

## HUMAN STUDIES AT A CROSSROAD: ANTHROPOLOGY, BIG HISTORY, AND OUR GLOBAL FUTURES

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**Abstract:** Anthropology has been in a constant process of expansion and clarification since humans began to consider their place in the world. As an exercise in increasing self-awareness, anthropology is not so much a discipline as it is an interdisciplinary field of study. In this way, it shares common ground with the field of big history, which also provides a way to contextualize humanity in its wider milieu. Such macro-views lead to new ways of thinking about past concepts, such as revising antiquated models of regional civilizations into a global civilization. In addition, anthropology has historical precedents for intersecting with big history, as in the works of Alexander von Humboldt, Sarat Chandra Roy, and Leslie White. The author describes these twin fields as complementary paradigms that can assist each other to not only better understand the human condition but to seek a new way forward in a time of climatic change and social crisis. His contention is that, just as anthropology historically built upon inputs from various societies and disciplines, its range of studies and social connections will continue to expand. This movement towards synthesis and holistic thinking will push anthropology into an exciting frontier of new challenges.

**Keywords:** Anthropology, Civilization, Big History, Evolution, Social Change, Humanity, Future.

We humans engage in a constant process of enlarging our understanding of the world around us. As our ancestors spread throughout Africa and beyond, they developed innovative strategies for survival – from tools and clothing to languages and customs. When dispersed human groups came into contact with each other, they shared ideas and genes. Self-awareness is a result of such interactions. This merging led to intercultural thinking of humanity as a global community, which in turn led to the birth of what we call anthropology. It was a method of self-actualization – by better comprehending our place in the world, we adapted ourselves and our surroundings.

We are again at the threshold of a new self-awareness, the product of the consolidation of scholarship and global contacts to form what has been called *cosmic evolution*, *big history*, and *universal studies*. This expanded worldview is the product of taking a sense of a unified humanity to the next level – the recognition that we are but one of many symbiotic life forms on Earth and but one entity within a larger cosmos. The ‘multiverse’ is commonly seen as a larger entity of which our universe is a component. Although there are many uses of the term, a big history perspective by astronomer Tom Gehrels is the one that is in mind for this essay. The concept of a multiverse also serves as a metaphor for the variety of ways of seeing and interpreting existence. (Gehrels, 2017).

### ANTHROPOGRAPHY

When did human self-consciousness expand beyond the level of other animals to become a focus of society? Did it happen for our Australopithecine ancestors three million years ago? Were the half-million-year-old shell-etchings of *Homo erectus* in Java an expression of that curiosity, or the Neanderthal stone rings in Occitania? Certainly, the cave and rock art of early humans in Africa and Eurasia and Australia demonstrates studied engagement with the world. At some point, mystical conjecture fused with practical knowledge to form a continuum of human understanding about the world. This fusion of ideas certainly did not provide a seamless fabric of awareness, but it was a beginning, an incipient form of anthropology and big history.

Something as simple as the repurposing of artefacts in Palaeolithic times indicates human connections with their past. (Vaquero et al., 2012. *Quaternary International*, 2015). This process increased during the Neolithic. Reuse of structural remains became so common in ancient Egypt that admonitions against such spoliation were proclaimed by dynastic officials in the second millennium BCE. (Gilli, 2009. Nicolaisen, 1979). We can thus see the roots of *anthropography*, the study of cultural literacy, the deep shadows of our ancestors' existence.



**Figure 1: Recently discovered cuneiform Tablet V of the Gilgamesh Epic, c 1800 BCE, which provides fresh insights about ethno-geographic encounters in the epic's Cedar Forest. Slemani Museum, Sulaymaniyah, Kurdistan, Iraq. Photograph by Osama Amin, 2015, Wikimedia Commons.**

Some, like philosopher-poet Lucretius in his verses *On the Nature of Things* in the first century BCE, expressed a materialist view of the universe and a unitary sense of humanity, presaging anthropology and big history. (Lezra and Blake, 2016). Renaissance discovery of Classical knowledge in scriptoria and the libraries of Al-Andalus revived interest in ancient scholars like Lucretius required researchers to negotiate exotic cultural traditions so as to access the materials. (Rowe, 1965).

Nor was this new intercultural awareness confined to Eurasia, as contact with the Americas went back prior to the Columbian exchange, with Polynesian voyages to South America and transient European settlement in North America, over a 1000 years ago. (Roullier, 2013. Bandi, 1972: 164–166. Seaver, 1996). These events set the stage for more intense globalization, a process that was not new but that led to the fields of anthropology and big history.

### GLOBALIZATION

European colonial expansion in the fifteenth century led to profound changes in understandings about humanity, but there was no metaphysical quality of European society that unleashed their hegemony on the world. The process can be described in a ‘Global Algorithm’:

Asian invention + Afro-American resource + European gestalt = Global civilization

The formula’s categories are shorthand for physical and intellectual exchange. Of course, this global dynamism was far more complex than a mere algorithm can convey, but it seeks to illustrate that – far from being just a European-driven phenomenon – the new global engagement had grown from the vast silk-route network into a planetary sphere of interaction that is more properly designated as ‘Global civilization’.



**Figure 2: Sultan Firoz Shah Tughlaq of the Delhi Sultanate had this Ashokan pillar (third century BCE) removed from Topra Kalan (Haryana) to Firozabad as part of his antiquarian collections in 1356 CE. The use of monumental stoneworks fused with the collection of artefacts to create a form of antiquarianism that sought to legitimize rulers. (Majid, 2015: 84–103). The column now is within the bounds of Delhi, India. Photograph by Samuel Bourne, 1860, British Library Online Gallery.**

Johann Friedrich Blumenbach is considered one of the first modern anthropologists. His dissertation at the University of Göttingen, *On the Natural Variety of Humankind* (1775), was an anatomical classification of human races, but it premised a single human species with all groups having equal potential and

variations being the result of environmental factors.

Human studies were not well demarcated at this time, as artefacts, languages and folklore were lumped together as ‘antiquities’. (Miller and Louis, 2012). It was a domain of amateurs, where the banal coexisted with the erudite. In 1794, William Shakespeare’s head was looted from his tomb to satisfy an influential English antiquarian. (Urry, 1993. Shea, 2016).

Scholars struggled to make sense of the facts, minutiae and notions that were jumbled together by antiquarians. Neo-Confucian scholar Miura Baien (1723–1789) merged Japanese concepts with Chinese and European ideas to develop a new vision of the world, one that has been compared favourably with the later studies of Alexander von Humboldt. (Piovesana, 1965).

Many Europeans viewed human society as a stage of global and progressive advancement, but one in which western European society formed the leading edge, a logic that often became an dubious justification for overseas expansion. (Vidyarathi, 1976). The colonial traffic in antiquities led Egyptian ruler Mohamed Ali Pasha to ban artefact exports in 1835. In 1858, his son created the Antiquities Service, which oversaw excavations in Egypt, and began the first museum in the Middle East five years later. (Fitz Gibbon, 2005. Stocking, 1987).



**Figure 3: Hathor shrine (fifteenth century BCE), Deir el-Bahari, Egypt. The remains are preserved in the Museum of Egyptian Antiquities in Cairo. Photograph by Henri Édouard Naville, 1907, Wikimedia Commons.**

The mid-century impact of evolution and materialist thought on society was profound. Although evolutionary theories and timeframes had earlier existed, the mechanisms were not so well enunciated as those by Charles Darwin, Herbert Spencer, and Karl Marx. Spencer’s theories especially had an impact on

anthropological thought, along with those of anthropologists Edward Burnett Tylor and Lewis Henry Morgan. (Darwin, 1859. Spencer, 1862. Marx, 1867. Tylor, 1871. Morgan, 1877).

People certainly knew of the many varieties of cultural expression at this time, but the overarching concept of *culture* was just beginning to be identified and elaborated. In 1871, Tylor provided one of the first definitions of culture in its social context.

Culture or Civilization, taken in its wide ethnographic sense, is that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society. (Tylor, 1871: 1).

Tylor saw anthropology to be in the lineage of universal history and interdisciplinarity. (Tylor, 1871: 1–2, 17). It thus came to be appreciated that anthropology was not just about ‘things’ that antiquarians collected but a matter of ‘process’ – in an interactive and evolutionary dynamic.

Human studies continued to be hampered by pseudo-scientific theory, which included crude notions of biological and social evolution that set-up hierarchies of superior and inferior species, races, and societies. (Reining, 1962). Scholarship began to more forcefully challenge such conceits, as research strengthened the precept that, despite differences, humans were a unified species. It was a long process.

Begun by amateurs, anthropology required little training or equipment. Folklore and linguistics were accessed by conversation and observation, while anyone with a shovel could do archaeological excavation. Biological anthropology was seen as an extrapolation from everyday hybridizing of farm crops and livestock. In 1878, the secretary of the Smithsonian Institution noted that anthropology was the most popular branch of science. (Tooker, 1990). Anthropologists did not need certification: One could enter it as a self-trained amateur.

Although lacking a degree, Edward Sylvester Morse became a self-taught scholar of snails, a co-founder of the journal, *The American Naturalist*, a lecturer at Harvard, and a fellow of the National Academy of Sciences. (Spiess, 1985: 104–106. Benfey, 2004: 45–73). In the 1870s and 1880s, he went to Japan as an advisor on educational reform during the Meiji Restoration. His collection of brachiopods led him to discover the Ōmori shell mound and to identify Jōmon culture (16,500 BP), while his study of Japanese ceramics and architecture cemented his reputation as an anthropologist. His international work and questions about the origins of Japanese society led to the founding the Anthropological Society of Japan in 1884 and the first academic journal of anthropology two years later. In 1892, a member of this group of scholars, Tsuboi Shogoro, became the first professor of anthropology at the University of Tokyo. (Morse, 1879. Benfey, 2004. Yamashita, Bosco and Eades, 2004: 91–92).



**Figure 4: Excavation of the Ōmori shell mound, Jōmon culture, Shinagawa (Tokyo), Japan, c 1877. Frontispiece, Edward Sylvester Morse, ‘Shell Mounds of Omori’, *Memoirs of the Science Department, University of Tokio, Japan*, vol. 1, part 1, Tokyo: University of Tokyo, 1879.**

In order to take advantage of amateur endeavours in anthropology, the British Association for the Advancement of Science published *Notes and Queries on Anthropology: For the Use of Travellers and Residents in Uncivilized Lands* in 1874. Adopting Tylor’s vision of progressive social evolution, the volume proclaimed an inclusive view of humanity: ‘History has confined itself chiefly to the achievements of special races; but the anthropologist regards all races as equally worthy of a place in the records of human development’. It also provided less noble suggestions: ‘If after a battle, or other slaughter, the head of a native can be obtained with the soft parts in it, it might be preserved and transmitted carefully and perfectly closed up in a small keg filled up with spirit, or brine thoroughly saturated with salt’. (British Association for the Advancement of Science, 1874: iv, 142).

The Great Exhibition in London and the Smithsonian Institution in Washington D.C. featured cultural exhibits from around the world, but so did P.T. Barnum’s circus and Buffalo Bill’s Wild West Show. Such populist and professional tensions led scholars to further specialize cultural studies with more schools of anthropology, journals, societies, a standard vocabulary, and regulations to protect antiquities. (Brownell, 2008. Bank, 2011. Trigger, 1990: 370–411. Liu, 2017).



**Figure 5: French postcard, Buffalo Bill's Wild West Show, 1903. MS 327, James Wojtowicz Collection, McCracken Research Library, Buffalo Bill Center of the West, Cody, Wyoming, USA.**

As university infrastructure divided into disciplines and departments in the later nineteenth century, anthropology likewise segmented. Folklorists were found in literature departments, physical anthropologists in medicine, linguists in languages, archaeologists in geology, and ethnologists in sociology. In 1876, ethnographer Alfred Russel Wallace noted the 'chaotic state of the infant science of anthropology'. (Christenson, 2011. Bernstein, 2002. Soffer, 1988. Wallace, 1876: 174).

## PROFESSIONALIZATION

As the concept of a global humanity gained wider support, it led to professionalization of human studies. Anthropologists worked to document traditional culture at a time when indigenous societies were being rapidly transformed by industrial society and colonial contact. These inquiries led to more involvement by state agencies, such as the U.S. Bureau of Ethnology (1879) and the British Ordnance Survey. Similar partnerships took place elsewhere, from South Asia to South America. (Hinsley, 1994; Ó Cadhla, 2007; Sengupta, 2013).

In 1899, Franz Boas set up the first department of anthropology in the United States, at Columbia University, by bringing together the study of archaeology, ethnology, linguistics and physical anthropology into the four-field system. It sought to regain some of the synthesis lost when universities adopted departments and disciplines. (Tooker, 1990).

Wilhelm Wundt began his academic career in Germany as a professor of anthropology and, although later celebrated as a founder of psychology, saw the

‘philosopher and historian, theologian and ethnologist in unified work’ to understand humanity. (Wundt, 1905: iii). A key purpose of anthropology was to identify what it was to be human via interdisciplinary methods.

Indigenous anthropology developed alongside Western models and some mediated cross-cultural issues, such as Sarat Chandra Roy, who served in the colonial judicial system for Bengal. He cultivated an appreciation for tribal society, published widely and, in 1921, established *Man in India*, the country’s first journal of anthropology. (Roy, 1938. Dasgupta, 2007). These resident anthropologists had the benefit of already being in the field and knowing the local languages and local societies. What they usually lacked were connections to bases of power, a common problem of centre / periphery scholarship. (Kilani, 2012).

Heritage came to be seen as a product of all humanity, as a ‘commons’. In this context, the United Nations’ *History of Humanity* came out in 1966, followed by a network of *World Heritage Sites* a decade later. (United Nations Educational, Scientific and Cultural Organization, 1966, 2009; 2014. Duedahl, 2011). It is a crediting of the reality of the field in its full context. (Bertacchini et al., 2012). A recent text on anthropology describes this agenda:

In our rapidly changing and increasingly interconnected world, where longstanding cultural boundaries between societies are being erased, new social networks and cultural constructs have emerged, made possible by long-distance mass transportation and communication technologies. To better describe, explain, and understand these complex but fascinating dynamics in a globalizing world, anthropologists today are adjusting their theoretical frameworks and research methods and approaches. (Haviland et al., 2017: 47).

As a result, studies in multi-sited ethnography, cosmopolitan anthropology and global ethnography developed (Marcus, 1995. Gille and Ó Riain, 2002. Kahn, 2003). Advances in cognitive and neurological science led to the study of human brains and behaviour. Older dichotomies were elaborated by richer varieties, as when LGBT awareness amplified the study of sexuality and gender, which brought into question other binary categories. Applied anthropology began to resolve problems with new subfields and techniques, from cyberethnography and metagenomics to hyperspectral imaging.

This hominid vision has been critiqued and change is suggested to expand anthropology to even wider realms. Just as humans grew out of a focus on their own kin and tribe to global humanity, so are we now in the process of expanding into a much more generous vision of existence. A number of anthropologists are also big historians and seek wider understanding of this more universal outlook.



### UNIVERSAL HUMANITY AND BIG HISTORY

As anthropology had begun to develop in the early nineteenth century, a more rigorous form of universal history also had started to come together, as in Wilhelm von Humboldt's model of integrated education and his brother Alexander von Humboldt's five-volume study of existence, *Kosmos*. (Hohendorf, 1993. Humboldt, 1845–1862. Helferich, 2004). Anthropologist Johann Friedrich Blumenbach was among Alexander's professors at the University of Göttingen, where their School of History sought to develop a modern and scientific universal history. Their goal was to unify knowledge and deploy it so the individual, society and nature could more harmoniously coexist, if not prosper.

Ironically, this synthesis of knowledge took place just as a movement towards academic specialization emerged. Those subjects that had been united under the broad rubric of philosophy or arts split into physics, history, sociology and the proliferation of disciplines and university departments that we see today. (Reba Soffer, 1988. Foucault, 1975: Part 3, Sections 2–3. Wallerstein, 1991). This new academic infrastructure slowed efforts to generate a universal history, but the goal to holistically understand existence never died away.

The ongoing work to assemble a meta-narrative of existence included works like geographer Alfred Russel Wallace's *Man's Place in the Universe* (1903), engineer Hiram Maxim's *Life's Place in the Cosmos* (1933), and ecologist Imanishi Kinji's *The World of Living Things* (1941). A vast aggregation of new data then came out of the World War and Cold War eras, requiring larger frameworks of reference. This resulted in intensified cross-disciplinary studies, as seen in bio-chemistry, electrical engineering, and the expansion of anthropology. By the 1970s, this *beau ideal* was beginning to be formulated as *cosmic evolution* and other rubrics.

It was a global conjuncture that occurred in multiple disciplines, regions, languages, and societies. Soviet astrophysicist Joseph Shklovsky wrote *Universe, Life, Intelligence* in 1962, which was expanded with U.S. astrophysicist Carl Sagan four years later. Other works followed, including U.S. bio-geologist Preston Cloud's *Cosmos, Earth and Man* (1978), Austrian physicist Erich Jantsch's *The Self-Organizing Universe* (1980), Colombian mathematician Antonio Vález' *Humanity: Inheritance and Conduct* (1986), U.S. biologist Lynn Margulis' *Microcosmos* (1986), and Chinese rocket-scientist Qian Xuesen's complexity studies (1991) on what his team called 开放的复杂巨系统 [Open Complex Giant System].

Social scientists joined these new directions (Frank, 1978. Wallerstein, 1984). Geographer Georges Nicolas saw a need for humanity to bridge the widening chasm between meaning and science, drawing inspiration from the French traditions of geo-anthropology, such as those expressed by Claude Levi-Straus, Paul Vidal de la Blache, and Antoine Bailly. (Nicolas, 1989).

This scholarship began to enter classrooms. In 1974, astrophysicists George

Field and Eric Chaisson gave a course on what they called *cosmic evolution*. (Chaisson, 1975; 1977; 1982. Field and Hirsh, 1980. Field, Verschuur and Ponnampereuma, 1978. Chaisson, 1981). Other scientists moved in this direction, as when astrophysicist G. Siegfried Kutter produced *Universe and Life: Origins and Evolution* (1987), based on two decades of research and teaching. (Kutter, 1987; 2011). In 1985, historian John Mears advocated for a general-education curriculum based on macro-history and began teaching such a course four years later. (Mears, 1986; personal communication, 2010). Other courses followed from Australian historian David Christian, Dutch anthropologist Fred Spier, and Russian social psychologist Akop Nazaretyan. It was a dynamic process, as academics began to expand beyond the confines of their disciplinary boundaries. (Christian, 2010).

Such overviews entered community life and social organizing. In 1983, when the United States announced its Strategic Defence Initiative and an orbiting weapons system – the ‘Star Wars’ Program – Osamu Nakanishi, an international relations professor and dean at Soka University in Tokyo, founded the Institute for Global and Cosmic Peace to advocate for cooperation in space. Their work led to publications of what they called *universal studies*, which incorporates big history, and then to the first university courses on big history in Japan. (Nakanishi, 2016; 2017. Nakanishi and Tsujimura, 2016).

In the early twenty-first century, a variety of organizations came together around this general trend, including the International Big History Association (2010), the Eurasian Centre for Megahistory and Systems Forecasting (2011), the Big History Project (2011), the Deep Time Journey Network (2014), the Asian Big History Association (2014), the Indian Association for Big History (2016), and the African Big History Association (2017). Each of these groups adopted particular themes and strategies of interest. For example, the Eurasian Centre has a special focus on cliodynamics, while the Asian Association has an interest in social engagement and the search for meaning.

It is not my intent to recapitulate the cosmic evolution / big history / universal studies movement here, as it already has been well documented elsewhere. (Rodrigue, 2017a). However, it is very important to emphasize three central points:

1. Universal thinking and disciplinary thinking worked together to produce the big history paradigm that we see today. Universal models provided a framework, while the disciplines provided depth. The interplay of these two tendencies led to the development of cosmic evolution, big history and universal studies.
2. This transdisciplinary study of existence materialized as an independent human invention all around the world, occurring to many people from many backgrounds at the same time. Such a *global conjuncture* serves as an important reminder of the common humanity of our world, a central

theme of modern anthropology.

3. As a consolidation of knowledge, big history does not replace but networks disciplines into larger, more holistic understandings of how things work together, as a form of super-interdisciplinarity.

Nor is this process restricted to just big history. It can be seen at work in more commonplace areas, as in the recent formation of the International Science Council (2017), when over forty social and physical science organizations merged, including the U.S. National Academy of Sciences and the National Research Foundation of South Africa. (McBean and Martinelli, 2017). In this way, a continuum of studies evolves into a holistic network of knowledge.

In big history, disciplines continue their work in a usual manner, but they do so in a broader, self-conscious context. This is seen in world historian Craig Benjamin's 'little big history' of Jericho, one of the world's oldest cities. As he summarizes it: 'The history of Jericho is a 14,000-year-long reminder that the big story of humanity can only really be understood if it is embedded deeply into the natural context in which it has played out, for the environment is truly the great physical stage upon which our human drama continues to unfold'. (Benjamin, 2015: 261).

This transdisciplinary approach also engages with essential community outreach, as when palaeobiologist Nigel Hughes paused in his study of trilobite fossils in the Himalayas to compose a story about a village girl and her quest to find a natural explanation for *gatchpathor* (petrified wood) that is common throughout much of the region. *Monisha and the Stone Forest* introduces Earth history to children and was produced by the Geological Society of India in Bangla and English. (Hughes and Basu, 2012a; 2012b). It has also been produced online as an audio-visual story. (Hughes, Basu, and Bipattaran and Ensemble, 2017). The story of Monisha not only fuses issues of science and society but helps expand this new continuum of big history in a form of applied anthropology that lay people can understand in the quest for wider understandings. (Hughes, Ghosh, and Bhattacharya, 2015).

An academic example of this new continuum can be seen at my own institution of Symbiosis International University in Pune. In 2017, our School for Liberal Arts (SSLA) adopted big history as a part of its core curriculum and offered a home to the Indian Association for Big History, since big history was seen to be a natural extension of the university's philosophy of *वसुधैव कुटुम्बकम्* (*vasudhaiva kutumbakam*, 'the world is one family'). Big history was built from an anthropology core, while the SSLA Collaborative for Asian Anthropology has an interdisciplinary mission of universal studies. In this way, Sarat Chandra Roy's 1938 call for a wider view of anthropology, one that would lead to a sense of 'universal humanity' was fulfilled in a small way. (Roy, 1938: 150).

### ANTHROPOLOGY AND BIG HISTORY

Anthropology's understanding of the flexibility of society leads to an awareness that humans have the ability to not only adapt to a wide range of conditions but to intentionally modify their surroundings and themselves. Traditional societies and global civilization coexist and evolve. Because civilization is an expression of modernity, it has less 'baggage' in the form of heritage to slow its transformation. Individuals possess multiple identities, including those bounded by language, religion, gender, tribe and many other traditional forms of cultural selfhood. The challenge we face today is how we can empower the least developed of these – our global identity – as a new form of civilization. In order to keep a positive trajectory of human self-awareness moving forward, we first have to survive.

Historical psychologist Akop Nazaretyan has documented how humans have managed to reduce violence over the last million and more years, despite the development of ever more lethal technologies. He codified this phenomenon as the *Law of Techno-Humanitarian Balance*, in which human populations – those that managed to survive – advanced strategies to constrain the use of harmful acts. He does not limit his study to just intentional weaponry but also includes destructive mechanisms like chemical contamination, reduction in biodiversity or other behaviours that negatively impact humanity. In this way, pollution and racism pose as much of an ultimate threat to human survival as nuclear proliferation. (Nazaretyan, 1993; 2010; 2018). Psychologist Steven Pinker later documented a similar trend. (Pinker, 2011).

A positive example of this axiom in action is the Spacewatch Program, which monitors near-Earth asteroids. In 1991, when international tensions were high, the program alerted the world of a small asteroid coming towards Earth. The concern was not for an impact, which would have been negligible, but for the fear that, if it burst in Earth's atmosphere, it could be mistaken for a nuclear explosion and provoke missile strikes during the First Gulf War and the collapse of the Soviet Union. The Spacewatch Program was begun by astronomer and big historian Tom Gehrels at the Kitt Peak National Observatory in Arizona (USA) in 1980. (University of Arizona, 2018. Gehrels, 2007: 183–202; personal communication, 2010 24 March). Nazaretyan therefore sees such efforts as important ongoing components of our social evolution and ability to survive.

Anthropologists and big historians see humanity, life and Earth's stability as related issues. This awareness by itself can help mitigate disputes, reduce tensions, and find alternatives. perception provides an example of the positive effects of the simple transition from small thinking to big thinking. With similar global awareness, we could also hope to reduce conflict worldwide.

Anthropology informs the larger views of big history, and big history impacts anthropology. Since the progression of time converts the present and future into

the past, anthropology can be seen as a form of big history, an incipient reflection of our on-going beginnings. This expansion of the conceptual framework of anthropology makes the resulting macro-anthropology all but synonymous with big history, in a trend we might describe as *the study of change, of how all things evolve and are networked*.

An example of the cross-fertilization of ideas appears in energy use. Anthropologist Leslie White identified energy as central to studies of culture. His *Law of Cultural Evolution* explains how culture advances when energy is harnessed and its use increases. (White, 1943: 338).

Everything in the universe may be described in terms of energy. Galaxies, stars, molecules, and atoms may be regarded as organizations of energy. Living organisms may be looked upon as engines which operate by means of energy derived directly or indirectly from the sun. The civilizations, or cultures of mankind, also, may be regarded as a form or organisation of energy. ... Culture is a kind of behavior. And behavior, whether of man, mule, plant, comet or molecule, may be treated as a manifestation of energy. Thus we see, on all levels of reality, that phenomena lend themselves to description and interpretation in terms of energy. (White, 1943: 335).

Big historians have similarly engaged in this study. (Neile, 2005; 2017).

One of the strategies suggested by the field of cosmic evolution, and adopted by some big historians, is a measure of complexity called energy-rate density. The metric formula for this *complexity ratio* is:

$$\Phi_m = \text{energy/time/mass}$$

It measures the amount of energy in a unit-of-time passing through a given mass, such as the calories active in a gram of carbon per second. Every object can be assigned a number based on this algorithm, while the number can be totalled for collective objects. This number is used as a measure of complexity ( $\Phi_m$ ) – the higher the number, the more complex an object is considered.

In this way, a butterfly is more complex than a galaxy, as the energy passing through its small mass yields a much higher number than the energy passing through the huge mass of a galaxy. The most complex thing in the known universe (as derived from this ratio) is collective human society. (Chaisson, 2001).

Anthropology, like many studies, has the need to discern and assess patterns. (Smith and Peregrine, 2012). How do we compare, say, the excavated remains from a medieval farming village in Tunisia with a present-day hunting ground in the Amazon Basin? The usual approach is an assessment of factors that vary with the interests of the scholars engaged in the work. This can be very subjective. The complexity ratio could provide a metric with which to gauge objects and assemblages

of objects from very different cultures, times, and locations. It certainly would not be a formulation of inherent cultural value, but it could be of use in comparative studies, as a correlation that might lead to further studies.

TABLE 1: CHAISSON, 2001: 139; 2011: 28.

### Average Energy Rate Densities

<u>System</u>	<u>Age (Gya)</u>	<u><math>\Phi_m</math> [erg/s/g]</u>
• Human society	0	500,000
• Animals	0.5	40,000
• Plants	3	900
• Earth	4	75
• Sun	5	2
• Milky Way	12	0.5

Other innovative strategies are being similarly adopted for studies of human culture. Isaac Newton's *Law of Universal Gravitation* (1686) calculated the attraction between objects (based on mass and distance). It was reformulated to assess economic networks in the late-nineteenth century but only gained traction as a more pervasive theory – the ‘structural gravity model’ – a century later. Historians and archaeologists recently applied this analysis to set up a predictive model for discovering lost settlements and reconstructing ancient trade networks from cuneiform records of 4000 years ago. (Yotov, 2016. Barjamovic, Chaney, Coşar and Hortaçsu, 2017). Such interdisciplinary thinking has the potential to greatly enrich our understanding of our past.

Moreover, as our understanding of the universe increases, so does our sense of humanity's engagement with the cosmos. For example, expansion into outer space has led to experiments on the human ability to travel long distances in low-gravity and in isolated, confined settings, from space ships to orbital stations. It raises questions about non-Earth colonies and habitat terraforming. (Clément and Reschke, 2010. Ralphs, Franz, Baker, Howe, 2015. Asian Scientist Newsroom, 2012). These are issues that can be beneficially addressed by anthropology insights.

### THE FUTURE

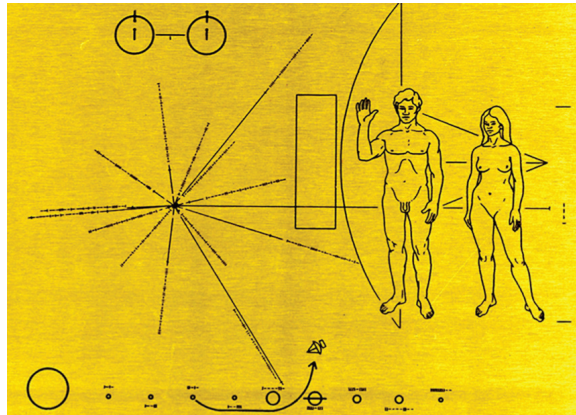
It used to be thought that self-reflection was just an ability of modern humans, one dating to a threshold of about 50,000 years ago. Recent research however shows that a capacity for problem-solving is not only available to others of our ancestral lineage and our primate cousins but to other vertebrates and invertebrates as well. (Dunbar, 2016. D'Errico and Stringer, 2011. Mithen, 1999. Fiorito and Scotto, 1992. Patton, 2008). Nonetheless, the cognitive ability with which *Homo sapiens* network with each other and with their environment is of monumental distinction

from other intelligences on Earth.

This ability opens the door on the potential for activities like extra-terrestrial communication. Dale Russell is a palaeontologist who worked with NASA on questions of intelligence. He speculated about how dinosaurs might have evolved into a species comparable to modern humans and how such a thought-experiment might assist in communication with similar extra-terrestrial intelligences. (Russell, 1981; 1993). This kind of reasoning is important because humanity has engaged in scientific efforts to reach into the meta-galaxy for decades.

In 1974, Cornell University's National Astronomy and Ionosphere Center and the U.S. National Science Foundation broadcast a message from the Arecibo radio telescope in Puerto Rico that provided information about Earth and its solar system, elements of DNA and their configuration, and the human shape and society. The message was transmitted in the direction of the Great Globular Star Cluster in the constellation of Hercules, 22,000 light years from Earth.

Likewise, between 1972 and 1977, NASA's *Pioneer* and *Voyager* space probes carried data about humanity. *Pioneer 10* and *11* conveyed plaques with figures of humans and symbols for Earth and the solar system embellished on them. On *Voyager 1* and *2*, analog recordings on a 12-inch (30-centimeter) gold-plated copper disk contained sounds and images of the diversity of life and culture on Earth. These 'Golden Records' included greetings in 55 languages, music and images of humanity in its various cultural expressions. *Voyager 1* is now outside our solar system and travelling through interstellar space towards Gliese 445, a star in the constellation of Camelopardalis, 18 light-years from Earth, which it will reach in 40,000 years. (United States, National Aeronautics and Space Administration, 2007; 2018).



**Figure 6: NASA's 'Plaque of Humanity', etching made for the *Pioneer 10* space probe in 1972. Designed by Carl Sagan and Frank Drake; drawn by Linda Salzman Sagan. Courtesy of Eric Chaisson and NASA.**

A variety of languages have been designed to facilitate potential communication between humans and otherworldly intelligences. One is Lincos (*Lingua Cosmica*), a

mathematically based programme from which intercultural communication between Earth and extra-terrestrial societies could be developed. Produced in 1960, Lincos was configured by two Canadian astrophysicists to transmit a message to nearby stars from the Yevpatoria RT-70 radio telescope in Ukraine in 1999 and 2003, the first since the Arecibo broadcast. One of its targets was 16 Cyg A, part of a triple-star system in the constellation Cygnus, 69 light-years from Earth. (Ollongren, 2012. Freudenthal, 1960. Dutil and Hon, 2009).

Besides these efforts in the field of *astrolinguistics*, other initiatives to better understand our place in the cosmos are underway. The Kepler space observatory, launched by NASA in 2009, has a dedicated mission to seek exoplanets with similarities to Earth and a potential for similar life forms. Seven years later, Ellen Stofan, NASA's chief scientist, anticipates evidence of extra-terrestrial life will be found by 2045. And, in 2016, the Hubble space telescope discovered that the universe has ten times the number of galaxies than previously thought, which vastly amplifies the opportunities to find life beyond Earth. (Wall, 2015. United States, National Aeronautics and Space Administration, 2016).

The Search for Extra-Terrestrial Intelligence (SETI) is essentially an anthropological study. (Vakoch, 2014). Such contact will likely not be with surviving civilizations in our galaxy, let alone in the universe / multiverse. Our existence as a species encompasses 300,000 out of 13,800,000,000 years – only 0.002 percent of all known existence. So it is likely that the communications and remains that we discover will be of a civilization that has vanished, through extinction or through evolution. (Tsujiyama and Katayama, 2017: 51). This opens the door on another potential use of anthropology in the future, as *astro-archaeology*.

If contact with extra-terrestrial life should occur, anthropology's experience with a wide range of topics would inform these encounters. This would include not just linguistics, cognitive behaviour and cultural analysis but also the discourse surrounding colonialism and issues of inclusion / exclusion. A parallel question is that if all sentient species eventually die out, or transcend to a different level, how do we *Homo sapiens* leave evidence of our knowledge for other sentient creatures in the meta-galaxy to discover and perhaps benefit from its use? This is essentially a question of *exo-humanitarian* values. (Panov, 2017: 381–384. Voros, 2017: 419–425).

Whatever the result of such efforts, big historians Alexander Panov and Joseph Voros note that in either event – finding extra-terrestrial intelligence or not – the result is significant: We are one of many or we are unique. (Panov, 2017. Voros, 2017). Panov further speculates that natural science has possibly begun to run its course and that a new direction, strategy and inspiration for humanity is needed. He does not identify what that new configuration might be, but he sees it as important for humanity to consider.

From the experiences of anthropology, it could be that a new strategy might be not one thing but a constellation of them. Indeed, Alexander Panov and Akop



Nazaretyan highlight the role of *superfluous diversity* in human societies as an important way to overcome crisis. Nazaretyan posits this as the *Rule of Redundant Variety*, in which the myriad ways that societies around the world accomplish the same purpose allows later societies, including global civilization, to choose from diverse and bountiful options. (Panov, 2017. Nazaretyan, 2004; 2017a).

The members of the Eurasian Centre for Big History and System Forecasting in the Russian Academy of Sciences consider the scale-invariant sequence that results in the *Snooks-Panov Vertical* to be a curious anomaly and contemplate its significance. A version of this formula is:

$$t_n = t^* - T / \alpha^n$$

The coefficient  $\alpha > 1$  is a compression ratio of duration of every subsequent phase of evolution in comparison to the previous one;  $T$  is the duration of the entire described period of time;  $n$  is the number of a phase transition;  $t^*$  is the limit of the sequence of phase-transition moments  $\{t_n\}$ .

Independently developed by nuclear physicist Alexander Panov in Russia and systems theorist Graeme Snooks in Australia at the turn of the twenty-first century, the calculations highlight how the span of time between major events in Earth and human history has become increasingly compressed. For example, the time between the Industrial Revolution and the Information Revolution is shorter than the span between the Upper Palaeolithic and the Neolithic. This formulation then becomes ‘vertical’ – reaches 0 – at about the year 2026. The question is: Does this predictive ‘singularity’ have significance? (Panov, 2017: 371–375).

Regardless of the formula, one just has to look out a window to see that the world is in crisis. In the last decades, we have become more aware that entire species of life are rapidly vanishing, along with fresh water supplies. Pollution makes many parts of the land and seas uninhabitable. Non-renewable resources are being exhausted. Global warming is impacting the entire planet, from the melting of the world’s ice sheets and permafrost to the related rise in sea levels and changing storm patterns. Local agriculture and business are destroyed by competition from multinational industry, resulting in the concentration of people in urban areas, as more and more residents are dropped to the lowest rungs of society. This human degradation of Earth and its life is now referred to as the *Anthropocene* epoch.

It is estimated that the original foraging lifestyle of our ancestors who lived prior to 10,000 years ago had the capacity to provide sustenance for 15 million people. The adoption of simple agriculture then allowed the carrying capacity to rise to 750 million. The industrial production that began 300 years ago permitted twice that number to coexist. In the last century, our population has risen to 7 billion and is expected to reach more than 10 billion by the end of the century. This extraordinary growth has been possible because of a variety of intersecting factors, including

adoption of petroleum as an energy source; the use of hybrid crops, pesticides and artificial fertilizers; medical advances; and urbanization. These numbers are far beyond the natural carrying capacity of the Earth and are possible only because of a greatly stratified society that leaves a majority with hunger and few of life's amenities, a situation that is worsening.

Many of the social problems we see around us are not an erosion of values, they are the result of our global system not being able to cope with the vast numbers of people, a degrading environment, and scarce resources. There is no going back to an archaic, primeval stage of society for the majority of people, indeed such quaint notions are part of the problem. If such an attempt were made by urban humanity to return to a simpler, primeval stage of production, billions of people would die. (Priyadarshini Karve, 2018, private communication). That is not to say that we cannot learn and adapt concepts from our past or that traditionalist societies cannot be encouraged, but we as a whole can only go forward with the configuration of new strategies for survival. (Rodrigue, 2017b).

And so, we are where we began, sitting around fires in our Palaeolithic caves millennia ago, asking questions of our existence. We have sketched out the pattern of our origins and more clearly see how we fit in the world, filling in the details and debating where to go with this new information. But our context has shifted. This time, we are seen as members of a global tribe contemplating a vast cosmos with a larger tool kit than that of our Acheulean ancestors. In this spirit, physicist and author Vandana Singh encourages us to 'step out of the claustrophobia of the exclusively human and discover joy, terror, wonder, and meaning, in the greater universe'. (Singh, 2013: 201).

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