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Simon L. Lewis and Mark A. Maslin. *The Human Planet: How We Created the Anthropocene.* London: Pelican, 2018. 480 pp. ISBN 978-0241280881

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Measured against the immense scale of time in which geologic aeons are computed (the 4.5 billion years that have elapsed since the birth of the planet Earth), the whole tale of the evolution of *Homo sapiens* (which started 'only' 300,000 years ago), appears to be something rather derisory. Indeed, if the sequence of geological aeons could be transposed onto the face of a clock, where each aeon corresponds to a time of the day and their sum equals a day of our lives, those 300,000 years of evolution would be squeezed into just a few seconds: less than the last four seconds before midnight.

Such considerations introduce the discourse of the book *The Human Planet: How We Created the Anthropocene,* by Simon L. Lewis and Mark A. Maslin. The volume is a follow up an article entitled *Defining the Anthropocene*, which appeared in the March 2015 issue of *Nature* magazine. The opening of the book is not neutral towards the topics covered within. In light of what has happened in those four imaginary seconds, the enormous impact of human presence on Earth, specifically that of *Homo sapiens*, can be better evaluated. The ultimate effect of this presence – equal to the impact of an enormous meteorite or the catastrophic eruption of a volcano – is a sharp change in the evolutionary trajectory of the planet. Hence, the authors suggest, the necessity to introduce a new term – *Anthropocene* – to define the present geological time.

In this new chapter of the history of the Earth, mankind has behaved as an absolute 'force of nature' and left behind 'written' and indelible traces – physical, chemical and biological – because it has disrupted the global carbon cycle, therefore causing the warming of the Earth's surface and ocean acidification; on the biological front it has caused the extinction of entire species. These traces can be found in geological records, such as glaciers, sediments on the bottom of the oceans, carbon fallout, tree rings and future rock formations.

Even though there is a fairly broad consensus on this topic within the scientific community, the question of the start date of the new era remains open-ended question. This is where Lewis and Maslin suggest two possible years, 1610 and 1964, both identifiable by a global synchronous marker. Yet, in actuality, they end up choosing the former date, because it comes closer to the criteria adopted to identify the latest geological era, known as *Holocene*, that should give way to the *Anthropocene*.

The first date, 1610, was identified because it is linked to a minimum peak of atmospheric carbon dioxide, the last act of a process that was started with the encroachment of the Europeans into the New World, continued with the death, due to wars and diseases, of about fifty million people, the ensuing reforestation of thirteen billion tons of carbon and the maximum global cooling brought by the so-called Little Ice Age from 1574 to 1677.

The term *Anthropocene*, first suggested by Paul Crutzen, comes from the Greek word *kainós*: which means 'new'/'recent'. But even though the root to which the suffix is attached refers to the presence of man on Earth (*ánthrōpos* in Greek means 'human'), this is not the distinguishing aspect that defines the character of the new era. The first specimens of mankind materialised more than two million years ago. Subsequently, man has evolved into a multitude of species, *Homo sapiens* being the latest and the only one that escaped extinction. Mankind began colonising every continent and producing a lasting impact on the biosphere only during the *sapiens* era and in relatively 'recent' times.

Lewis and Maslin based their analysis on an abundant body of data; data relating to the presence of trees (there were about 6,000 billion at the time of the first agricultural practices, while today only half still stand) and data on the extinction rate of animal species, which has been happening a thousand times faster since the arrival of *Homo sapiens* (in the past forty years alone, the population of marine, avian and terrestrial species has decreased by 58 per cent).

A scrupulous analysis of these data brings the authors to reconsider an old thesis by Alfred Russel Wallace, the co-discoverer of the theory of evolution. Back in 1876 he observed how the advent of our species coincided with a depletion of the planet's fauna. Lewis and Maslin point out how fauna, especially large herbivores, play an important role in supporting the balance between a large number of different species, preventing some from prevailing over others and therefore altering the entire food chain.

When fauna becomes extinct, its absence triggers cascading effects that cause further mass extinctions and even climate change. This is where the central questions of the book actually take shape. What will the consequences of human actions be? How long will they last? What risks will they entail? These are complex questions, impossible to answer without drawing on a great deal of information and without effectively intertwining a wide variety of disciplines: first and foremost the history of mankind and geology, but also geography, environmental science, economy, demographics, conservation biology and evolutionary biology.

The volume, which is extensively descriptive and includes a very detailed bibliography, unfolds on a solid conceptual framework. It is divided into eleven chapters that scan the history of mankind from its origins to this day, while also looking at possible future scenarios. The first chapter delivers the history of the concept of Anthropocene and retraces all the stages of the debate that led to its definition. This is where the voices can be heard of multiple authors –recent ones, such as Paul Crutzen, Eugene F. Stoermer and Jan Zalasiewicz; and illustrious personalities of the past, such as Georges-Louis Leclerc and Thomas Jenkyn.

The second chapter illustrates the succession of the myriad geological eras that make up the four aeons into which the history of the Earth is divided: Hadean, Archean, Proterozoic and Phanerozoic. This is where the narration turns a bit fuzzy and the reader is overcome by a sense of confusion due to the high concentration of technical concepts in a succinct number of pages.

The third chapter is all about human prehistory and succeeds in communicating to the reader a very important concept: the evolution of mankind was not determined by a succession of species. The paths of several species, such as *Homo sapiens* and *H. neanderthalensis*, have actually crossed, sometimes even causing bitter conflicts.

The following four chapters are the real core of the discussion. They delineate the four major transitions that have changed human societies. The focus is placed on the succession of discoveries, innovations and revolutions that first allowed human beings to conceive of themselves as separated from nature and, therefore, validated in proceeding with projects of domination and exploitation of nature itself. According to Lewis and Maslin, there is an alternation of two types of transitions: the first and the third transition are defined by energetic revolutions while the second and the fourth are defined by the radical change in the organisation of human activities. The fourth chapter outlines the birth of agriculture. The fifth describes 'Globalization 1.0'. The sixth chapter highlights the industrialisation and urbanisation processes, while the seventh defines 'Globalization 2.0'.
According to the authors, the birth of agriculture caused alterations in the Earth's atmospherestabilising the climate and leading to more favourable conditions for man. Hence the

development of the first cities and, subsequently, of sedentary civilisations. 'Globalization 1.0' is the first process of standardisation of the world. It is the outcome of Columbus' discoveries and of the establishment of long-distance trade transactions (the so-called 'Columbian Exchange'). The coming together of the old and the new continents, though, led to European dominance, the colonisation of the Americas and the eradication of Amerindian civilisations. The disappearance of entire populations induced a reforestation process that led to slow climate change and a general cooling of the planet (the so-called 'Little Ice Age'). The industrialisation process and the exploitation of fossil fuels caused an increase in gas emissions, specifically, of carbon dioxide. This led to atmospheric overheating and a further alteration of the global climate. According to the authors, this energetic transition caused the first 'Interglacial Period'.

'Globalization 2.0' is the second process of standardisation of the world. This time around the process started in the Americas and first involved Europe before expanding to the rest of the globe. It started post World War II, when the 'great acceleration' of capitalism produced an extraordinarily widespread standard of economic prosperity and wellbeing. 'Globalization 2.0' was also a global organisational revolution; a revolution that involved industrial production and maximised its productivity. This increase in productivity brought about new gas emissions and, consequently, further climate changes and new alterations to ecosystems. This transition is still in progress and, according to the British authors, it represents one of the riskiest experiments in the entire history of humanity. Lewis and Maslin wonder if this experiment is not testing the strength of the planet.

The eighth and ninth chapters have a decidedly more technical tone. They capture the heated scientific debate on methods for defining the ages of the Earth (asking what are the thresholds of these ages and how to determine their beginning and their end). Lewis and Maslin claim that the *Holocene* is now definitely passed and, not unlike other scholars, they believe that this threshold is inscribed in the soil. In other words, the biochemical changes brought on by countless human actions can be found in geological sediments and in specific markers. However, as regards identifying these markers, the authors take on a unique stand as opposed to that of other experts.

According to most modern scientists, the beginning of the new era coincides with the Industrial Revolution; however these two authors believe that it actually dates further back, to 1610. That year, the reforestation processes outlined in Chapter five brought on a cooling of the Earth linked to an increase in photosynthesis. The concentration of carbon dioxide in the air decreased by many parts per million, leaving behind traces in the layers of ice found in the underground of Antarctica. These traces, found in a sample collected by Law Dome, seem to prove the transition to a different geological era.

The authors believe that setting the beginning of the *Anthropocene* is an action with political consequences that could affect the interaction between man and nature. The narrative of our development depends on the determination of this starting point. Indeed, if we say that the *Anthropocene* started in the early days of agriculture, the environmental changes brought on by mankind are just written in our destiny. They are embedded in the existence of mankind, irreversible and unstoppable.

On the contrary, if we attest that the new era began in relatively recent times, we will have to accept the fact that climate change is decisively tied to colonialism, to the instrumental application of science and to the abuse of technology. In that case we would have to question our whole cultural orientation. We would have to question the role of science itself, the conjunction of science and technology and the application of this conjunction to industry and the heightened development of a capitalist economy. We would have to question our habits and our whole approach towards consumption. Dating the beginning of the *Anthropocene* to 1610, as here, means telling the story of

an evolution defined by powerful chiaroscuro; a development that begins with the extermination of populations, with colonialism and with slavery; a development that is intertwined with the birth of capitalism, mercantile first, then industrial and consumerist.

In the last two chapters of this intense volume the authors try to stimulate further debates and critical thinking. In addition to outlining possible alternatives for the future, they provide some viable options with respect to a series of political and socio-economic decisions that seem to deviate from the dimension of the objective data, arriving at the uncertainty of mere possibility. Lewis and Maslin wonder if the human race shares the same chance of growing and then collapsing as the bacteria found in a Petri dish; these reproduce until all available resources are exhausted and then they die. Or, the authors wonder, should we expect man's current way of life on Earth to be altered by something totally different. In other words, they ask if there will be a fifth transition to an era where we will be able to mitigate the effects on the Earth system. Theit answers deliver substantial optimism as well as trust in *Homo sapiens'* wisdom.

In chapter ten, the authors explain how mankind has succeeded in becoming 'a force of nature' through the concept of 'complex adaptive systems'. Human societies, starting with those based on hunting and harvesting as well as those based on consumer capitalism, have been characterised by a growing ecological footprint, following a nonlinear dynamic based on rare changes in way of life. The permanence of human society in each state has always had a shorter duration than in the previous state and each transition has occurred thanks to a positive feedback circuit based on a growing availability of energy and information. This positive feedback circuit made changes ever more irreversible. Drawing from the theory of adaptive systems, Lewis and Maslin come to a conclusion: infinite growth is unlikely, but an irreversible implosion is unlikely as well. The explosion of digital connectivity and technological progress and the availability of renewable energy sources could lead to a fifth transition, where human society is characterised by new forms of reflection. In this hypothetical new society, artificial intelligence could save the world.

Written before the coronavirus pandemic, Lewis and Maslin's book now takes on a deeper meaning. If, on the one hand, it brings man – his presence and responsibilities – to the centre of the universe, on the other it fully restores the fragility – as well as the marginality – of our actions. Awareness of this double human dimension could be at the root of the fulfilment of the 'prophecy' presented at the end of the book: a bleak future is not inevitable.