Quotes from: Manuel Delanda, *A Thousand Years of Nonlinear History*. Edited by Matteo Pasquinelli.

The human endoskeleton was one of the many products of that ancient mineralization. Yet that is not the only geological infiltration that the human species has undergone. About eight thousand years ago, human populations began mineralizing again when they developed an urban *exoskeleton*: bricks of sun-dried clay became the building materials for their homes, which in turn surrounded and were surrounded by stone monuments and defensive walls. This exoskeleton served a purpose similar to its internal counterpart: to control the movement of human flesh in and out of a town's walls. The urban exoskeleton also regulated the motion of many other things: luxury objects, news, and food, for example. In particular, the weekly markets that have always existed at the heart of most cities and towns constituted veritable motors, periodically concentrating people and goods from near and faraway regions and then setting them into motion again, along a variety of trade circuits. [p. 27]

The oceans and the atmosphere form a nonlinear dynamical system that contains ten times more solar energy than plants capture through photosynthesis, and only a tiny fraction of the potential energy of plant life powered most of civilization's past intensifications. The enormous reservoir of oceanic and atmospheric energy fuels a great variety of self-organized structures: tornadoes, cyclones, pressure blocks, and, more importantly for human history, wind circuits. […] However, these skills were inadequate to master the circuit that would change the course of the millennium: the gigantic "double conveyor belt" formed by the trade winds and westerlies, the wind circuit that brought Europeans to the New World and back again. [p. 53]

Both coal and steam, and later oil and electricity, greatly affected the further development of Western towns, and, as usual, once the mineralized infrastructure of those towns, and the institutions within then, had registered the effects of these intensifications, they reacted back on the energy flows to constrain them, either inhibiting them or further intensifying them. [p. 74]

Simmons views cities as veritable transformers of matter and energy: to sustain the expansion of their exoskeleton, they extract from their surroundings sand gravel stone and brick as well as the fuel needed to convert these into buildings. He notes that, like any system capable of self organization, cities are open (or dissipative) systems, with matter-energy flowing in and out continuously. […] What made these urban centers special, however, was not so much the matter-energy flows that traversed them, but the way in which those flows became *amplified.* […] Even though an industrial town had to invest more energy than previous urban centers, it extracted greater surpluses per unit of energy. Basically, it used certain flows of energy to amplify other flows. [p. 76]

In the eyes of many human beings, life appears to be a unique and special phenomenon. There is, of course, some truth to this belief, since no other planet is known to bear a rich and complex biosphere. However, this view betrays an "organic chauvinism" that leads us to underestimate the vitality of the processes of self-organization in other spheres or reality. It can also make us forget that, despite the many differences between them, living creatures and their inorganic counterparts share a crucial dependence on intense flows of energy and materials. In many respects the circulation is what matters, not the particular forms that emerge. As the biogeographer Ian G. Simmons puts it, "The flows of energy and mineral nutrients through an ecosystem manifest themselves as actual animals and plants of a particular species." Our organic bodies are, in this sense, nothing but temporary coagulations in these flows: we capture in our bodies a certain portion of the flow at birth,

then release it again when we die and micro-organisms transform us into a new batch of new materials. The main form of matter-energy flow in the biosphere is the circulation of flesh in food chains. Flesh, or "biomass", circulates continuously from plants to herbivores, and from herbivores to carnivores, giving the ecosystem its stability and resilience. […] Compared to plants and microorganisms, "higher" animals are just a fancy decorations in an ecosystem, consuming and transforming biomass with decreasing efficiency as their size increases. [p. 103-5]

This section explores the relationships between medieval cities and towns and the ecosystem in the which they grew – not only the forests they devoured as they proliferated but also all the other interactions they maintained with biological entities, especially microorganism. […] And then, of course, we must consider that other uncontrollable element of ecosystems, the climate. Both infectious diseases and changing weather patterns played a great role in urban history, making epidemics and famines part of the "biological regime" that dominated urban and rural life until the eighteenth century. [p. 106]

From different perspective, cities and towns may themselves be considered ecosystem, at least to the extent that biomass circulates through them to feed their inhabitants. The diagram of this circulation, however, must include processes occurring outside cities and towns because urban centers have always depended on their countryside for food. […] Moreover, this parasitic relationship can be reproduced at a larger scale. In the early sixteenth century, for example, as cities grew and developed trade links with one other, their food began to flow from ever remoter supply zones. [p. 106]

The cities that began multiplying in Europe at the beginning of the millennium were like so many islands in the middle of a large temperate forest in its climax state, dominated by oaks and elms. Cities are like islands in two different ways. In term of climate, cities are "heat islands," separated from their countryside by a sharp difference in temperature. […] But all medieval towns big and small were islands in another respect: their low degree of species heterogeneity. A typical medieval town can be described as a tightly packed assemblage of humans, a few species of animals and plants, and, as one writer put it, "a lumpen-proletariat of insects". [p. 107]

The main characteristic of an urban ecosystem is its homogeneity: human beings *shorten all food chains* in the web, eliminate most intermediaries and focus all biomass flows on themselves. Whenever an outside species tries to insert itself into one of these chains, to start the process of complexification again, it is ruthlessly expunged as a "weed" (a term that includes "animal weeds" such as rats and mice). Medieval towns were, in this respect, no exception. Moreover, the agricultural lands that fed these towns were themselves simplifications of the forests they had replaced. When a piece of forest was cleared to create arable land, an assemblage of plants in its climax state was driven back to its very first state of succession, its species composition homogenized and its energy and nutrients redirected toward a single center. […] The same held true with respect to animals. Several domesticated species (pigs, cattle, goats) may be considered *biomass converters*, which aid the process of shortening the redirecting food chains. For example, cattle and goats transform indigestible biomass (leaves, grass, sprouts) into edible flesh and milk. Pigs are even more efficient converters (one-fifth of the carbohydrates they eat are transformed into protein), but the feed mostly on sources that are also suitable for human consumption. They can nevertheless serve as living storage devices for unpredicted surpluses. Together, humans and their "extended family" of domesticates, as the historian Alfred Crosby calls it, transformed a heterogeneous meshwork of species (a temperate forest) into a homogeneous hierarchy, since all biomass now flowed toward a single point at the top. In a sense, a complex food web was replaced by a simplified food pyramid, at least in those areas where urbanization had triumphed. [p. 108]