International Big History Association

Origins

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Evolutionary Process:
An Organizing Principle for General Education

Researching a New Scholarly Field:
The Case for Big History

ChronoZoom Celebration and Reunion

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EVOLUTIONARY PROCESS:
AN ORGANIZING PRINCIPLE FOR GENERAL EDUCATION

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RETROSPECTIVE REFLECTIONS

I was pleased but taken by surprise that anyone would want to reprint the article below, despite the merits it seems to possess. I wrote it in the summer of 1979 and finally published it seven years later, after exposing it to critical responses at several professional conferences. I had the challenges of general education in mind, a subject with which I had acquired considerable experience as a young academic and about whose objectives I had come to feel passionately. While I had given general education considerable thought, the idea of big history as a field of teaching and research had not yet occurred to me, although I had begun to imagine its possibilities in the years just prior to the time David Christian made the inspired suggestion that we should use the term.

I am having the article reprinted in its original form, in part to underscore whatever originality it may contain and in part to remind readers of how far subsequent discoveries and breakthroughs have taken us in the last thirty years. Obviously, astrophysicists no longer think that the universe is somewhere between fifteen and twenty billion years old. Physical anthropologists no longer describe anatomically modern humans as Homo sapiens sapiens, and historians have grown accustomed to using BCE and CE rather than BC and AD in their dating. We now realize that regions of the world I failed to mention such as the Andean highlands and the highlands of New Guinea brought forth some of the earliest plant domestication in the human experience. The sources mentioned in my footnotes may remain useful, but they have become woefully out of date.

On the other hand, my push for a science-oriented approach to general education may still have some merit and the concept has obviously become integral to the maturing field of big history. We have learned to take for granted the historicity shared by many disciplines. We have been refining our methodology into an ever more tightly integrated interdisciplinarity. Meanwhile, the challenges set forth in my original article have remained fundamentally unchanged, not only within the field of big history we have been pioneering, but in the realm of general education as well.

Of all the challenges confronting this nation's colleges and universities in the 1980s, none seems more difficult than the problem of general education. Extensive academic reform invariably encounters strong resistance, much of it stemming from inherent institutional conservatism, and every effort to achieve greater philosophical and structural coherence in basic undergraduate requirements appears to have fallen well short of the publicly stated goals.

One explanation for these repeated failures was suggested nearly ten years ago by Theodore D. Lockwood, president of Trinity College.[1] Commenting on what he described as "the rush back to general education," President Lockwood warned that college and university faculties "could end up producing just another 'eclectic muddle' of requirements" unless they clearly kept in mind what had caused the earlier required courses to collapse in the first place . He reminded us of the intellectual fragmentation and the disintegration of "a shared set of beliefs about the fundamental goals of undergraduate education" that have resulted from increasing specialization, pointing out that an "everwidening definition of what it is important to know" has been an unavoidable by-product of the information explosion. His most

trenchant conclusion suggested that "today's undergraduate programs frequently resemble a grab bag: a little of this, a little of that, with no integral relationship among the parts. Students rarely gain more than a vague sense of the interrelatedness of knowledge, though it is precisely such insight that they will need to understand themselves and their increasingly complex world."

In words that have lost none of their urgency since they were first written, Lockwood asked: "Do we as faculty hold enough convictions in common to enable a new principle of curricular organization to emerge –a principle that grows organically from widely shared assumptions and that can thus win general assent?"

Despite the many countervailing signs, we have good reason to answer Lockwood's question with a resolute "yes." Deeply ingrained departmental loyalties and a narrow sense of professionalism may have eroded our capacity to grapple with larger educational issues, but the situation is by no means irreversible. After all, we have inherited a venerable tradition of intellectual values and educational purposes that do link us together, despite the obvious and important differences from one field of study to the next. We need to remind ourselves that human knowledge is ultimately indivisible, and that we can fit whatever particular data we happen to be using in our teaching and research into a consistent, interrelated whole. We may therefore reasonably suppose that a college or university faculty could, if it so desired, agree upon its overall goals and set campus-wide priorities. Even in general education, a faculty should be able to define an organizing principle that would bring order out of chaos, focusing attention on crucial issues and permitting a reexamination of established assumptions from a new perspective.

In our search for this elusive organizing principle, it might be helpful to begin with the fundamentals, asking ourselves (once again) what we should be trying to achieve in general education. If we want to overcome the fragmentation that many of us now decry, then we must be prepared to demonstrate the interrelationships and linkages between departmentally separated fields. This aim, in tum, requires an integrating framework within which students can explore their major areas of interest in the most intellectually meaningful fashion. Here we are handicapped by the widely held assumption that a broad academic orientation usually means superficiality, whereas specialization is invariably accompanied by deep insight. We might consider the possibility, instead, that an exhaustive investigation of narrow topics is likely to evoke profound understanding only when coupled with background breadth, while specialization will yield shallowness if it divorces particular information from the larger context. Once we accept that idea, we are ready to appreciate the value of a common educational experience for all undergraduates, an experience that we implement not through the familiar distribution requirements, so often designed to protect departmental interests, but through a number of core courses to be taken by every student in the first two years of the bachelor's degree.

How do we put together flexible, yet integrated, academic structures that allow participating faculty to organize their own class offerings, permit easy administration, and still meet the objectives that a core curriculum is designed to serve? President Lockwood's notion of an organizing principle provides the key, and I shall here delineate such a principle. In so doing, I am not suggesting that this proposal offers the only possible solution to the problem of how to construct a genuinely integrated core curriculum. I want only to show that viable organizing principles can be identified, that they represent an essential element of innovative curriculum-building, and that their implementation can bring substantial rewards to an academic community.

I have selected the concept of evolutionary process, or, alternately, historical development, as the organizing principle because it is fundamentally simple yet comprehensive in scope.[2] Every discipline embraces an element of historicity; every discipline is concerned in one way or another with how the relationship-patterns between apparently

disparate phenomena alter over time. This concern with the process of change can be seen in the biologist's preoccupation with the evolution of life forms, the astronomer's interest in the sequential development of stars, or the political scientist's examination of unfolding political systems. And whatever our disciplines, we discover–when we observe the evolutionary process over long time spans–a persistent direction in the order and sequence shaped by our minds, a direction that moves things from the singular to the plural, from the homogeneous to the heterogeneous, from the simple to the complex, from isolation to integration.

Evolutionary process is thus an organizing principle that we can use to establish connections between our respective fields. If we asked faculty members what, given the current state of scholarly investigation, their particular disciplines have to contribute to the education of general students, and how those contributions might be presented within the context of evolutionary process, they should be able to fit their responses into an integrated series of topics and themes.

A Twelve-Credit Core Curriculum

In order to implement this organizing principle I would block off twelve hours in every undergraduate's program, one three-credit course in each semester of the freshman and sophomore years. The resulting core curriculum would begin with a course taught in collaborative fashion by physicists, astronomers, and geologists. Within a framework that summarized prevailing views about the origins and structure of the physical universe, the instructors would emphasize ideas about the birth of our sun and the subsequent development of the solar system, paying particular attention to the early evolution of the earth as a planetary body. A historically-oriented treatment ranging from the initial formation of elements some eighteen to twenty billion years ago, through the sun's ancestral supernovation about 6.6 billion years ago, to the emergence of the earth approximately 4.6 billion years ago should provide ample opportunity to discuss the properties, changes, and interactions of matter and energy, and thereby to enhance the general student's understanding of those dynamic forces that have shaped and continue to shape the larger cosmos of which he or she is a part.[3]

Students might then explore the formation and development of the earth's interior structure and major surface features, down to the point in our planet's history, about 2.5 billion years ago, when it reached something like its present character. At this point, the course should help to define a global model emphasizing what the bio-geologist Preston Cloud has called the "intimate relationship between plate tectonics, global geography, climatic variation, and biological evolution."[4] With an exposure to concepts that have recently transformed the earth sciences, students should acquire a basic comprehension of the ways in which the forces operating in the earth's interior are connected with those affecting its surface. They should learn about the origins of the atmosphere and hydrosphere and understand how continuing modifications of the earth's crust are related to the evolutionary cycles of air and water, as well as to photochemical and biological processes. The course should produce a heightened sense that nature is indivisible, yet constantly changing, and that the earth is a very unusual cosmic body whose specific characteristics make it capable of supporting life.

At the outset of the second course, students would focus on topics designed by chemists, with their concern for the composition of substances and the transformations that substances undergo. This course should begin by focusing upon the time span, roughly from four billion to 500 million years ago, during which the processes of prebiotic chemical evolution prepared the way for the emergence of life-forms on our planet. Students would learn about the growing complexity of organic chemical formation – how chemicals were transformed from relatively simple, organic molecules into elaborate systems with the properties we usually attribute to living organisms. In addition, students would understand the place of chemical evolution in the origins of the atmosphere and hydrosphere.

Having been exposed to current thinking about the sequence of chemical events leading up to the first living cells, students in the second course would be ready to respond to the questions biologists have raised about the problem of organic evolution.[5] Although a well documented record of life on our planet extends back more than two billion years, the course work should concentrate on the long and diversified process of plant and animal evolution that followed the appearance of multicellular life around 680 million years ago. Students should be exposed to prevailing views about natural selection as a generative process in the unfolding of life-forms and should grasp the ways in which evolution depended on the further development of the earth's biosphere. If asked to think about the distinctive properties shared by all life forms, such as integration, reproduction, homeostasis, and energy capture and, I might add, the permanent cessation of the life functions which we call death, students could begin to differentiate more clearly between living and non-living things.[6]

After their work with chemists and biologists, I would have students take a third course, taught primarily by anthropologists, archaeologists, and historians, which concentrated upon two major transmutations in the development of the human community.' The first, involving the process of physical and cultural evolution that probably originated several million years ago on the savannas of east Africa and culminated in the emergence of Homo sapiens sapiens approximately 35,000 years ago, could be presented as a means of exploring the unique attributes of human beings – intellectual, emotional, and spiritual, as well as physical. In every known culture of the Paleolithic Age (c. 1,600,000-10,000 B.C.), hunting and gathering were the universal means of human subsistence. This course should therefore emphasize those facets of the human experience, such as cooperation, artistic expression, and the permanence of the male-female bond, that developed as a consequence of the hunting-gathering adaptation. For countless generations, small bands of hunter-gatherers functioned in reasonable harmony with their physical environment. Their life was typically nomadic, leisurely, and egalitarian.

Through their examination of hunting-gathering societies, students should be able to grasp the implications of the second transmutation, which culminated in the breakthrough to civilization about 3,000 B.C., and itself embraced two enormous milestones: the Agricultural Revolution and the Urban Revolution.[8]

We have learned to identify the Agricultural Revolution (c. 8,500-6,500 B.C.) with events in the Ancient Near East, but the shift from hunting and gathering to sedentary food production occurred independently and at various times over a several thousand-year period in widely separated places: the Fertile Crescent, southeastern Europe, northern China, south east Asia, and Meso-America. Because settled agriculture provided human beings with the capacity to enormously augment their resource base, it produced a fundamental economic revolution.[9] What should be emphasized here is the heightened impact which human beings now made on their environment, as well as the ways they accelerated the process of change in societies whose enhanced complexity evoked substantially more variety in the behavior patterns of their members.

The Urban Revolution had a similar effect on the scale and complexity of social organization. It too altered the nature of interactions between people, now producing new forms of integrating institutions that reflected hierarchical patterns of authority, social stratification, the specialization of functions, and an unequal distribution of wealth. The course's treatment of the Agricultural Revolution and the Urban Revolution should be designed to help students understand how complex societies– what we usually call civilization–superseded the hunting–gathering context of human existence. They should also have an opportunity to discuss the cumulative impact of cultural evolution.[10]

The fourth and final course in my core curriculum would involve historians and social scientists charged with presenting humanity's experience within civilized societies. Believing, as I do, that the last 5,000 years (3,000 B.C.-2,000 A.D.) will eventually be seen from a

long-term perspective as constituting a single, coherent unit in the evolution of humankind, I want students to comprehend the common denominators among the various civilizations that have emerged,[11] and then, using the common denominators as a take-off point, to examine the third radical transformation in the texture of human existence,the one that humanity is currently experiencing in virtually every area of the world.[12] Consideration of this watershed might appropriately focus upon the theme of modernization as it was pioneered by Europeans under the impact of the industrial and democratic revolutions in the late eighteenth century and as it has subsequently been experienced by peoples in other cultural contexts, partly through a process of Westernization. This approach would make students aware of the increasingly technological, industrial, urban – and global context of contemporary life. They should be asked to think about the radical reorientation of ordinary existence that has taken place since the mid-nineteenth century, in association with momentous technological innovations, scientific advances, and a fundamental restructuring of social organizations and human values.[14]

This, very briefly, is how I would describe one way to build a core curriculum on the organizing principle of evolutionary process. The result should be an interlocking set of courses humane and liberal- which would provide students with a sense of the seminal phases in the development of the universe, the earth, and the human community, as currently understood through scholarly investigation. This hypothetical framework could be altered to fit many possible patterns of contributing disciplines, for it does not necessarily exclude departments or fields that I have failed to use here. The disciplines I have chosen seem to me to be of particular importance, but the organizing principle could be implemented in markedly different ways by different faculties, depending on their particular strengths and interests. Similarly, I have no fixed notions about the size of the core block, though the number of credit-hours committed to the common core should be kept fairly small, if only to allow students ample opportunity, in the first two years, to satisfy other academic needs. The core block is intended to provide a basic background, rather than a comprehensive treatment of any topic. The size of the core and the content of its courses could be altered at any time; additional requirements, such as freshman English, foreign languages, or mathematics, could readily be clustered around it.

Discussion of the Science-Oriented Core

While many other questions could profitably be raised about this proposal, I want to concentrate on the problems inherent in its heavy reliance on the natural sciences.[15] Many students are frightened by science requirements, doing everything they can to avoid them and typically feeling that they have derived little benefit from those science courses that they have been compelled to take. Some discomfort may be felt by humanists, who are accustomed to viewing their own disciplines as the heart of general studies; and, above all, by science faculties, who are usually so immersed in laboratory research and other professional activities that they have little time to devote to subjects not directly related to their own work.

As for the objections that might be raised against reversing the relative emphasis on the sciences and humanities, I would respond that any system of general education relevant to the needs of contemporary students must embrace the natural sciences, partly because of the role played by the sciences in shaping our age, partly because the sciences have become one of the most important sources of genuinely new insight into the human condition. An obvious example can be seen in the discovery of the helix structure of DNA, which has opened up the possibility for a better understanding of such fundamental life-processes as heredity, growth, and aging, and perhaps intelligence and memory as well. The consequent refinement of molecular biology, bringing with it the prospect of deliberate genetic manipulation, raises difficult ethical problems that illustrate the humanistic value of science in the program of general education. Any system of general education that attempts to offer a foundation for confronting the nature and meaning of contemporary human existence, but fails to draw heavily upon the sciences, would be grossly deficient.

Furthermore, serious study in the sciences can be exciting to individuals for whom science is not a primary concern. From my own teaching experience, I suspect that students who are curious about the origins of things will have no trouble finding in the sciences essential raw material on which to base their reflections. Widespread discontent over existing science requirements notwithstanding, I have observed numerous undergraduates who are easily provoked into thinking philosophically about their lives by an exposure to theories and concepts derived from the natural sciences. Instead of killing general education, an extensive science component that would not be taught as an encyclopedic factual summary, nor solely as an introduction to particular disciplines, but would be presented with a humanistic orientation and an abiding concern for the intellectual welfare of undergraduates, could well bring a new general education program to life, making it far more meaningful to students than anything we have given them thus far.

And what of our science faculties? It seems to me that they could profit as much from the development of a science-oriented core curriculum as could the students in their courses. Preparation to teach general requirements would broaden their perspective on their own disciplines, help them place specialized research into an enriching content, and enable them to integrate more effectively their responsibilities as educators with their achievements as scholars. Moreover, what can be said of scientists can be said of the entire academic community. We need strong, dynamic systems of general education for our own professional growth, as much as our students need them for their intellectual advancement. If nothing else, a determined commitment to the formation of an innovative core curriculum could provide a college or university faculty with an opportunity to establish closer ties be tween teaching and research, while bridging the gap between what C. P. Snow long ago labeled "The Two Cultures."

Another reservation about the academic structure envisioned here may stem from its unitary character. The aim is to generate the very best and up-to-date interpretation of reality that a faculty is capable of producing. And yet, trained as we are to analyze data from a variety of perspectives, and to emphasize—at least in the humanities—that individuals comprehend issues in various ways, we are bound to feel uncomfortable with the very idea of a core curriculum that imposes one dominant approach. Any coherent academic structure will be founded on common assumptions that, in turn, tend to dictate a shared overall interpretation. What is critical, therefore, is the way in which that interpretation is handled in the classroom. Don't we all insist that one view takes precedence over another, in light of our own understanding of a particular problem? We counterbalance this tendency, however, by also insisting that our information is incomplete and our conclusions tentative. Successfully incorporated into our teaching, a healthy sense of tentativity should be an adequate antidote to the intellectual limitations inherent in any common organizing principle for general education.

Moreover, we cannot avoid limitations if we are to provide our students with what has for so long been missing in general education: a clear academic vision of the world in which we live. Through a core curriculum like the one outlined above, we could say to our students that this is what we, as a faculty, have come to understand, through teaching and research, about the nature of reality; this is how we, as an academic community, bring meaning to the data we have acquired; and we are presenting it to you so that you can use whatever appears relevant in your own quest for ultimate answers.

Yet the biggest challenge, as I see it, stems from the fact that few existing courses can accomplish what I have in mind. Key faculty members would have to leave aside their research and other professional activities long enough to engage in a prolonged experiment in curriculum-building, an experiment. whose initial results might not prove entirely satisfactory. Administrators would have to reorient the prevailing reward sys tems to

support an uncertain enterprise. Without any doubt, the implementation of a core curriculum would entail substantial shifts in deeply entrenched professional attitudes, as well as an extensive investment of precious resources.

Given such obvious difficulties and limitations, why would any institution of higher learning want to commit itself to such a burdensome enterprise? Doesn't this project involve unacceptably high risks, especially at a time when so many colleges and universities are hard pressed to fund existing programs? I would insist that it is precisely our present difficulties that make carefully calculated risk-taking in general education both beneficial and, in the long run, inescapable. What we are now offering is not meeting our expectations. Our recurring attempts to solve fundamental academic problems with old techniques are proving insufficient. It is unlikely that any reasonable innovation we might try could make general education more confused and divisive than it already is.

We might encourage ourselves by remembering the potential advantages of a strong core curriculum. For our students it could mean welcome direction in their undergraduate experience. Administrators would worry about the impact of radical experimentation on recruitment and retention, but I hold fast to the conviction that there are many young men and women who would respond enthusiastically to a rigorous course of study which would bring them into closer contact with the realities of their world, allowing them to grapple with the nature of those realities through the contributions of advanced scholarship. As for the faculties of our colleges and universities, they would be compelled to demonstrate the very breadth of knowledge that they insist they want to see in their students.

In short, involvement in a core curriculum would motivate us to exemplify more completely the principles of liberal education that we nominally espouse, to the enrichment of both teaching and research. The development of a core curriculum might help us channel our collective energies, enabling us to regain that sense of common purpose and larger commitment that has invariably characterized educational institutions during periods of unusual accomplishment. And to what, we may ask, is the next generation of undergraduates more likely to respond?

Notes

1. "The Rush Back to General Education, " *The Chronicle of Higher Education*, 14, No. 13 (May 23, 1977), 32.
2. For an illustration of how the concept of evolution can be used as a "broad working hypothesis that attempts to integrate all that is known into an overall frame work of understanding, " see Eric J . Chaisson, "Three Eras of Cosmic Evolution," in *Life in the Universe*, ed . John Billingham (Cambridge, Mass.: MIT Press, 1981), pp. 1-16. For a more readable explication of Chaisson's views, consult his *Cosmic Dawn, The Origins of Matter and Life* (Boston: Little, Brown and Company, 1981), the last three chapters of which remind us that human culture, when considered as a totality , is properly treated as an evolutionary stage in a universal process. For the general reader who wants to move beyond Chaisson, Ilya Prigogine's book *From Being to Becoming, Time and Complexity in the Physical Sciences* (San Francisco: W. H. Freeman and Company, 1980) would be a good place to begin.
3. For the nonspecialist, Joseph Silk, *The Big Bang, The Creation and Evolution of the Universe* (San Francisco: W. H . Freeman and Company, 1980), offers a manageable introduction to the history of the universe and to current controversies in astronomy, cosmology, and astrophysics.
4. Preston Cloud, *Cosmos, Earth , and Man: A Short History of the Universe* (New Haven: Yale University Press, 1978), provides an excellent overview of this relationship in Part Two.
5. The justification for asking chemists and biologists to work together in this second core course has been articulated succinctly by a leading textbook author, who observed that "one of the fundamental maxims of modern biological science is that life processes obey the laws of chemistry and physics. Clearly, there is no understanding modern biology without at least some knowledge of chemistry, especially the

chemistry of the elements and classes of compounds that form living material." See William T. Keeton, *Biological Science*, 3rd ed. (New York: W. W. Norton and Company, 1980), p. 27. On p. 25 of the fourth edition, coauthored in 1986 with James L. Gould, Keeton underscored his original point by asserting that "the study of biology . . . begins with—and continually returns to—the basic laws of chemistry and physics."

6. While much has been written on this subject, an approach consonant with the requirements of general education is suggested by Nobel Prize-winning biologist Francis Crick, who skillfully addresses a variety of difficult issues in *Life Itself, Its Origin and Nature* (New York: A Touchstone Book, 1981).

7. For a more extensive discussion of this idea, see John A. Mears, "Conceptual Strategies for Survey Courses," in *What Americans Should Know: Western Civilizations or World History?* Proceedings of a Conference at Michigan State University April 21-23, 1985, ed. Joseph W. Konvitz (East Lansing, Mich.: Board of Trustees, Michigan State University), pp. 67-81.

8. In discussing these milestones, I have drawn upon Charles L. Redman, *The Rise of Civilization* (San Francisco: W. H. Freeman and Company, 1978).

9. This argument has been made by Douglas North, *Structure and Change in Economic History* (New York: Norton, 1981), Chaps. 7-8.

10. Important contributions to the theory of cultural evolution were made in the 1960s by the anthropologist Julian H. Steward, many of whose papers have been reprinted in *Evolution and Ecology, Essays on Social Transformation*, ed. Jane C. Steward and Robert F. Murphy (Urbana: University of Illinois Press, 1977). A leading contemporary theorist is Marshall D. Sahlins; an early summary of his views can be found in the essay "Evolution: Specific and General," published in a volume he co-edited with Elam R. *Service, Evolution and Culture* (Ann Arbor: The University of Michigan Press, 1960). For the modification of his views since 1960, consult Marshall D. Sahlins, *Culture and Practical Reason* (Chicago and London: the University of Chicago Press, 1976).

11. Here again, historians will find help in the writings Qf anthropologists. See, for example, Eric R. Wolf, *Europe and the People Without History* (Berkeley: University of California Press, 1982), Chaps. 1-3; and Grahame Clark, *The Identity of Man* (London: Methuen, 1983), Chap. 6.

12. A provocative assessment for the beginning student can be found in Kenneth Boulding , *The Meaning of the Twentieth Century: The Great Transition* (New York : Harper and Row, 1964).

13. Modernization and Westernization are controversial concepts which often confuse, rather than clarify, complicated issues. Much has been written on modernization, but I prefer the definition offered by John R. Gillis in *The Development of European Society 1770-1870* (Boston: Houghton Mifflin Company, 1977), pp. xi-xiii.

14. For an economic perspective, see North, Chaps. 9-12.

15. Despite its age, *General Education in Science*, ed. I. Bernard Cohen and Fletcher G. Watson (Cambridge: Harvard University Press, 1952), remains one of the best resources for educational leaders concerned about the natural sciences. Little has been written on the place of the sciences in the kind of core curriculum I am suggesting here.

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Response to
"Evolutionary Process: An organizing principle for general education"

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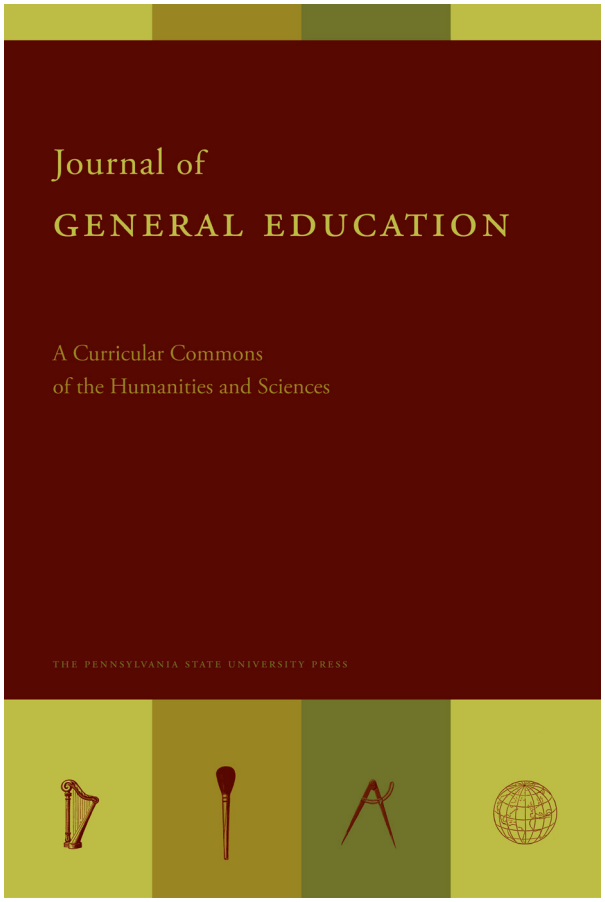
When reading John Mears' article "Evolutionary Process: An organizing principle for general education" in an early draft of this Origins issue, it struck me how relevant many of ideas and challenges John described still are today, almost 30 years after the publication of the piece. This also made me wonder why I had not read the obviously important article before. I wanted to know what happened to John's ideas, if they had been put into practice at Southern Methodist University, and if so, what worked, what did not and why? These questions seemed very relevant to me as a big historian, yet I didn't know the answer to any of them.

This may be partly the case because at the time when John Mears' article was published, I had barely left kindergarten. I therefore don't remember the article being published or discussed by peers. I had known for a while though about John's pioneering role in the field of big history, so I could have asked around and looked up the article. Doing so just never crossed my mind.

This makes me realise that I and possibly some others who entered the field of big history in the last decade as well or so may not know as much about the recent history of our field as we should. As a result, from time to time we may be trying to reinvent the wheel, when instead we could be building on the experience and knowledge of the big history pioneers of the '60s, '70s and '80s.

Perhaps this points to a need to describe the endeavours of the people who laid the foundations for the modern academic big history movement in greater detail. Such descriptions, along with original publications and summaries or reviews of such publications, could then be published, so people could learn from them. For this reason, I think publishing this reprint of John Mears' article in Origins is a very good idea, and I hope more similar pieces will follow.

John Mear published his article, "Evolutionary Process: An organizing principle for general education" when I had barely left kindergarten . . . . We could be building on the experience and knowledge of the big history pioneers.



Researching a New Scholarly Field: The Case for Big History

Abel A. Alves, *Ball State University*

After decades of scholars in the humanities and social sciences arguing that knowledge cannot be unified, and that such efforts might even be dangerous, Big History provides us with a reality-based venue for interdisciplinary discussion. It works to advance our collective learning by promoting categories of understanding that can be corroborated through the gathering of multiple pieces of evidence and the application of interpretive methodologies from different disciplines. It provides a viable means to attaining a global, encyclopedic sense of knowledge that was once dreamed of by the likes of Aristotle, Sor Juana Inés de la Cruz and the authors of the Enlightenment's *Encyclopédie*, and one that has been called for again by individuals like Edward O. Wilson in his book *Consilience: The Unity of Knowledge* (Knopf, 1998).

The 1980s and 1990s saw much of American academic discussion in fields like history, literature and cultural anthropology dominated by cultural constructionism. The differences generated by language and customs were emphasized to such an extent that one might think that different cultures created entirely different species of humanity that could not understand each other, even when we all know that the errors of mistranslation do not preclude our ability to give the same message in multiple languages at an airport, and to have that message understood in uniformity by people of different languages and cultures. Cultural construction often ignored the fact that cultures are not constructed out of thin air—that to assemble anything there must be building blocks. Constructionists like Michel Foucault and Jacques Derrida created a new nominalism where particulars could not be reduced to universal essences, and any interpretation was as good as any other interpretation in a competition of discourses. That a struggle for power still existed for these individuals begged the question of whether some human behaviors, and categories of understanding those behaviors, might transcend individual cultures. Among other things, don't we all breathe air, drink water and rely on food? Aren't these aspects of our nature important, and don't cultures construct themselves in relation to these realities?

In the 1920s in France, the Annales School of historians was already engaged in seeking "the structures of everyday life" that underpin all the rest of human history, and in such a way that they tried to divorce themselves from ideologically influenced narratives like Marxism and Classical Liberalism. Annalistes poured through archival records to uncover mortality rates and caloric intake. They studied geography to learn the limitations on food production provided by a particular topography, and they always related these material realities to the cultural interpretations of them, seeking out general cultural attitudes that they labeled *mentalités*.[1] In *The Mediterranean and the Mediterranean World in the Age of Philip II* (Harper & Row, 1972-73; originally published 1949), Fernand Braudel made the sea and its surrounding deserts and mountains the true protagonist of his history, explaining transhumance and galleys in the context of a lack of flat fertile fields and winds respectively.[2] In his first volume of *Civilization and Capitalism: 15th-18th Century*, entitled *The Structures of Everyday Life* (Harper & Row, 1981; originally published 1967), Braudel opened with the early modern

1 For an overview, see Peter Burke, *The French Historical Revolution: The Annales School, 1929-2014*, 2nd ed. (Stanford: Stanford University Press, 2015).

2 Although the Mediterranean does experience some fine seasonal trade winds, galleys, maneuverable without a favorable wind, persisted for centuries in the Mediterranean region: "The costly Mediterranean galleys could sometimes of course, even in the seventeenth century, make startling comebacks: a sailing vessel was only the stronger when there was enough wind to fill her sails. In a dead calm the agile galley could move to the blind spots of the immobilized fortress and carry off the victory." Fernand Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II*, trans. Siân Reynolds, 2 vols. (New York: Harper & Row, 1972-73), 1: 636, 257. For transhumance, see 1: 85-102, 238-46.

human population's pursuit of subsistence and its reliance on wheat, rice and maize above all else. Though he would go on to discuss economies and social structures, they were always rooted in physical reality. Borrowing from cultural anthropology, sociology, economics, geography and the dietary studies of his day, Braudel and other Annalistes expanded knowledge through developing an interdisciplinary understanding of human history that always referred back to basic human needs and pursuits underlying our rich cultural variations.

Big History answers the relativism of late twentieth-century cultural constructionism (i.e., you cannot create a unifying master narrative), and it revitalizes the Annales School quest by applying the tested and corroborated methods of the sciences to human history. History now possesses tremendous and ever-growing amounts of data. By stepping back and contextualizing human history in "the rhythms of natural history as a whole," Big History helps us to organize vast amounts of information.[3] By breaking down disciplinary limitations that interfere with attempts to organize broader templates of understanding, Big History can bring order to the chaos of fractured historical discussions.

Rather than only being focused on cultural differences in the farming practices of places like Asia and Europe, Big History steps back to discuss our need to forage and farm because of our inability to use sunlight, carbon dioxide and water to photosynthesize our own carbohydrates like plants. It also recognizes that leaf-cutter ants have farmed before us, and that other ants, herding aphids, have been pastoralists before the Mongols and other human groups. Farming and pastoralism are thereby understood as part of the cycles of nature, even before Big History then proceeds to explore early agrarian cultures' fascination with understanding the seasonal cycles of planting and harvesting through the patterns writ in the stars and the religious projections that derived from this real reliance on the heavens.

From David Christian's *Maps of Time* in 2004 to the 2013 textbook *Big History: Between Nothing and Everything* (McGraw-Hill, copyright 2014) by Christian, Cynthia Stokes Brown and Craig Benjamin, Big History's evidence has been presented in the light of the Big Bang and thresholds of complexity. This foundational perspective, which firmly places humanity in the context of the natural world, is so universal in scope that it allows for a myriad of other fruitful avenues of interdisciplinary exploration under its canopy.

My own work occupies a small area within the expanse of Big History. I study the effect of evolution and the environment on human culture. The methods and evidence of comparative ethology and biological anthropology therefore inform my analysis of the historical record. If a behavior, like food-sharing, can be found across human cultures and in the activities of other social animals, especially our close primate relatives, aren't we looking at an evolutionary trait? But why do different human communities share different kinds of food and have different table manners? Aren't these cultural adaptions also rooted in biological reality? Different environments provide different resources which people utilize to express human universals. This is the sort of topic I explored in my 1996 book *Brutality and Benevolence: Human Ethology, Culture, and the Birth of Mexico* (Greenwood). The sixteenth-century conquest of Mexico became my case study to test the presence of species-specific patterns like hierarchy, agonistic display, food-sharing behavior, xenophobia and curiosity—patterns that both Amerindians and Spaniards could recognize in each other despite their differences in language and particular customs. In the tradition of Alfred W. Crosby's *The Columbian Exchange* (Greenwood, 1972), I also looked at how Amerindian and Spanish cultures are syncretized as they combined different catalogues of domestic plants and animals.

In addition to my being influenced by Crosby, the title of my first book,

3 David Christian, "The Case for 'Big History'," in *The New World History: A Teacher's Companion*, ed. Ross E. Dunn (Boston and New York: Bedford/ St. Martin's, 2000), 581. Originally published in the *Journal of World History* 2 (Fall 1991): 223-38.

Brutality and Benevolence, itself reveals my longstanding debt to the anthropologist Claude Lévi-Strauss. His binary structuralism appealed to me in the 1980s, as did Fernand Braudel's quest for *The Structures of Everyday Life*. However, there was an influence on my thought even older than these: the groundbreaking scientific work of Jane Goodall. As a boy, I was captivated by National Geographic's televised *Miss Goodall and the Wild Chimpanzees* (1965). I then went on to read articles in the *National Geographic* magazine and her 1971 book *In the Shadow of Man* (Houghton Mifflin). Jane Goodall first taught me that we can better understand our own species-specific behaviors by comparing and contrasting them to the behaviors of our closest living relatives. If chimpanzee cooperation and competition were used to elucidate our own cross-cultural patterns of behavior in *Brutality and Benevolence*, it was because of Jane Goodall's excellent work as the historian of the chimpanzees of Gombe, Tanzania.

Termed "biohistory" by Robert McElvaine in his 2001 book *Eve's Seed: Biology, the Sexes, and the Course of History* (McGraw-Hill), the approach I used in *Brutality and Benevolence* was already foreshadowed in the footnotes, brief paragraphs and articles written by historians like Richard Trexler, Gregory Hanlon and Theodore Zeldin in the 1980s and early 1990s.[4] In 2001, the biohistorical approach gained the attention of *The New York Times*, and McElvaine and I were interviewed by Emily Eakin for an article entitled "Tilling History with Biology's Tools."[5] A comparative primatology that included humanity had now become a research agenda in history—one in line with the notion developed by David Christian, and elaborated by Russell Genet, that we are "the chimpanzees who would be ants."[6]

In 2002, this venture into historical human ethology was expanded further when Carol Blakney, my collaborator from the very start of this endeavor, began biohistorical research on the development of feminism and patriarchy in human culture. Feminist behaviors reappear again and again across human cultures and in other animal species as well. Though our usage of the term "feminism" may have originated in the late nineteenth century, assertive females who define culture, often against the violent opposition of males, have always existed.

In 2007, Blakney and I coauthored our first essay in the biohistory of feminism. It focused on the seventeenth-century Mexican intellectual and feminist Sor Juana and was published online by the Metanexus Institute as "Baroque Consilience: Sor Juana Inés de la Cruz."[7] This was done under the auspices of the institute's executive director William Grassie, a proponent of Big History whom I had first met at one of the interdisciplinary conferences held by Susanne Lohmann's UCLA Center for Governance between 2001 and 2003. It was a fertile time, and I was exposed to the ideas of individuals like Lohmann, Grassie, Christopher Boehm, Patricia M. Greenfield, David Sloan Wilson and others.

4 Richard C. Trexler, *Public Life in Renaissance Florence* (Ithaca and London: Cornell University Press, 1980), p. xxiv, n. 11, p. 88, n. 7, pp. 110-11, n. 97, p. 132, n. 2; Richard C. Trexler, *Sex and Conquest: Gendered Violence, Political Order, and the European Conquest of the Americas* (Ithaca: Cornell University Press, 1995), 197-98, n. 112; Richard C. Trexler, "Introduction," in *Gender Rhetorics: Postures of Dominance and Submission in History* (Binghamton, NY: Medieval and Renaissance Texts and Studies, 1994), 2-3; Richard C. Trexler, "Introduction," in *Dependence in Context in Renaissance Florence* (Binghamton: Medieval and Renaissance Texts and Studies, 1994), 3-4. Also see Gregory Hanlon, "Les Rituels de l'agression en Aquitaine au XVIIe siècle," *Annales: Économies, Sociétés, Civilisations* 40:2 (mars-avril 1985): 244-68; Theodore Zeldin, *An Intimate History of Humanity* (New York: Harper Collins, 1994), 135-42.

5 Emily Eakin, "Tilling History with Biology's Tools," *The New York Times* (Saturday, February 10, 2001), A15, A17.

6 David Christian, *Maps of Time: An Introduction to Big History* (Berkeley, Los Angeles and London: University of California Press, 2011), 250-52; Russell M. Genet, *Humanity: The Chimpanzees Who Would Be Ants* (Santa Margarita, CA: Collins Foundation Press, 2007), 51-53, 86, 93.

7 Carol Blakney and Abel Alves, "Baroque Consilience: Sor Juana Inés de la Cruz, Theology, Natural Philosophy, and Feminism," Big History, Metanexus Institute, http://www.metanexus.net/essay/baroque-consilience-sor-juana-ines-de-la-cruz (June 22, 2007).

An earlier version of the Sor Juana essay entitled "The Biohistory of Feminism: Sor Juana Inés de la Cruz, Jane Goodall, and Gigi" had been sent to *The American Historical Review* for consideration in 2002-2003. Although a decade later, in December 2014, *The American Historical Review* has now published a roundtable discussion "History Meets Biology,"[8] the time was not right in January 2003 when we received the seven readers' reports. While one anonymous reader applauded "the attempt to stretch history across the primate field," calling the essay an "exciting undertaking" and "an interesting article that uses the activities of the chimpanzee Gigi to defeat arguments about cultural construction," and another found the manuscript to be "a well-written, provocative essay that deserves a wider reading," a third thought the manuscript was "an odd article to send to a history journal."[9] Over the past decade, fertile interdisciplinary discussions with other scholars continued to provide ideas, and Blakney and I are now engaged in writing a book-length manuscript entitled *The Biohistory of Feminism*.

Between 2007 and 2011, interdisciplinary exchange also contributed to my exploring the interaction of people of European, African and Amerindian cultures with nonhuman animals. This resulted in *The Animals of Spain: An Introduction to Imperial Perceptions and Human Interaction with Other Animals, 1492-1826* (Brill, 2011), a book that still insists at the end that "Humans too were animals of Spain."[10]

It was also during this time that I became aware of the newly formed International Big History Association and saw that its interdisciplinary scope and interests provided a community where the sort of work done by Blakney and myself might be discussed. I became a founding member in 2011 and presented at the inaugural conference in 2012. I also immersed myself in *Maps of Time* and other expositions of Big History. "The Animals of the Spanish Empire: Humans and Other Animals in Big History," in *Teaching and Researching Big History: Exploring a New Scholarly Field* (Uchitel Publishing House, 2014), resulted from these first encounters between my biohistorical approach and Big History. I look forward to other dialogues in the future and hope that ethological analyses of historical human behavior can be of some use in providing Big History with microcosmic pieces of evidence to support its positioning of humanity in "the rhythms of natural history as a whole."

The particulars gathered through microhistories can be used to deter facile overgeneralizations concerning human behavior, while the facts of evolutionary biology can be used to contextualize and make sense of human history. But so too can the facts of astrophysics, geology and other chronometric sciences. One of the greatest strengths of the International Big History Association is that its membership includes scientists as well as historians. The organization provides a permanent venue for interdisciplinary work, and, thereby, multiple ways to create new avenues of intellectual exploration to expand upon the foundations laid by David Christian in *Maps of Time*.

Already Esther Quaedackers has engaged in a method of deconstructing artifacts of our material culture so that they are understood both in the light of science and the humanities. Her discussion of Tiananmen in *Teaching and Researching Big History: Exploring a New Scholarly Field* is a new sort of microhistory that fully contextualizes a famous human monument built six centuries ago in China. From the gravity and electromagnetism that underpin the engineering of any structure on earth to the fact that other animals build protective structures, and that bowerbirds use construction to display, Quaedackers, through reverse engineering Tiananmen, demonstrates one way in which humans must

8 Multiple Authors, "AHR Roundtable: History Meets Biology," *The American Historical Review* 119: 5 (December 2014): 1492-1629.
9 Correspondence dated January 31, 2003 concerning "The Biohistory of Feminism," Manuscript #31377 submitted to *The American Historical Review.*
10 Abel A. Alves, *The Animals of Spain: An Introduction to Imperial Perceptions and Human Interaction with Other Animals, 1492-1826* (Leiden and Boston: Brill, 2011), 219.

be understood as a part of nature. In a course she has co-taught with Fred Spier at the University of Amsterdam, her students are now following her lead in writing about beer or the Mona Lisa in relation to the solar system, the origin of life and human evolution.[11] Her approach anchors interdisciplinary discussion in a very concrete way by applying the perspectives of different disciplines to understand a manageable topic more fully than even the Annales School did. Building on a tradition foreshadowed in works like Sidney Mintz's *Sweetness and Power: The Place of Sugar in Modern History* (Viking-Penguin 1985) and Mark Kurlansky's *Salt: A World History* (Walker, 2002), this sort of approach can surely help to extend knowledge for scientists, students of the humanities and the general public.

There are other possibilities for the future evolution of Big History as well. Our propensity to develop collective learning might be used to direct the study of Big History in a way that resembles the teaching and writing of historiography. Starting with Enheduanna's mythic interpretation of the heavens, this exploration of Big History can then go on to demonstrate the accumulation of corroborated evidence that leads to our understanding of the cosmos today. Along the way, humans, so fascinated with the doings of their conspecifics, will be drawn into a presentation underpinned by the life histories and achievements of individuals. This was already done to some extent for a popular television audience in Ann Druyan's and Steven Soter's revised edition of *Cosmos* in 2014.[12] Obviously, the individuals who were selected for this series, including Mesopotamian priestess and author Enheduanna (ca. 2300 BCE), did not comprise an exhaustive list. Just as the Annaliste Pierre Goubert broadened biography to write about *Louis XIV and Twenty Million Frenchmen* (Pantheon, 1970; originally published 1966), arguing that the seventeenth-century French monarch could only be fully understood in the light of his interaction with his subjects, a scientist's or intellectual's biography can be written so that the story is couched in terms of the contribution made to our understanding of our place in the universe, and Big History itself can be written as the development of our perception of the cosmos.

Since the publication of the first edition of *Maps of Time* in 2004, Big History has started to map different avenues of research. From seeing us as "chimpanzees who would be ants" to Quaedackers's comprehensive interdisciplinary genealogies, the research has started, even while other avenues, such as interaction with the history of science, continue to be suggested by overviews like the text *Big History: Between Nothing and Everything*, published by Christian, Brown and Benjamin.[13] There is much work to be done, and the International Big History Association provides a truly interdisciplinary environment for the broadest possible gathering of corroborated knowledge. We have a future, even as we study the past.

11 Esther Quaedackers, "To See the World in a Building: A Little Big History of Tiananmen," in *Teaching and Researching Big History: Exploring a New Scholarly Field*, ed. Leonid Grinin, David Baker, Esther Quaedackers and Andrey Korotayev (Volgograd: "Uchitel" Publishing House, 2014), 90-111.

12 Ann Druyan and Steven Soter, *Cosmos: A Spacetime Odyssey*, dir. Brannon Braga, Bill Pope and Ann Druyan, presented by Neil deGrasse Tyson (Twentieth Century Fox Home Entertainment, 2014).

13 For a small sampling of such history of science moments, see David Christian, Cynthia Stokes Brown and Craig Benjamin, *Big History: Between Nothing and Everything* (New York: McGraw-Hill Education, 2014), 18, 46-47, 81-82.

New and Returning IBHA Members

One of the key purposes of the IBHA is for those of us who are interested in Big History to have a place to associate. It is a place to learn of other members' Big History activities and thoughts. So we are delighted to welcome new members to the IBHA – and by the vote of confidence and recognition of the value of our association by those who have renewed their membership. It is a pleasure to have each of you with us.

Ken Baskin — February 26 — Renewal

Mark Ruble — February 26 — New Member

F. Lanier Graham — March 1 — Renewal

Dustin Eirdosh — March 11 — New Member

Arturo Giraldez – March 11th – Renewal

Jerry Arlen Jones — March 11 — New Member

Ann El Khoury – March 11th – Renewal

Philip Kenney — March 14 — New Member

J.M.G. (Ann-Marie) Poorthuis — March 15 — Renewal

Jonathan Markley — March 17 — Renewal

Wendy Curtis – March 18 – Renewal

Nobuo Tsujimura – March 19 – Renewal

Tony Harper – March 19 – Renewal

Bill Cox – March 19 – Renewal

Adalberto Codetta Raiteri – March 19 – Renewal

Stuart Silverstone – March 22 – Renewal


Third IBHA Conference
July 15 - 17, 2016
Amsterdam

Earth and Planetary Science
University of California, Berkeley

Renaissance Geology Group
Walter Alvarez
David Shimabukuro
Roland Saekow
Cheyenne Waldman
Ana Isabel Martínez Poza

ChronoZoom Celebration and Reunion

Big History and ChronoZoom

Pyramids of Giza
Hellenistic World
Roman Empire
Eruption of Vesuvius in 79 AD destroys Pompeii
Ptolemy
Avicenna
Darwin
Wegener
Lunar landing

3rd Millenium B.C. | 2nd Millenium B.C. | 1st Millenium B.C. | 1st Millenium A.D. | 2nd Millenium A.D.

5 THOUSAND YEARS | 5 THOUSAND YEARS

HUMAN HISTORY

EGYPT
Mount Saint Helens

"Ardi" *Ardipithicus ramidus*
"Lucy" *Australopithicus afarensis*
1000X zoom

5 MILLION YEARS | 5 MILLION YEARS

HUMAN PRE-HISTORY

"Ardi," 4.4 Ma
"Lucy," 3.2 Ma
Snowball Earth Episodes
1000X zoom

4.567 BILLION YEARS | 4.567 BILLION YEARS

EARTH & LIFE HISTORY

Atmosphere and Oxygen
Production of the Continental Crust
Oxygen content of the atmosphere
Makganyene Snowball Earth episode
Snowball Earth episodes
Sturtian
Marinoan
Hadean | Archean | Proterozoic | Phanerozoic
(Precambrian)

BIG BANG
3X zoom
13.7 BILLION YEARS | 13.7 BILLION YEARS
The sun and planets form

COSMIC HISTORY

Ardi image courtesy of Gen Suwa; Lucy image from "Bone Clones" 2010"; early Earth image from NASA/JPL; Pyramid photo by Jerzy Strzelecki.

The ChronoZoom project has just transitioned development and project management from Microsoft Research to the University of Amsterdam and Fontys University thanks to the support of Esther Quaedackers and Marcel Koonen. ChronoZoom will fall under the under the auspices of Axiell: the major museum software company. This marks the end of 6 years of direct development under Microsoft Research. In a way, the project will graduate, leave Microsoft Research, and move to the very capable leadership of Esther and Marcel.

To celebrate the occasion and new beginnings, Roland Saekow hosted a reunion dinner in Bellevue, Washington to thank Microsoft Research team members for all their hard work over the past 5 years developing ChronoZoom as a free open source timeline project. The reunion dinner occurred on March 2nd, 2015.

Rane, Roy, Lori and many more were able to attend.
- Tony Hey, former Vice President of Microsoft Research Connections
- Daron Green, Senior Director at Microsoft Research Connections
- Bill Crow, Principal Program Manager at Microsoft. His team

Roland Saekow presenting Daron Green with IBHA recognition plaque.

ChronoZoom Celebration and Reunion

From left to right: Daron Green, Alex Wade, Javier Luraschi, Bob Walter, Tony Hey, Roman Snytsar, Mike Zyskowski, Rane Johnson, Milly Alvarez, Donald Brinkman, Curtis Wong, Jay Beavers, Roland Saekow, Walter Alvarez, Lori Ada Kilty, Roy Zimmermann, Bill Crow, David Shimabukuro, Peter Skjøtt Larsen, Neil Cresswell, Chris Engberg, Cici Wang

developed the underlying zoom technology called Seadragon used in the original ChronoZoom.
- Curtis Wong, Principal Researcher at Microsoft Research who developed World Wide Telescope.
- Alex Wade, Director for Scholarly Communication at Microsoft Research.

In all, 22 were able to attend from three different teams at Microsoft Research that worked on the project.

The IBHA produced a plaque recognizing Microsoft Research's support over the past years that was awarded at a ceremony at the dinner. Roland read an official statement/letter on behalf of the IBHA board while presenting the plaque to Daron Green, who was part of the founding of the IBHA in Coldigioco, Italy in 2010.

Walter Álvarez gave a commencement speech for ChronoZoom's "graduation." Roland had suggested the original idea for ChronoZoom in Walter's class in 2009; he finally "turned in" the full term paper that had been a course requirement.

Photos of Microsoft dinner by Chris Engberg

Nominations for IBHA Board of Directors

The members of the IBHA Board of Directors hold staggered three year terms. Each year, a few seats become open. Since the IBHA was founded, there have been a number of Board members who have cycled off the Board, a number of new people who have joined it, and a number who have stayed on. In the interest of fostering both continuity and change, the IBHA selects Board candidates in two ways:

(1) the existing Board proposes a list of names; and
(2) IBHA members identify additional names.

We encourage you to participate by logging on to the IBHA website at http://ibhanet.org/. Click on "Forum," "IBHA Discussions," and "IBHA Board of Directors Nominations." You may by April 15, 2015 post the names of any members you recommend for Board membership.

Up to that time, please check the forum periodically for new postings and endorse all candidates of your choice. (Just follow the simple instructions at the website.) Moreover, if you become a candidate, please add a statement describing your interest in serving as a Director. Should you be recommended but unable to serve, please let us know. Candidates endorsed by at least 10% of IBHA membership (37 people) before May 15, 2015 will become nominees.

An electronic election for new Board members will begin on July 1, 2015, and end on July 31, 2015. The new Board will be announced in August.

We welcome your active engagement in this important process.