

LEARNING TO CO-EVOLVE IN THE ANTHROPOCENE: PHILOSOPHICAL CONSIDERATIONS FROM NATURE

1. *Introduction to the Anthropocene.*

In the last years, the term ‘Anthropocene’ has become an important topic in scientific, philosophical, and political debates to achieve a sustainable development on our planet. Scientists divide the history of our planet into epochs, such as the Pleistocene, the Pliocene, and the Miocene. Nowadays, we are living in the Holocene epoch, a name given to the post-glacial geological period of the past ten to twelve thousand years. However, there is a global debate questioning the huge ecological footprint left by humankind on the Earth. The biologist Eugene Stoermer and the Nobel winning chemist Paul Crutzen advanced the term ‘Anthropocene’ in 2000, and it has gained acceptance as a new geological period characterized by the influence of human behavior on Earth’s atmosphere. Using atmospheric carbon dioxide concentration as a simple indicator to track the pollution acceleration, many researches have proved that our human activities have experienced a great explosion with significant consequences for Earth System functioning. According to Steffen, Crutzen, and McNeil, the Anthropocene began around 1800 with the onset of industrialization, the central feature of which was the enormous expansion in the use of fossil fuels¹. Then, the concept emphasizes the humankind influence in global geology and ecology, when human actions have a drastic effect on the Earth.

Despite the International Commission of Stratigraphy and the International Union of Geological Sciences have not yet officially approved the term as a

¹ See W. Steffen – P. Crutzen – J. McNeil, *The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?*, «AMBIO: A Journal of the Human Environment», 36 (8), 2007, pp. 614-621.

recognized subdivision of geological time, scientist worldwide have begun to use the term ‘Anthropocene’ to describe current historical context. In this sense, the main objective of this article is to study the co-evolutionary processes that life has developed over billions of years, in order to identify sustainable pathways for the future of humanity on our planet. Then, the paper combines transdisciplinary methodology with the biomimetic approach to innovate in the battlefield of Anthropocene. Biomimicry seeks sustainable solutions to solve human complex problems by using nature as teacher. Philosophical considerations on co-evolutionary strategies of nature allow us to face global challenges of today. But, how could we learn to co-evolve harmonically with Nature to achieve a sustainable development? How could we create an “escape route” in the Anthropocene? How could we transcend the current paradigm of unsustainability and systematic ecocide?

2. *The Big History: A Unified History of the Universe, Earth, Life, and Humans.*

Coined by David Christian² and theoretically developed by Fred Spier³, the ‘Big History’ is a unified framework that integrates all sciences concerning the history of the universe, Earth, and life along the history of humankind. This theoretical framework allows us to understand our individual and collective responsibility to co-evolve in a sustainable and resilient way on the Earth. It means new transdisciplinary approaches to understand how humankind is interconnected with nature and the cosmos at different levels of reality. If we want to learn how to co-evolve with Nature in the Anthropocene, we must reintroduce our sociosphere and technosphere into the biosphere⁴. For this reason, the Big History helps us to identify and recognize – in a systemic, holistic, and multidimensional way – the sustainable strategies that work in nature, in order to inspire us bio-mimetically in solving human problems (social, economic, technological, etc.).

According with the scientific consensus of Big History, the humanly known universe arose about 13.7 billion years before present (BP), with the explosion of the *Big Bang*. Earth formation occurred between 5 and 4.5 billion years BP, and the miracle of life appeared around 3.8 and 3.5 billion

² See D. Christian, *Mapas del tiempo: Introducción a la Gran Historia*, Barcelona, Crítica, 2010.

³ See F. Spier, *Big History and the Future of Humanity*, Oxford, Blackwell, 2011.

⁴ See J. Collado Ruano, *Biomimicry: A Necessary Eco-Ethical Dimension for a Future Human Sustainability*, in *Future Human Image*, vol. 2 (2015), pp. 23-57.

years BP⁵. During the first half of this period, the forms of first-born life on Earth remained at very simple complexity levels (as *Archaeobacteria* or *Eubacteria*), but the appearance of free oxygen in the atmosphere originated the first complex cells (Eukaryotes), some 2 billion years BP⁶. The Cambrian explosion of metazoans took place about 1,5 billion years later, some 542 million years BP. Since then, the biological variety has increased rapidly, forming a wide range of multicellular organisms that are developing survival strategies with very unique energy flows, such as the food chain.

While it seems that life arose in the depths of the oceans, it only managed to reach the mainland about 450 million years BP. Only 250 million years after reaching the Earth's surface came the first warm-blooded animals, where dinosaurs highlighted during the Jurassic period until they disappeared 66 million years ago by a supposed asteroid impact on Earth. As historian David Christian⁷ noted, this circumstance gave rise to hegemonic period of mammals, from where emerged later the first bipedal hominids around 7 million years BP. Thanks to carbon-14 testing performed on fossil remains found to date, we can know in an approximate way the dating of first Australopithecus, which seem to be about 4 million years. *Homo Habilis* dates from 2.5 until 1.9 million years; those of *Homo erectus* are around 1.9 million years, and those of *Homo neardenthalis* and *Homo sapiens* point about 200,000 years ago⁸. With the extinction of *Homo floresiensis* about 13,000 years ago, *Homo sapiens* is the only survivor of the human species that co-inhabits and co-evolves on planet Earth with the rest of the animal biodiversity, plants, insects, bacteria, etc.

Co-evolution is a term coined by biologist Paul Ehrlich and botanist-environmentalist Peter Raven in 1964. In their joint work *Butterflies and Plants: A Study in Coevolution*, they approached the reciprocal evolutionary influences of plants and insects that feed on them: «an approach to what we would like to call coevolution is the examination of patterns of interaction between two major groups of organisms with a close and evident ecological relationship, such as plants and herbivores»⁹. While the idea of co-evolution

⁵ See L. Margulis, *Symbiotic Planet: A New Look at Evolution*, New York, Basic Books, 1998.

⁶ See Spier, *Big History and the Future of Humanity*.

⁷ See Christian, *Mapas del tiempo: Introducción a la Gran Historia*, p. 162.

⁸ See Y. N. Harari, *Sapiens. A Brief History of Humankind*, New York, Harper Collins, 2015.

⁹ P. Ehrlich – P. Raven, *Butterflies and Plants: A Study in Coevolution*, «Society for the Study of Evolution», vol. 18, No. 4 (1964), p. 586.

was not new and had already expressed in previous theories, the use made for Ehrlich and Raven allowed thinkers from other fields of application make new interpretations.

In 1980, evolutionary ecologist Daniel Janzen was the first to define the concept of coevolution in his paper *When Is It Coevolution?*: «“Coevolution” may be usefully defined as an evolutionary change in a trait of the individuals in one population in response to a trait of the individuals of a second population, followed by an evolutionary response by the second population to the change in the first», Janzen explain adding that «“diffuse coevolution” occurs when either or both populations in the above definition are represented by an array of populations that generate a selective pressure as a group»¹⁰. Thus, ecological interdependence requires three basic principles: 1) *specificity*, where the evolution of each specie is due to the selective pressures of the other; 2) *reciprocity*, when both species jointly evolve; 3) *simultaneity*, both species evolve simultaneously. So the co-evolutionary process has been used in a relatively restricted sense in the context of biological evolution.

But the sense of ‘coevolution’ used in this research goes beyond to discuss about sustainability: including both the degree of mutual phylogenetic partnership as the degree of mutual change in the co-adaptation, but also global processes of macroevolution and specific processes of microevolution. As pointed elsewhere, we can define co-evolution as « a reciprocal evolutionary change among species and their natural environment that, during the complex development of inter-retro-actions with each other, mutually modify each other constantly»¹¹. This view is in harmony with the distinction between biological and social evolution introduced by historians Korotayev, Markov, and Grinin¹².

Co-evolution is a feedback process very present in nature and has been basis for agricultural and industrial exploitation of human beings in their historical evolution on Earth. As explained by ecological economist Richard Norgaard: «with industrialization, social systems coevolved to facilitate development through the exploitation of coal and petroleum. Social systems no longer coevolved to interact more effectively with environmental

¹⁰ D. Janzen, *When Is It Coevolution?*, «Evolution», 34 (3), 1980, p. 611.

¹¹ J. Collado Ruano, *La bioética como ciencia transdisciplinar de la complejidad – una introducción coevolutiva desde la Gran Historia*, «Revista Colombiana de Bioética», 21 (1), 2016, pp. 54-67: 58.

¹² See A. Korotayev – A. Markov – L. Grinin, *Modeling of Biological and Social Phases of Big History*, in *Evolution. From Big Bang to Nanorobots*, edited by L. Grinin, A. Korotayev, Uchitel, Publishing House, 2015, pp. 111-150.

systems»¹³. With Industrial Revolution, began an era of hydrocarbons that drastically changed co-evolutionary processes of the prior agricultural stage of mankind¹⁴. When social systems began to exert strong pressure on environmental systems, the stock of energetic and material resources decreased very quickly: starting an evolutionary period of planetary unsustainability. That's why the Anthropocene is so important in Big History. Human race has had a profound impact on the climate and environment of the Earth and we must learn urgently how to co-evolve harmonically with nature to avoid ecological extinction and points of no return.

3. *The Great Acceleration: An Exponential Ecological Footprint on the Earth System.*

The Earth has been deeply modified by human actions during the last centuries. Since the Industrial Revolution, human population has been increased until 7.6 billions¹⁵. In few generations, humankind has exhausted the fossil fuels that were generated over several hundred million years, resulting in large emissions of air pollutants. The combustion of fossil fuels, along with deforestation, soil erosion, and animal agriculture have increased substantially the atmospheric concentrations of several greenhouse gases – such as carbon dioxide (CO₂) and methane (CH₄) –, contributing to global warming. That is why many Earth System scientists have concluded that the Anthropocene began in the middle of the twentieth century, during the called 'Great Acceleration', a period characterized by unprecedented economic growth and environmental devastation¹⁶.

While the period from after 1973 is frequently called the Golden Age of Capitalism, humans have changed Earth's ecosystems drastically. According to Elizabeth Kolbert, the Earth is in its sixth great extinction event, with rates of species loss growing rapidly for both marine and terrestrial ecosystems¹⁷. As climate change shifts ecological boundaries, problems like habitat preservation come to resemble landscape architecture. Facing the

¹³ R. Norgaard, *Development Betrayed. The End of Progress and a Coevolutionary Revisioning of the Future*, New York, Routledge, 1994, p. 39.

¹⁴ See J. Lovelock, *Ages of Gaia*, Oxford, Oxford University Press, 1988.

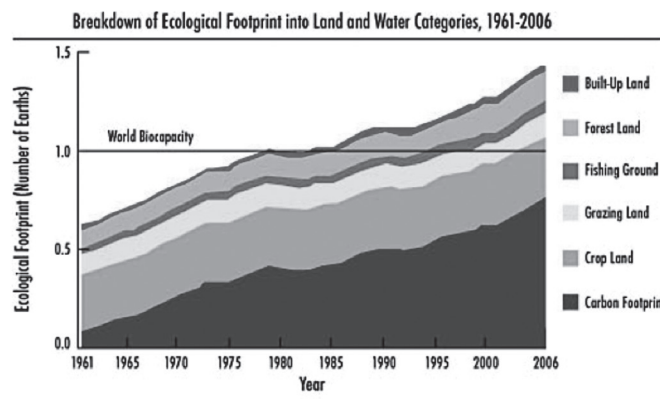
¹⁵ UNDESA, *Population Division: World Population Prospects 2012 Revision*, United Nations Department of Economic and Social Affairs, New York, UNDESA, 2013.

¹⁶ See I. Angus, *Facing the Anthropocene: Fossil Capitalism and the Crisis of the Earth System*, New York, Monthly Review Press, 2016.

¹⁷ See E. Kolbert, *The Sixth Extinction: An Unnatural History*, New York, Henry Holt, 2014.

Anthropocene provides us a clear analysis of how fossil fuel based capitalism has enabled humans to become a force of nature and how radical political and economic change is our only hope to design sustainable futures. The biophysical and social roots of the current environmental crisis come with a revolutionary idea of the Anthropocene: the end of the division between people and nature. Learning to co-evolve with natural ecosystems is the key to build 'other possible worlds', where humanity becomes aware about biomimetic pathways for a resilient development on our planet.

In current Anthropocene context, biomimicry emerges as a transdisciplinary science that deals with studying the complexity of inter-retro-actions developed between dynamic systems that make life (humans, animals, plants, etc.), within an environment which houses the ideal conditions for coevolution. Humankind is the unique species that uses large amounts of energy for agriculture, industry, households, international trade, and so on. All the other biological species only use energy for their survival and reproduction. Hence the systematic degradation of nature makes us accomplices of a global ecocide. «There are few more alarming indicators about the brutal climate imbalance that we have implemented, and the consequences will be terrible – ecocide and genocide, if you want to express in a synthetic formula»¹⁸, argues the philosopher Jorge Riechmann. As showed in Graphic 1, the ecological footprint is perpetuated by our human activities based on destruction of life and nature¹⁹.



Graphic 1. Ecological Footprint. *Resource*: WWF (2014).

¹⁸ J. Riechmann, *Un buen encaje en los ecosistemas*, Madrid, Catarata, 2014, p. 333.

¹⁹ See M. Wackernagel, W. Rees, *Our Ecological Footprint. Reducing Human Impact on the Earth*, Gabriola Island, New Society Publishers, 1996.

In *The Great Escape*, Nobel winning economist Angus Deaton describes the remarkable story of how, beginning 250 years ago, some parts of the world experienced sustained progress, opening up gaps and setting the stage for today's disproportionately unequal world. Nowadays, China, USA, India, Japan and the European Union are using 75% of total biocapacity²⁰. The other countries only have 25% of the planet's biocapacity to develop. With this unequal development between called global North and global South, we all have overpassed the biophysical limits of Earths' regeneration. This means we are using the natural resources of future generations. They will suffer the climatic consequences of global warning caused by our current consumer culture (chronic shortage of resources, loss of biodiversity, ecosystem changes, deforestation, glacier melting, rising sea level, pollution of soil, water and air, etc.). But this kind of 'planetary apartheid' and irrational progress becomes more impressive when we read the last inform of OXFAM, because «the richest 1% of the world population has more wealth than the remaining 99% (...). In 2015, only 62 people have the same wealth that 3,600 million people (the poorest half of humanity)»²¹. There are 836 million people with \$1.25 per day, concentrated in South Asia and sub-Saharan Africa²². With such imbalances, biomimicry represents a paradigmatic shift because it promotes the transformation of capitalism's production system inspired by nature's wisdom²³.

Affirming that economic growth is good for itself, postulating that human quality levels can be measured by GDP and GNP of a country, represent an intellectual fraud of danger consequences in the era of global ecological crisis. While it is true that capitalist system has brought enormous material benefits, its functionalist view subordinates everything to the maximum economic profit and the indiscriminate consumption at the expense of nature. For this reason, the battlefield of Anthropocene requires to tran-

²⁰ See *State of the World 2006. Special Focus: China and India*, World Watch Institute, Washington, Island Press, 2006.

²¹ *Una economía al servicio del 1%. Acabar con los privilegios y la concentración de poder para frenar la desigualdad extrema*. OXFAM report n° 210, January 18, 2016, p. 2. Available in: https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/bp210-economy-one-percent-tax-havens-180116_es_0.pdf

²² See *Transforming Our World: the 2030 Agenda for Sustainable Development*, United Nations (Resolution adopted by the General Assembly on 25 September 2015), New York: UN, 2015, p. 4.

²³ See J. Collado Ruano, *O desenvolvimento sustentável na educação superior. Propostas biomiméticas e transdisciplinares*, «Revista Iberoamericana de Educación», vol. 73 (2017), pp. 203-224.

scend the debate between communism, anarchism, socialism, and capitalism. All of them are political theories of social organization derived from classical mechanics mental structures, where human beings are controlling natural resources for their own wishes and needs²⁴. Thus, biomimicry emerges as a sustainable worldview that uses nature as teacher to learn how to co-evolve harmonically with all living and non-living organism of our planet.

4. *Biomimicry: Using Nature as Teacher.*

What we are facing today is not only an environmental crisis, but also a geological revolution of human origin. Human irrationality in patterns of consumption and production are unsustainable and are also causing serious consequences in the environment. In this sense, this essay explores the principle of biomimicry as a meta-model to be applied in economy, engineer, architecture, design, urbanism, industry, technology, art, politics, education, energy, and so on²⁵. Nature is the only ‘business company’ that has never failed after 3.8 billions years. To face the Anthropocene’s challenges, it is necessary to understand better the principles and strategies of nature. Biomimicry has a revolutionary potential to offer a “way out” of political confrontation, because mimesis promises a way toward a future free from human arrogance. *Feeling-thinking-acting* in harmony with the co-evolution processes of nature is the main goal of biomimetic philosophy²⁶.

The term *biomimicry* comes from the ancient Greek *bios* (life), and *mīmēsis* (imitation). In the nineties, the American science writer Janine Benyus popularized the term in her book *Biomimicry: Innovation Inspired by Nature*. Since then, biomimetic approach is one of the most innovative responses in recent years to protect the environment and improve the quality of life through new sustainable habits of consumption and production. «Biomimicry uses an ecological standard to judge the correctness of our innovations. After 3.8 billion years of evolution, nature has discovered what works, what is appropriate, and what endures»²⁷ notes Benyus, affirming that biomimetic revolution «begins an era based not on what we can extract from the natural world, but what it can teach us». Obviously, this scientific line of thought is in harmony with ancient worldview of indigenous and

²⁴ See B. Nicolescu, *O Manifesto da Transdisciplinaridade*, São Paulo, TRIOM, 2008.

²⁵ See J. Collado Ruano, *Una perspectiva transdisciplinar y biomimética a la educación para la ciudadanía mundial*, «Educere», n° 65 (2016b), pp. 113-129.

²⁶ See Collado Ruano, *O desenvolvimento sustentável na educação superior*.

²⁷ J. Benyus, *Biomimesis. Cómo la ciencia innova inspirándose en la naturaleza*, Barcelona, Tusquets editores, 2012, p. 13.

aborigine peoples, who see in nature its *sacred dimension*. So, the concept of biomimicry has origin with first human groups that created gods according to various natural phenomena (sun, water, mountains...). Biomimicry revives the *sacred* and our spiritual intelligence²⁸. That is why science and spirituality converges in the biomimetic vision.

In recent years, as people began to rethink science-spirituality relations, all ecological practices have come under increasing criticism. The philosophical considerations from nature of this article have the goal to study the co-evolutionary processes that life has developed over billions of years in the context of 'Big History'. The main intention is to identify their operational principles and strategies in order to apply them to solve complex problems. The most important observations show us that all forms of life are developing sustainable co-evolutionary strategies in nature since life's first appearance about 3,8 billion years ago. In this sense, many contemporary thinkers have proposed to learn from nature to build a more just, democratic, and better integrated with the biosphere society.

Nowadays, the principle of biomimicry is already articulated enough to be a tool which guide us towards achieving an enduring sustainable development in co-evolutionary harmony with our planet. By identifying the operational principles of live at different levels, and more specifically in its ecosystem level, we are available to design 'other possible worlds' where human systems are melodically engaging in the co-evolutionary symphony that takes place in the Big History. In 1971, the biologist and ecologist Barry Commoner formulated the basic 'laws' of ecology: 1) *Everything is connected to everything else*. There is one ecosphere for all living organisms and what affects one, affects all. 2) *Everything must go somewhere*. There is no 'waste' in nature and there is no 'away' to which things can be thrown. 3) *Nature knows best*. Humankind has fashioned technology to improve upon nature, but such change in a natural system is likely to be detrimental to that system. 4) *There is no such thing as a free lunch*. Exploitation of nature will inevitably involve the conversion of resources from useful to useless forms. In his later book *Making Peace with the Planet*, Commoner notes that techno-sphere prevalent in industrialized societies 'is in war' with the biosphere, causing global ecologic crises impossible to be hidden²⁹.

The notion of 'ecoliteracy' or 'ecological literacy' developed by physicist Fritjof Capra seeks to understand the organizational principles of ecosys-

²⁸ See D. Zohar – I. Marshall, *SQ: Spiritual Intelligence. The Ultimate Intelligence. Connecting with our Spiritual Intelligence*, London, Bloomsbury Publishing, 2000.

²⁹ See B. Commoner, *Making Peace With the Planet*, New York, Pantheon, 1990.

tems to build sustainable human communities. According to Capra, there are five main principles: 1) Interdependence. 2) Cyclical nature of ecological processes 3) Tendency to associate, establish links and cooperate as essential characteristics of life. 4) Flexibility. 5) Diversity³⁰. In short, Capra believes reconnecting with the web of life means rebuilding and maintaining sustainable communities in which we can satisfy our needs and aspirations without diminishing the chances of future generations. For this task we can learn a lot from ecosystems, true sustainable communities of plants, animals, and microorganisms. To understand them, we must become ecologically literate. «Being ecologically literate, being “ecoliterate”, means understanding the organizing principles of ecological communities (ecosystems) and use these principles to build sustainable human communities. We need to revitalize our communities including education, business, and policies»³¹.

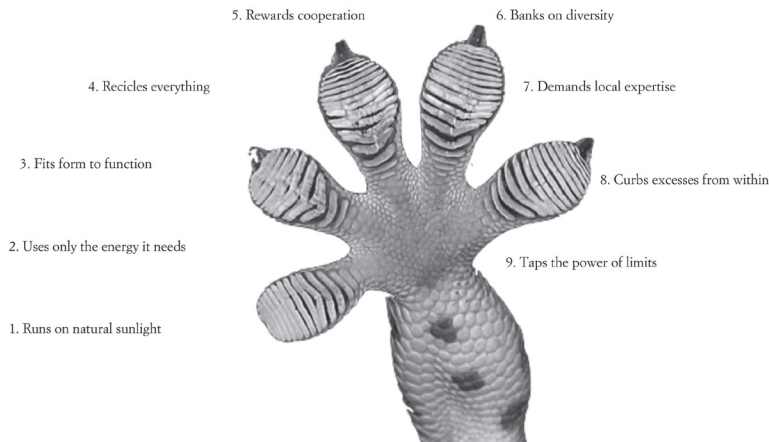


Figure 1. *Principles of Life in the Nature*. Source: Benyus, *Biomimicis*, p. ???

In this literacy context, the biologist Janine Benyus proposed to use Nature as model, measure, and mentor. Benyus recognized nine laws, strategies, and operational principles of Life in the Nature that can be used as example of beneficial model for human behavior: 1) Nature runs on natural sunlight. 2) Nature uses only energy and resources that it needs. 3) Nature fits form to function. 4) Nature recycles and finds uses for everything. 5)

³⁰ See F. Capra, *La trama de la vida. Una nueva perspectiva de los sistemas vivos*, Barcelona, Anagrama, 1998.

³¹ *Ibidem*, p. 307.

Nature rewards cooperation. 6) Nature depends on and develops diversity. 7) Nature requires expertise and resources. 8) Nature avoids internal excesses. 9) Nature taps into the power of limits³². Those principles invited us to reflect and compare the inherent characteristics of ecosystems with the culture of human production. «It could even be said that capitalism is the metaphorical antithesis of the natural process of life: in it prevails exclusion, squander, deregulation, what we call today as *relocations*, as well as unaware speculative flows to real production of goods and services»³³ notes the natural philosopher Luciano Espinosa compared to natural systems of the biosphere where «operate inclusive circuits of all member of the network, which are attached to the ground, tied to the satisfaction of the basic needs and the constant recycling of matter and energy». In short, biomimicry allows us to rebuild human systems in order to fit them in the natural systems.

In a similar manner, the economist Jorge Riechmann suggest six basic principles for the ecological reconstruction of economy: 1) Homeostasis or “steady state” in biophysics terms. 2) Living from sun as energy resource. 3) Close material cycles. 4) Not carrying too far the materials. 5) Avoiding xenobiotics as POPs (Persistent Organic Pollutants), GMO (Genetically Modified Organisms). 6) Respecting diversity³⁴. Riechmann defines the concept of *economic homeostasis* to stop growing economically to focus more on qualitative development. At the same way as there is no living species in nature which grow all time, the economy (as subsystem of the Earth) must steady, only consume necessary natural resources and focus on human capabilities in a broaden form. This means stop using the GDP as a compass to guide progress, because they do not take into account the number of hours that parents devoted to their children, or insecurity in the streets, or the quality of education, quality health systems, etc. Then, it does not seem unreasonable to derive – by biomimicry –, from the maturity ecosystem concept, the idea of economic homeostasis or steady state (in biophysical terms) to human systems.

A new sustainable paradigm emerges from all those ecological principles recognized by many authors. I argue that Big History perspective constitutes the requisite ground for a new biomimetic era in the Anthropocene,

³² See Benyus, *Biomimesis*.

³³ L. Espinosa, *La vida global (en la eco-bio-tecno-noos-fera)*, «LOGOS: Anales del Seminario de Metafísica», vol. 40 (2007), p. 66.

³⁴ Riechmann, *Un buen encaje en los ecosistemas*, p. 211.

which I call ‘Cosmodernity’³⁵. This idea is in full harmony with Nicolescu and Moraru³⁶, and it seeks to involve and innovate various socio-ecological areas – i.e. biotechnology, bioengineering, bio-textile, bio-architecture, biomedicine, bio-economy, etc. From this cosmodern view, scientific knowledge of an external physical universe converges with the spiritual knowledge of an inner emotional universe. This transdisciplinary approach is the pure essence that defines the Cosmodern Philosophy. This cosmodern approach constitutes an epistemological openness that seeks to integrate and combine multiple cosmic, physical, ethical, emotional, cultural, and artistic dimensions of humankind who constantly co-evolves in systemic and interdependent processes of energy, matter, and information³⁷. A cosmodern consciousness emerges to face the challenges of the Anthropocene when we learn to *feel-think-act* with the *continuum* of nature.

5. *Cosmodern Conclusions to Co-evolve in the Anthropocene.*

As the Anthropocene presents novel challenges for living a meaningful life, we need to rethink our own existence in many ways. Whether we are talking about philosophy or science, ontology of epistemology, ethics or politics, facing the end of our planet as we know it dramatically changes our learned outlooks and ingrained priorities. According to philosopher Roy Scranton, «we have entered humanity’s most philosophical age, for this is precisely the problem of the Anthropocene. The rub now is that we have to learn to die not as individuals, but as civilization»³⁸. Learning to die is not easy. That is why I consider Cosmodern paradigm as the civilizational metamorphosis where humankind reinvents his relationship with the *sacred*. This means stop exploiting nature to learn from it and create new biomimetic models that allow us to achieve an enduring sustainable development.

Unlike the Industrial Revolution, the Biomimetic Revolution involves the appearance of a new epistemological paradigm that focuses on what we can learn from nature, rather than focusing on what we can exploit

³⁵ See J. Collado Ruano, *Paradigmas epistemológicos en Filosofía, Ciencia y Educación. Ensayos Cosmodernos*, Saarbrücken, Editorial Académica Española, 2016.

³⁶ See C. Moraru, *Cosmodernism: American Narrative, Late Globalization, and the New Cultural Imaginary*, Ann Arbor, The University of Michigan Press, 2011.

³⁷ See J. Collado Ruano, *La bioética como ciencia transdisciplinar de la complejidad – una introducción coevolutiva desde la Gran Historia*, «Revista Colombiana de Bioética», vol. 11, n° 1, 2016, pp. 54-67.

³⁸ R. Scranton, *Learning to Die in the Anthropocene: Reflections on the End of a Civilization*, San Francisco, City Lights, 2015, p. 21.

it to obtain raw materials to be manufactured in the industry. From this cosmodern perspective, we can define biomimicry as the transversal study of self-eco-organization of biological systems in their environment, focused to discover the principles of sustainability and co-evolutionary strategies that occur in our planet in order to use them as a meta-model to imitate in human sub-models. Consequently, biomimicry also represents a (r)evolution of human knowledge because it leaves behind centuries of efforts to dominate and control nature. An idea that has always been present in the ancestral worldviews of indigenous and aboriginal peoples, who defended Mother Earth as a living organic system, and not as a dead entity that only provides us with raw materials for manufactures.

Addressing the challenges of the Anthropocene requires philosophical considerations from nature, in order to debate about our human solidarity and adaptiveness in earth system governance³⁹. We cannot really predict the future, but if chaos theory altered our understanding of the universe, biomimicry should transform our life on Earth during the Anthropocene. Both Anthropocene and biomimicry attempt to conceptually traverse the gap between the natural and the social through the construction of *feeling-thinking-acting* learning process. «When you listen to your feelings, you follow an algorithm that evolution has developed for millions of years, and that withstood the harshest quality tests of natural selection»⁴⁰ argues historian Yuval Harari, adding «your feelings are the voice of millions of ancestors, each of whom managed to survive and reproduce in an unforgiving environment». In abstract, emotional feelings, spirituality, and interiority are important facets to achieve mental, social, and environmental balance needed to improve the human welfare in a resilient and sustainable manner with all ecosystems of the Earth. We are now in a paradigmatic crossroad. The future of our children and grandchildren depends on our present decisions, and we cannot fail them.

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³⁹ F. Biermann, *Earth System Governance. World Politics in the Anthropocene*, Cambridge, MIT Press, 2014.

⁴⁰ Harari, *Sapiens. A Brief History of Humankind*, p. 391.