

## 1 A Virus for the Planet

### 1.1 Premise

The unbridled proliferation of human beings in recent centuries and their invasion of every last geographical corner resemble in many ways a pandemic, in terms both of its widespread character and its destructive effect. We use the term “Anthropocene” (Shantser 1973; Bonneuil & Frezzos 2013; Ellis 2018; Lewis & Maslin 2018), almost with barely concealed pride, to highlight the prevalence, if not the exclusivity, of our impact on Earth. We paint a picture of some sort of Human Era, which, unfortunately, on the one hand reveals our responsibility for the poor health of the planet, and on the other risks amplifying the anthropocentric idea that we are the undisputed rulers of Earth’s dynamics, as we are emancipated from any ecological constraints. There is no doubt that our species has successfully achieved its adaptive affirmation: we have, in fact, colonized every corner of the globe, overcoming climatic and foraging adversities, defeating most of the dangers we met and reshaping the landscape according to our needs. However, it is precisely this expansion into the most varied places that makes our species more exposed to the current planetary imbalance. The transformation of each environment into a constrained habitat existing within certain limits does not shelter us from the alterations we cause. On the contrary, it exposes us to them even more. In other words, our success as a species – for example, from a demographic point of view – is the very reason why we should pay greater attention to ecological dynamics. The mistake we make, instead, is to believe that we are immune – closed off inside a bubble where technology acts as an amniotic container. This is why I have always been perplexed by the term “Anthropocene” because it lends itself to the most serious misunderstanding: that is, seeing ourselves as a world apart, freed from those ecological chains that sustain all species through interdependence. Our success, instead, has made us more dependent than ever!

We human beings seem to ignore the impact of our growth, behaving as if we were still a sparse population dispersed in the savannah of East Africa, carrying chipped stones and sticks, roaming in search of charred meat left over from a fire. And without the slightest worry, we are burning every last remaining corner of the world, infecting the lungs of the planet and filling the atmosphere with carbon dioxide. Are we a virus contaminating Gaia’s exhausted body, to take up James Lovelock’s metaphor (Lovelock 1979)? Can humankind be considered a silent deadly infection that now hails its virulence, its ill-fated success? There is undoubtedly a substantial difference between human action and that of a virus, which is due to the specific moral responsibility involved in our choices.

Bewilderment over our neglect of the network of living beings is growing day by day, paradoxically in direct proportion to the destructive power we are deploying. Even a virus owes its permanence to its ability to find a niche balance. The human species, on the contrary, risks applying the epidemic logic of the virus to the entire planet, without reaching or aspiring to a balance. But, in doing so, it is becoming Earth's disease.

The whole world is exhausted and feverish, upset by imbalanced meteorological phenomena and alterations in the trophic chains. In many ways, we are behaving like a virus, blindly replicating through the spasmodic use of the world's resources, disorganizing its structure and saturating it with debris. The planet thus seems to be seeking immunity to the human infection, because the entire biocenotic community is threatened by the ravenous aggression of humans. Our species consumes the world like an insatiable monster, capable of digesting the complex architecture of biodiversity, phagocytizing in a second the priceless masterpieces that emerged from the forge of time over millions of years thanks to a slow selective refinement. The impact of human development, tuned to the Promethean note of fire, leaves a trail of ash and deserts, destroying entire biological libraries so rich that the Library of Alexandria pales in comparison. Biodiversity contains galaxies of adaptive information, extraordinary life strategies accumulated in ecosystems thanks to the slow work of phylogeny. And we, with frightening arrogance, set fire to it, unaware that we are pulverizing knowledge on which our very future depends. The awareness of the morbidity of human action, present especially in younger generations, is therefore due to the erosion of a large part of the natural environment, which has occurred especially in recent decades (Spilsbury 2011; Renner 2013). Hence, the view of human species as a virus and the metaphorical use of the term "infection." We can try as hard as we please to deny our responsibility for the serious calamities that appear on our horizon like a looming storm, but today it is simply no longer possible to live in denial. Human responsibility for global warming – that is, the fever of the planet that, once again, brings us back to the virus metaphor – is recognized by the scientific community. Slowly, however, questions are also emerging in public opinion. It is wrong to generically blame the human species for what is happening, not recognizing the different impact of various populations, diverse cultural traditions and varying policies carried out by different states. And for the same reason, the word "anthropocene" is actually generic, because it tends to assign similar responsibilities to very different behaviors. Western culture has a major responsibility in this sense, due to its largely anthropocentric conception of the relationship with nature, which has transformed our impact on the planet into a sort of disease – hence the metaphor of viral infection. For this reason, I am very puzzled both by those

who exalt human power to control the dynamics of nature, as if it were a machine with command levers, and by those who adhere to a sort of ahuman movement in favor of human extinction, forgetting the many virtues of our species. It is not a question of fighting humanity, but rather some aspects of the Western tradition, through a revolution of thought that is able to go beyond anthropocentrism.

After all, even if within a different axiological and interpretative framework, all those who consider their Selves as something disembodied – think about the idea of “mind-uploading” (Bostrom 2014) – can recognize themselves in the image of a virus. Those who aspire to a future of emancipation from the body, those who consider the human being as disconnected from the ecological networks of interdependence, those who see themselves as a world apart, as aboard a lifeboat that at any time can abandon the rest of the living to drift or shipwreck – those people are all viruses. Those who see the technosphere, which envelops the Anthropocene nucleus, as a sort of protein capsule that allows it to attack all nonhuman organisms, act just like a virus that hooks onto cell sites to inject its own replicating charge. People who think of the biosphere as a huge table where to feast *ad libitum* actually see themselves and behave as viruses, using technology as a capsid. Unfortunately, even this way of thinking, supported by an anthropocentric drift of humanist thought and formalized by the transhumanist movement, uses the virus paradigm as an explanatory model of the relationship between our species and the community of the living.

But how did we come to all this? It is difficult to identify a single cause or a linear chain of events that led us to this disastrous situation for the various biomes of our planet: either the problem lies in the natural demographic evolution of the human species, no longer kept under control by other competitors, or the critical factor is to be found in an anthropocentric culture that has devalued everything that did not belong to the human race. Perhaps both are to blame. What is certain is that today we are faced with a large number of critical issues: each one is highly significant in itself and all may converge to produce a catastrophic situation. What cannot, in any way, be questioned is the responsibility of human beings in this increasingly accelerated process of subversion (IPCC Report 2019; Houghton 2015). The victims of this process have been those self-regulating dynamics which, despite cyclical fluctuation and evolutionary events, still characterize life on Earth. This is an epochal event, unfortunately still denied or neglected by those who hold the reins of world governance in their hands, and this lack of awareness should be even more worrying. If life on Earth – which, as ecology has taught us, knows no barriers and represents the primary phenomenon of globalization – were an organism,

we should now take a seat at its bedside and understand that we are the disease that is killing it.

The belief that our immediate interests should dictate our behavior has led us into a paradoxical condition, namely being the infection of our own planet. This infectious trend is now revealing all the serious problems it has created by altering the homeostatic systems that allowed for the development of life, including that of our own species, in the Cenozoic era. As a result of global warming, in addition to the systematic destruction of forests and the pollution of seas, we are also witnessing the loss of the biodiversity on which every living creature depends. If, on the other hand, we think that we are some sort of separate organism, we risk believing that we can save ourselves on our own and, in so doing, we risk pursuing this logic to its suicidal conclusion. The fact remains that we are part of an organism whose origin is rooted in the Tertiary rather than the Quaternary Period. The question is, are we really a virus for the Earth?

## 1.2 The Network of the Living

The best-known trait of viruses is undoubtedly their lack of interest in the host, even though the latter provides them with the opportunity for replication; in this sense, we can find several analogies between viruses and humans, if we look at the way the latter relate to the community of the living. A virus is an entity apparently free from belonging, it is neither rooted nor aspires to enter the network of ecological interdependencies, it is stateless and difficult to attribute. The etymology of the Latin word “virus” simply means poison, underlining the accidentality of its presence, that is, its nonintegration into the harmony of nature. In the history of life, the origin of viruses is not clear: according to some, they are the product of regressive processes of the genetic material, for others they may even be considered the first replicating forms in a hypothetical RNA world (Ben-Barak 2008; Fry 2000). Of course, like other living forms, viruses reproduce, have genetic material and evolve by natural selection, but in contrast they lack their own metabolism and cell structure. Viruses are undoubtedly borderline entities, capable of following the logic of living beings without, however, fully adhering to their laws. Humans, too, seem to want to free themselves from the laws of nature, to respond exclusively to their own expansionist dictates, transforming the world into a frontier to conquer, into a body to infect. The network of the living is inevitably made up of constraints, for the simple reason that every relationship produces chains of dependencies and limitations of usability, but the human imperative – we could say the Promethean legacy – is to circumvent all constraints, refusing to accept any external limitation.

The community of the living produces positions and denies existential volatility, because it roots each species in a niche, which gives it recognizability as well as a place to exist. But this is denied to human beings – as we read in Pico della Mirandola’s *Oration on the Dignity of Man* (1942 [1496]) – or rather, it is rejected by humans themselves. The human being as it arises from the humanistic proposal eludes the great chain of living beings because it does not recognize itself in any rank, that is, in any adaptive niche, rejecting residence in the biotic community characteristic of all other species. Even generalist or opportunistic species present an adaptive conformation, which is denied to humans by the proponents of the theory of incompleteness. The nomadic habits of human beings lead them to massively exploit one territory, only to abandon it to move on to the next. Viruses use infected cells as a factory to reproduce indiscriminately and then spread from one host to another through the most diverse networks of contagion: blood, sputum, organic liquids. Viral dynamics resemble a fire that: i) feeds on fuel, that is, susceptible organisms; ii) gains strength through the convergence of triggers, that is, becomes virulent due to the recurrence of contagion; iii) spreads through the wind, which corresponds to the increase in contact in an epidemic. Social dynamics can be represented as infections, and our relationship with the biosphere replicates their stages. The network of the living, although denied by the human being, can be temporarily evaded, but in the end all the chickens come home to roost because one cannot hide from the laws that regulate the biosphere.

In order to understand the pressing issues we are facing, it is necessary to illustrate these self-regulatory dynamics that lead to a state of balance of powers and explain why they are being jeopardized today. As important physicists such as Erwin Schrödinger (1940) and Ilya Prigogine (1977) have shown, life is a thermodynamic process of accumulation and dissipation of the Sun’s radiant energy. Throughout the history of life on our planet, this process has produced complex organisms that, over the course of generations, have given rise to phenomena of evolution correlative to their life environments. It’s what we now call “adaptation” – a process of specialization of the various life-forms, whereby each species is linked to a certain environment and a certain way of life. The study of ecology shows how the biocenotic community forms a network of relationships where each species is connected to the others through several interdependencies. It is a mistake to consider a species in an essentialistic way, that is, as a package of self-referenced qualities, because each character is expressed through this relationship network. Therefore, we must never forget that the biosphere is also a global network that is self-organized on several levels, from the elementary one of the cell to the ultimate one of the macro-organism called Gaia.

The organization of the living at different levels is based on homeostatic mechanisms of negative feedback interaction, so that the growth of a factor induces the development of a counter-factor capable of containing its impact. We know, for example, that: i) the population increase of herbivores is held back by carnivores and, vice versa, the numbers of the latter are constrained by that of herbivores; ii) the production of carbon dioxide by animals is controlled by plants' intake of this gas through photosynthesis; iii) the organic material of the carcasses of living creatures is brought back into circulation by detritivores. This food web (Smith & Smith 2006; Odum & Barret 2005) or life cycle reminds us that, despite being subject to fluctuations, the system tends to stay within certain gradients. Even the evolution of the living can be read as a convergence on homeostatic and relational organizations, whereby each organism depends for survival on an ad hoc environment and its anatomical and functional conformation requires certain parameters. In the same way, each species is related to the others through chains of complex interactions. Every time a link in the network is cut off, the whole chain of interdependencies is put at risk, because no organism is isolated.

The system obviously has some resilience – this is true for cells as well as for other higher-level networks – so that small and gradual perturbations that do not involve points of particular sensitivity are buffered. What is worrying, regarding human action, is precisely this quality. Let me clarify: Homeodynamic systems, capable of keeping variables within a given gradient range, precisely *because* they absorb perturbations inevitably end up hiding their effects and therefore do not immediately reflect the actual degree of the damage. Many of these are “threshold systems” (Marchesini 1996a), that is, capable of operating by negative feedback below a certain value (like a thermostat) and then behaving in an autocatalytic way, that is, by positive feedback above that value. Let's take an example: Up to a certain concentration limit, the carbon dioxide produced by heterotrophic organisms stimulates the growth of plants and marine organisms able to lower the amount of the said gas, which means that we have a balanced or negative feedback system; however, above that limit, the excess of carbon dioxide favors global warming by the greenhouse effect, decreasing the development of plants and also increasing the frequency of fires and the destruction of plankton, with further release of carbon dioxide. Suddenly, a condition that was partly compensated for through buffering effects leads to events that accentuate it – with a catastrophic outcome – as a result of positive feedback. Not to mention other phenomena of greenhouse gas release due to glacier melt.

Homeodynamic systems develop over biological times, that is, over tens of millions of years, and are incomprehensible if evaluated by the yardstick of historical time, which is our focal point and which struggles to cope even

with periods of thousands of years. These systems are very effective and efficient in building a sort of stable macroclimate – such as that of a rainforest – but precisely because of the complex chains of relationships that regulate their functions, they are extremely vulnerable to major disturbances, as shown by the frequent mass extinctions that have characterized life on Earth (Gould 1991; Buffetaut 1993). Human beings are irresponsibly pushing the homeostatic thresholds of the planet and are doing so by acting on different fronts and in different ways that, unfortunately, converge on the same perturbative direction. First of all, there is a progressive subversion of some cycles that are fundamental for the balance of life – such as water, nitrogen, carbon – due to activities directly or indirectly related to human action. Agronomic pressure, for example, due to the energy-intensive diet of Western and developing countries – I am referring to the massive use of food of animal origin – has produced progressive deforestation that has affected the last remaining rainforests on Earth, transforming them into pastures or monocultures for fodder. As we know, forests represent the most important bastion of carbon dioxide uptake and oxygen release. Unfortunately, the past decade has been disastrous in this respect: in 2019 alone, over 20 million hectares are estimated to have gone up in smoke (Mariotti 2019). The effects of this are having repercussions on many nodes of the network of the living.

As stated, forests are crucial for the carbon cycle and therefore for limiting the greenhouse effect. Destroying them not only means canceling out their function as the lungs of the planet and as tools for the removal of greenhouse gases, but also means increasing the concentration of carbon dioxide itself, thereby exacerbating global warming. At the same time, the destruction of places where biodiversity is at its highest – most of the species present in such ecosystems are not even included in the known catalog of the living – is leading to the so-called “sixth mass extinction” (Kolbert 2014). This is not a minor problem and it concerns not only disappearing species, but also those that remain, because they are being disconnected from those biocenotic relationships that safeguard their balance. These self-regulating mechanisms are often mistaken for static systems, but obviously this is not the case. A biocenosis is a dynamic system of regulations within fluctuations that are sometimes cyclical, sometimes evolutionary, but that always involve interactive convergence between organisms. I am therefore concerned not only about the species that are going to die out today, but also about those that will disappear over time and, even more so, about the species that will see a population boom that will no longer be contained, condemning the entire biome to decline and initiating dangerous animal diseases that will inevitably pose a widespread danger.

### 1.3 Deforestation

One of the phenomena of greatest impact on the balance of the planet, and therefore on the maintenance of the network of interdependencies that characterize the life of Gaia as it was configured in the Tertiary era, can be traced back to the massive use of the territory for anthropic purposes. Since the Neolithic revolution, which began about 10,000 years ago, at first slowly and then feverishly, humans have carried out the most devastating operation that Earth has ever seen: the replacement of forests with land intended for the exclusive use of human beings. The processes that have contributed most to deforestation have been livestock farming and agriculture, in addition, of course, to housing and urban conversion, that is, the so-called overbuilding. However, the role of agro-zootechnics has been predominant: when chainsaws are put into operation or a forest burns down, there is always a plan to create new pastures or land for cultivation (Rifkin 1993; Sachs 2011). In the human imagination, deforestation means translating an unproductive resource into a fruitful mine, in the immediate term through timber (which is useful in many productive activities) and in the future thanks to the fertility of the soil and its high value in terms of humus, to obtain both lush pastures and land for agronomic activity. The felling of trees then accelerated dramatically in the 20th century, when tractors and other mechanical means were involved in tillage and harvesting. It was at that point that even the tree-studded hedges that delimited different plots were cut down, transforming the countryside into stretches of open land that go as far as the eye can see (Mazzino & Ghersi 2003).

This process was slow and gradual up to the threshold of the modern age – many historians consider the 11th century as the transition phase in the transformation of the European landscape (Andreoli & Montanari 1995) – and then continued at an exponential pace. Today the incidence of this phenomenon has unfortunately reached a worrying peak, as over the past century the last remaining rainforests have been ravaged for extensive farming and monocultures. In order to cultivate an area, in fact, one has to carry out certain operations – such as weeding, changing the course of rivers, plowing the soil – that have a considerable impact on biodiversity and fertility itself. The forest environment is the result of an ecological climax that has taken an unimaginable amount of time to form and yet it is swept away in a flash, first by chainsaws, then by plows. The forest has its own homeostasis, where trees are at the center of a network of self-organizing processes: roots expand into the ground to avoid erosion, leaves fall and feed a complex system of water retention, nitrogen-fixing bacterial colonies increase fertility, plants transpire to feed the formation of vapor and an organic layer gives rise to humus. Deforestation inevitably



produces aridity and deletion of the organic part of the soil: the geographical areas where trees were first cut down are now deserts (Lanternari 2003; Imeson 2012).

We may believe that in these geographical areas, once the cradle of great civilizations – think, for example, of the Fertile Crescent – meteorological dynamics have simply changed in the direction of aridity, and perhaps this is indeed the case. In fact, we know that over time air currents change also on the basis of the modification of tectonic plates. However, today it is well known that, in the rainforests, it is the plants themselves that create that recycling of water that prevents desertification. The Amazonian forest contributes to feeding the humid and rainy climate that distinguishes it, so it is increasingly evident that it is nature itself that packages its environmental qualities over time (Campbell, Reece & Simon 2007). When a rainforest is cut down, water is dispersed by runoff, the humus layer is pulverized, the habitats built by a large number of organisms (niche construction) are destroyed, the most important climatic cycles (water, nitrogen, carbon) are permanently broken down and the soil maintained by the root system is eroded. How can we fail to see the forest as a mortally infected macroorganism?

The erosive processes occurring in natural habitats are strikingly reminiscent of the evolution of epidemics. At first, they only affect some areas – generally the most promising ones that are healthy but also fertile and rich in water – and then they spread in one main direction and along secondary offshoots until they affect the whole territory. Deforestation is always accompanied by misleading publicity, so that the forest is painted as obscure, elusive and threatening, a receptacle of feral and demonic entities, while the felling of the trees is dotted with brightness and clarity, irenic in its submission to human control. The conversion of the “saltus” into cultivated land is seen as an operation of reclamation or purification, because it overlaps simplification with essentiality, by stamping out wilderness in line with the best prophylaxis. When it is not chainsaws, it is fire that devastates the forests, always set by human beings, most of the time for petty interests, sometimes by neglect, occasionally for fun. The Promethean myth that portrays our species as indebted to Prometheus – the reflective Titan who bestowed fire on the human being – binds us indissolubly not only to *techne* but also to fire. This story, in my opinion, has a strong anthropological and psychological significance. When Edward O. Wilson (2017) locates the origin of myths in the nocturnal tales exchanged by hunters beside the fire, he captures an aspect that should make us think: the fascination we get from flames is perhaps an ancestral trait, a sort of resonance that, if on the one hand captures our attention in front of pyrotechnics and screens, on the other hand exposes us to pyromania (113–119).

Of course, what should also be of concern is the disarticulation of ecosystems with very serious repercussions on animal populations, both in terms of demographic balance and habitat displacement. Human beings have already contributed – directly, through the marketing of exotic species, and indirectly, through the exchange of goods – to importing numerous alien species that have put ecological sustainability at serious risk. But there is also an epidemiological threat: the transfer of viral pathogens from one species to another, including humans. The ecological alteration, creating a magmatic situation of cohabitations unknown in phylogeny, leads to the development of highly infectious zoonoses that are difficult to eradicate. We must not forget that a biome is not simply a set of environmental components hosting a series of living organisms: we must rather imagine it as a network of interdependencies that maintains particular values within a certain gradient. When we break this network, the whole system breaks down and changes the mobility of the factors at stake, especially the infectious ones, which were previously confined and contained at one point of the network.

Deforestation also shows us the human being's inability to cope with long timescales. Destroying a forest does not mean destroying something that refers to the here and now, but rather an entity that has been created over time, in some cases over tens of thousands years, and which would take just as long to be reformed – provided that it is ever possible to reform it, I would add.

#### 1.4 Consumerist Bulimia

One of the most important causes of the anthropic conversion of forest and wooded areas is certainly the need to find more and more food resources for the human population. We might, then, believe that what we are observing is nothing other than the consequence of the uncontrolled development of humanity, and in some ways this is true. As we know, the demographic development of our species has followed an impressive growth rate over the last two centuries: if in the nineteenth century the world population was still around one billion, by the 1960s it had already reached three billion, doubling in just forty years, reaching six billion at the end of the 1990s. But it only took a decade to grow by more than a billion and, even if it has an irregular trend, this development rate seems not to have come to a halt. It is inevitable that this phenomenon will have an impact on the consumption of resources, such as the increase in fishing, which is putting the regenerative capacities of the oceans to the test. The unstoppable growth of the world's population, especially in some geographical areas, is causing the depletion of resources and the use of all types of animals for food. The markets of megacities, where no attention is paid to hygiene, are becoming open-air epidemic factories.