 2012), Globalization: The Crucial Phase (edited, in press), and Investment and Translocality: Recontextualizing the Baloch in Islamic and Global History (2013, online at Crossroads-Asia). The last two are written in Big-History perspective. Abstract: The accelerating rate of social change in the modern world presents serious challenges to the anthropologist. In extrapolating from the particular that we observe to the general that we investigate, we must now think of processes rather than situations. Big History helps us to understand that in order to make sense of a process we must see it as a

stage on a trajectory and understand how it got to that stage. As the rate of social change accelerates, we need a longer time perspective for understanding the present. In the study of situations we focused on cultural difference. In the study of processes we need to shift our attention to changing patterns of social interaction. This shift shows us that social interaction has been the engine of change and of human history (and prehistory). Humans have always expanded their arenas of interaction (their communities) to the limits of the carrying capacity of their environment. Benefitting from the collective learning (cf. Christian 2004) that came with increasing community size Their rates of innovation increased and they increased the carrying capacity. As their arenas of interaction continued to expand from one threshold (cf. Christian 2004) of qualitative social change to the next, from sedentarization some 10kya down to the current threshold of globalization, rates of innovation and productivity have increased faster and faster. The recent growth of the field of biosemiotics has shown us that this intensification of social interaction has a pre-human, even pre-biological history. Globalization has been on the cards since the Big Bang.

Tracy Sullivan

"Transformative Learning Experiences and the Little Big History Project for Secondary Students"

What makes a learning experience transformative? The answer is much the same as what makes Big History a transformative experience - connection. Based on the work of Kevin Pugh transformative learning experiences are defined as those in which students actively use concepts to see and experience their world in meaningful ways. If students believe the concepts they are learning in the classroom are connected, in a meaningful way, to the functioning of their everyday lives they are more likely to forge a deeper understanding. Traditionally transformative learning experiences have been examined in the field of Science. This paper will expand the examination of transformative learning experiences into the interdisciplinary landscape via the Little Big History Project. Using examples of student work from Australian big history students, the Little Big History Project as used in Australian big history classrooms will be examined using the three defining characteristics of transformative learning experiences; motivated use, expansion of perception and experiential value. How does the structure and delivery of the Little Big History Project in this context engage students in applying big history content and concepts in their everyday experience? see everyday objects through the lense of big history content and concepts?, and value big history content and concepts in a way that enriches their everyday experience?

Charles Sven

"Creation of Our Universe: A Richard Feynman-like analysis of new physics discovered since the 1930's – applied without assumptions"

Much new physics since the 1930's has been discovered in a variety of expanding scientific disciplines that have a direct bearing on the study of cosmology, NOT all apparently related and NOT currently organized into one cohesive structure. The consequence of this Feynman-like analysis, starting from scratch using only observations and replicated experimental results, combines these new disciplines starting with the conversion of energy into matter conducted at Stanford labs in '97, then adds dark energy, the Super-Kamiokande ageless atom/proton study, the Hubble's Deep Field observations, the recording of the 13.7 billion year old CMB cosmic microwave radiation sightings and other equivalent discoveries. All these reassembled describes the dark energy source [that uses Einstein's formula — m = E/c2] of the Big Bang Explosion in Pre-Existing Space. This then dramatically changes the way we calculate the age of our atoms, galaxies, and Universe. All of my analysis is based on REPLICABLE physics fully documented in this paper from NASA, and other equivalent web reports. Full paper available at: http://www.allnewuniverse.com/Creation-of-Our-Universe-11th-of-March-2013.pdf

Brian Swimme

"Radical Mythospeculation and a Second Axial Age: Cosmic Evolution and Deep History"

Rigor and imagination have proved to be the two crucial ingredients in all major scientific breakthroughs. "Radical mythospeculation" is the term that the sociologist Robert Bellah, drawing on Eric Voegelin, employed to describe an important phenomenon in the history of human thought, when the evolution of symbolic consciousness in certain complex societies like ancient Greece or Israel reached a degree of critical reflexivity that transcended the traditional social-religious world of the archaic civilizations but did not reject the mythic-narrative mode of cognition. This creative synthesis of the rational and the mythic helped bring forth the emergence of the Axial Age in the first millennium BCE, and the origins of many of the principal religious, philosophical, and scientific traditions that continue to shape our world today. A similar creative synthesis may be emerging now, as evident in works such as Eric Chaisson's Epic of the Universe and David Christian's Maps of Time. Building on these works as well as Bellah's magnum opus Religion in Human Evolution, this presentation will consider the idea that some kind of new axial age might be emerging from the crisis of the late modern and postmodern era, and that something like radical mythospeculation with a necessary creative tension between rigor and imagination might help mediate the emergence of a new world view.

Matthew Switzer

"Time, Order, and the Millennial Constant: Eric Voegelin's Relevance to Big History and the Future of Humanities"

How might a first year high-school teacher facilitate an inquiry into English and Social Studies? This presentation draws from the political science of German-American Eric Voegelin (1901-1985) in clarifying the relation between language, consciousness, and reality. Voegelin's unfinished project to restore our focus to the engendering experiences of an ongoing truth-quest enables a comprehensive analysis that understands symbolic consciousness as an evolutionary force. His insight into the structure of "universal humanity" can therefore situate us as participants in a primordial community whose imaginative capacity is borne in the events and cultural traditions that shape the evolution of consciousness. After briefly reflecting on the implications of Voegelin's contribution to "big history" and an integral philosophy of time, a quick lesson is considered drawing from principles relevant to the field of humanities.

Bruce W. Thompson; (please see Linda Sheehan)

James Tierney

"Why is Big History Important?"

This paper is a continuation of the thinking I presented at the Michigan conference. It uses Big History as a "Map" to search for clues as to the origins of violence in human cultures. This search has grown out of my many years as a social worker in child welfare. Those of us in child welfare are very aware of the violence within families and specifically toward certain children in those families but there is no emerging theory to help us understand why some caretakers, most of whom profess to love their children, beat and even kill them. I use the continuity inherent in Big History to help see beyond the last 14,000 years when large scale violence first appears in the archeological record and thereby search beyond the violence that is reality easy to articulate in our current culture, which Steven Pinker has done so well. Because violence is so common to our species today, the tendency is to assume it is inherent in Human Nature which it may be, yet, on the other hand, it may be a product of our more recent history. Big History helps us see continuity in history through threads like complexity building but it also helps us acknowledge that all that appears to go without saying, may not be fact. The 60,000 years that our forbears spent in Europe prior to the past 5,000 years of "recorded" history may hold some clues that will help us respond more effectively to what appears to be an increasing trend in child deaths here in America.

Nadia Tomova

"Identification and Analysis of Thresholds in History. Little Big Histories"

The purpose of teaching and researching history is to identify past errors and achievements, and to analyse and learn from them. In order to facilitate the study of the matter and to better understand it, history has been divided into four major periods - Prehistory, Ancient history, Medieval history and Modern history. However, in my view, that sort of periodisation poses limitations on understanding history as a whole, and thus undermines the whole purpose of teaching and studying history. Therefore, to be able to see the big picture and to fully benefit from it, we should change the way we look at history. Throughout my studies, I have always been perceiving history as an inseparable whole. As a result, I noticed that approximately every three hundred years something big happens that irreversibly changes the course of history. In this paper, I will identify these thresholds in history and I will analyse the tercentennial periods between them. This alternative periodisation will ease the study of history by dividing it in smaller periods, while not undermining the inseparable entirety of history. The paper will identify and analyse thresholds in history, it will provide an alternative periodisation, and it will link history to other sciences answering the question: "Is history a science?".

Nobuo Tsujimura

"Osamu Tezuka's Phoenix: The Big Attractive in Japan"

Phoenix is the masterpiece of Osamu Tezuka, a legendary comic artist in Japan. It consists of stories of those who seek to obtain a phoenix, a symbol of universal life force and immortality, from the prehistoric times to the remote future. Their scenes are on the Earth and in the universe. Though stories are fiction and parody of myth and history, they include deep historical insights on unchanged nature of humanity at cosmological scale. Thus, it has "big historical" importance even though it is not an academic work of Big History. It is not creative to limit our activity within academic domain. Wisdom and knowledge of humans are vaster more than science or academism. I call all activities including academia which enable us to consider and place ourselves in the cosmos as "the Big Attractive." Phoenix is one of such examples of the Big Attractive. Originally, Japanese peoples believed in animism and then influenced by many civilizations like Chinese, Indian and Western ones. Such tradition and impacts fuse into one in Phoenix. Thus, it can show us a Japanese hybrid way of cosmological view. Japanese big history-like works can't be explained only within an academic framework. Art radically means "technique for survival." Academic study with letters is only young art. If we, big historians want to make big histories modern creation myths and spread them to ordinary people, we need go beyond academism and return to the original meaning of art. Our strongest rivals and abundant field are there.

Dana Visalli

"Big History Outside: A Walk Through Time"

I work as a naturalist and ecologist, helping people to see elements of the natural world around them that they may be overlooking, and pointing out some of the ecological and evolutionary relationships in nature. I attended and enjoyed the 2013 Big History Workshop at Dominican, but in my perception it would have been greatly improved by engaging with the living world just beyond the classroom. In this presentation I propose to do just that. Wherever natural organisms exist, portions of the evolutionary story of life on earth are present to observe, enjoy, and learn from. A short walk on the Domincan campus would reveal many stages in the evolutionary journey of plants in particular—from algae to the mosses and liverworts, through club-mosses and horsetails to conifers and angiosperms. Flowering plants illustrate the emergence of mutualistic, symbiotic relationships between plants and animals and plants and fungi. We could spend hours observing the intricate beauty and intelligence of flowers with hand lenses, perfectly adapted as they are to engage with their pollinators. The pollinators are equally compelling. The wider evolutionary story is not quite as evident on a casual walk, but if there are any rock outcrops on the campus we immediately have a small window into the evolution of the planet, and birds and squirrels would at least be in evidence to hint at the long journey of the animal kingdom. Big History manifests itself each and every day.

Dana Visalli

"Big History & the End of War"

The emerging scientific story of the journey of the universe offers each individual who engages with it a sense of being a part of something immense and meaningful. It offers a means of expanding consciousness beyond the bounds of the genetically defined self-center, which inevitably has physical and/or psychological territory to defend. Growing awareness of the intricacy and diversity of life around us tends to elicit feelings of deep affection for the earth and life upon it. This presentation will aim to refresh this natural sense of affection for the immense journey which has given us our lives, and then contrast that with the impressive capacity for destruction that our culture has developed in the form of weapons and industry of war. I will briefly outline the evolutionary social history of hominins and point out some of the evidence of the increase in intelligence, compassion and empathy in our evolutionary line over time. To the degree that people identify with the journey of life on earth and feel affection for the life around them they will naturally reject participation in the destruction of the biosphere and move towards a symbiotic relationship with the life around them.

Joseph Voros

"On the Transition to 'Threshold 9': Examining the implications of 'sustainability' for human civilisation, using the lens of Big History"

The 'thresholds' formulation of Big History treats the transition to modernity (or in another closely-related view, The 'Anthropocene') as the eighth and most recent threshold in the overall sequence leading from the Big Bang to our contemporary global civilisation. When we consider the idea of a 'Threshold 9' we are confronted with the question of the many trajectories possible for future human history. Previous work has profiled four major general classes of possible futures as they apply specifically to the energy basis of modern civilisation. 'Sustainability' is an aspect of one class of these futures. But what might a 'sustainable' form of human civilisation actually look like in non-idealised reality and in gritty detail? Once the cheap-energy subsidy provided by fossil fuels begins to wind down, there will be a need to transition to a new energy basis. The argument here is that the underlying character of that energy basis has profound implications for the forms of social complexity possible for human civilisation. It cannot be simply assumed that the recent fossil-fuel powered trajectory of ever-more growth will continue unabated. Barring a technological breakthrough, the most probable future trajectory for human civilisation appears to be one of increasingly constrained access to energy, since all known renewable sources have a much lower energy 'density' than fossil fuels. This paper examines some initial ideas for examining the deeper implications of what such a 'sustainable' civilisation might look like in broad outline, from the nature of agriculture and food production to the forms and structures of the built environment.

Robert Walter

"Context and Story Telling: Beyond Temporal Zoom, Adding Content Zoom to ChronoZoom"

ChronoZoom is a ground-breaking, web- based application that allows easy creation and display of timeline information. It allows the viewer to "zoom" temporally and see expanses of time that range from 3.8 billion years ago to the present, to filling the screen with a single week. This ability permits Big History educators and researchers to discover and communicate events that vary widely in duration and location in time and space. This temporal zoom has limitation created by the structure of the contained timelines themselves. Regardless of zoom level, the limits of a display and a visitor's patience prevents display of a very large number of parallel timelines. In addition, since these timelines are nested, no consistent, universally-accepted taxonomy exists to represent the appropriate "stacking" of this information. In this paper we propose overlaying multiple ChronoZoom canvases to permit establishing high level context and then drilling down to reveal new canvases that offer more detailed views of the subject of interest. By constructing a taxonomy-free context, ChronoZoom can use the same set of content to support Big History education and research from early learning through graduate and post graduate research. These information layers support nested Little Big Histories where each level provides a new, more detailed story. Since these layers are accessed from a more general treatment of the subject, the student is in control of the context.

Jos Werkhoven

"A plea to start Big History from primary school."

A plea to start Big History from primary school. Jos Werkhoven , April 2014 Werkhoven@DeArend.nl Since the mid-nineties, I am inspired by Fred Spier, involved in Big History, to put the cosmic education, which I was already doing in Montessori Education, in a broader context. Since then, I increasingly see how the study of Big History education can provide more meaning. Currently, the focus on the teaching of Big History is on universities and secondary schools. I would like to make a plea for starting Big History from primary school and I hope the Big History Association wants to support this argument and it would help to broaden the attention to Big History in primary education. From my own experiences in Montessori education I advocate starting Big History from primary school. A child from 6 year starts with abstract thinking, fueled by stories, it has an open observation and is extremely sensitive to the great questions in our cosmos. At this time primary school children don't learn these skills rather than on Big History. Besides the direct education for the child's study, the study of Big History can help a school to be a better example for the child and give a customized organization of education for the current time and a better future-oriented organization of education. Inspiration for thinking about organizing and motivating Big History in primary schools I get from the work of Anne-Marie Poorthuis I work closely with (see her own paper). My own argument is rooted in the work of Maria and Mario Montessori and is further supported by my own experience, the desire to adapt education to the current and future time and modern scientific knowledge. The work of Maria and Mario Montessori. From 1947, both have made a case for cosmic education. Although it was aimed at 'giving the world to the child', it was also strongly colored by the image of time: after two world wars. The Montessori's sought to 'improve the world through the child' (peace education). Own experiences. I shape cosmic education using four frameworks : 1. Space (Powers of ten - Kees Boeke); 2. Time (Lines of Life - Jos Werkhoven); 3. Repeating patterns (material to analyse sentences, Maria Montessori); 4. The prepared environment (Maria Montessori); they give an open and always adaptable content of education. Current educational needs and modern scientific knowledge. The fast and rapidly changing information society and the modern scientific insights, ask for a re-orientation to education. The focus on '21th Century skills' is an example on this. The current education system is still ever based on ancient traditions; form and content wringing in the present.

Peter Westbroek

"Discovering the Earth: fear and fascination"

The widespread concern about global change shows the Earth to be a hotspot of emotional involvement. Through negative spiralling this fear may become the worst of our ennemies. In science it provokes anthropocentrisms impeding coherence and progress. For a detached attitude we must rely on Earth System Science which regards this planet as a coherent system over the full 45 million centuries of its existence. As ESS reveals, the Earth turns itself inside out on many different timescales at once. Materials and information are continuously annihilated and

subsequently re-created from the debris, owing to an immense global memory. Over and above this cycling tendency, an ongoing trend towards planetary differentiation becomes apparent over time, ranging from global turmoil at first to the present complexity with culture and the internet. ESS shows that life is an emergent property of the planetary dynamism: it is the Earth that evolves, not just life. By the same token, it is the Earth that undergoes cultural evolution, not only humanity. These simple principles set the stage for the unification of the natural and the social sciences. Furthermore, the awesome insights we gain from this science provide the basis for a new orientation in life, a worldview that allows us to overcome our fears and establish a more harmonious relationship with this planet.

Jonathan White

"Organized Conflict: Thoughts on Big Military History"

This paper examines the concept of big military history. It discusses the sub-discipline of military history, the nature of military historiography, and strategic thinking that may have created a de facto big history perspective prior to the advent of the concept. The paper moves on to an examination of possible methods for teaching big military history. It closes with speculation about the necessity of continuing interdisciplinary research to develop ideas.

Florian Windhager

"Visual Analysis of Big History Data in a Space-Time Environment"

To communicate their contents to a wider public, Big History projects are used to visualize their extensive subject matters with synchronoptic timelines. From an information visualization perspective, this method productively enables the visual assessment, localization, and comparison of temporal data as colored trajectories against a commonly darkened, linear background. While sharing a similar focus on the visualization of temporal data, the method of time-geography transfers its trajectories into the three-dimensional viewing environements of space-time cubes, hence providing extended options for the visual analysis of spatio-temporal movement and development patterns. To highlight the associated potential of supporting Big History research and education, the presentation will introduce the method's operating principles and illustrate its application to selected historic phenomena. Specific emphasis will be put on a possible linkage to complementing spatio-temporal views, as provided by social and semantic network visualization. To explore scenarios of future development, an outlook will investigate options for the collective realization of enriched Big History visualization platforms.

Barry Wood, University of Houston

"Narratives of Power:
Kings, Empires, Dictators"

This proposal emphasizes imaginative narratives as a driving force throughout history. "Narratives of power" refers to a particular kind of story that enhances the power of kings, the greatness of an empire, or the actions of a dictator. While these had a powerful hold on the imagination and were believed within their originating cultures, we tend to regard them as stories, myths, or fictions. In Middle Eastern and European kingships (Sumerian, Egyptian, Greek, Hebrew, and Roman) narratives of divine kingship prevailed. In South and Southeast Asia, the deva-raja (god-king) spread from India to kingships in Myanmar (Burma), Thailand, Cambodia, and East Java. Chinese emperors followed a Mandate from Heaven. Early empires at their apogees developed founding narratives with an extended back-history (Sumerian, Hindu), divine imperatives (Israel, Rome, the Holy Roman Empire), eponymous ancestry and mythical genealogies (Sumerian, Hebrew, Roman, British), numerically inflated wars (Greeks/Trojans, Israelites/Canaanites, Kauravas/Pandavas), chronometric inflation of warrior heroes' ages (Sumerian, Persian, Hebrew, Hindu), and spatial inflation of ancient cities (Uruk, Troy, Indraprastha, Ayodhya, Camelot). In modern dictatorships, elaborate narratives develop to chart out necessary or inevitable social, political, or military action. Drawing on Hegel, Marx developed a narrative of social evolution from capitalism to communism which inspired Lenin and the Russian Revolution. Derived from both Hegel and Marx, Mao's narrative of history was based on a resolution of contradictions or opposing social forces (an application of dialectical materialism) which inspired the communist revolution and founding of the People's Republic of China. Hitler's fiction of a master race included a narrative of Aryan destiny and triumph over the entire world. Imaginative narratives of power enhanced kingship and empire; modern versions mobilize people, promote revolution, and justify the application of military power. Their effects through history have been profound.

This presentation is based on a book-length manuscript nearing completion.

Barry Wood, University of Houston

"A Big History Novelist
James Michener (1907-1997)"

James Michener, with more than forty titles to his credit, began writing short novels (Tales of the South Pacific, The Fires of Spring, The Bridges at Toko-ri, , Sayonara) that enjoyed substantial but not record-breaking sales. At age 52, he embarked on a new kind of epic novel (800-1,000 pages) that included substantial sections of Big History. (The focus of this report is on four novels that appeared over a 30-year period, 1959-1988, before the advent of Big History. Each reached No. 1 on The New York Bestseller List, thus providing an impressive index of Michener's long-term popularity and impact.) Hawaii (1959) included a chapter detailing the billion-year rise of volcanic islands and a second chapter on the migration of Pacific island

people to Hawaii early in the Common Era. The Source (1965), which recounts an archeological excavation of a tel (fictionally called Makor, "the source") in Israel, includes numerous drawings of artifacts found. One section presents a narrative of a family living in a cave that had been occupied by Homo sapiens out of Africa for 70,000 years. The time chosen (9831 BCE) is the moment when this family is experimenting with planting einkorn wheat—one of the first wild grasses to be domesticated—thus putting into story form the first step in the emergence of settled agrarian life in West Asia. In 1974 Michener published Centennial in anticipation of the Colorado centennial and the U.S. bicentennial, both occurring in 1976. Here he included an extensive three-billion year geological history of the Midwest with diagrams; a story set 136 million years ago of a dinosaur (diplodocus); a chapter devoted to the 45-million year evolution of the horse in America, its migration from Alaska to Asia, and its extinction until reintroduced by the Spanish. One of his most expansive big-history presentations occurs in Alaska (1988)—100 pages covering the geological assembly of Alaska, the era of the glaciers, the migration of Native American ancestors from Asia to the Americas, and sections devoted to the mastodon and woolly mammoth, possibly driven to extinction by overhunting. These novels reveal extensive research and knowledge pertaining to three of the four areas of Big History: Earth, Life, and Humanity.

Panel: Routes to Importance of Big History
Barry Wood: Panel Chair

While Big History fills in the lives of people in those vase expanses of time preceding traditional history, numerous peoples, regions, and themes remain uutouched. Frderick Paxton elevates a major Native American culture to a place with accepted historical periodization. James Tierney looks for overlooked trends in prehistoric behavior that might presage the current prevalence of family violence. In a personal narrative, Robert Moore describes his own circuitous discovery of "multiple perspectives" that led him to embrace Big History.

Jonathan Yavelow

"Using Big History as a central element of a University science core requirement"

The science-based story of the universe and the origin of humans is a window into both the elegance of the scientific information and the scientific process that has uncovered these facts. When we present science as an integration of all of the sciences it reveals the fascinating big picture story of the universe and our origin. Selected seminal experiments from each field are windows into both the elegance of the scientific information and the scientific process that has uncovered these facts. Data based decision-making and constructive criticism deserves the utmost respect by our culture. The science-based story of the Universe is based on insights from all of the sciences. It begins 13.7 billion years ago and progresses through the formation of stars and the origin of the chemical elements, to a supernova explosion and the subsequent formation of our solar system and the Earth as a dynamic planet capable of sustaining and evolving life. The story is very humbling and reflections from students are incorporated into this presentation. One student reflection is that the probability of us existing at all is less than winning the lottery!

This puts a perspective on everything that exists as extremely precious. Thus, science education communicates both critical thinking and epiphany. The same scientific thinking that has yielded our story of the universe is a habit of mind that we must use to approach our sustainability problems. This thinking has been incorporated into my recent book Star Gazing to Sustainability: Appreciating the Scientific Process.