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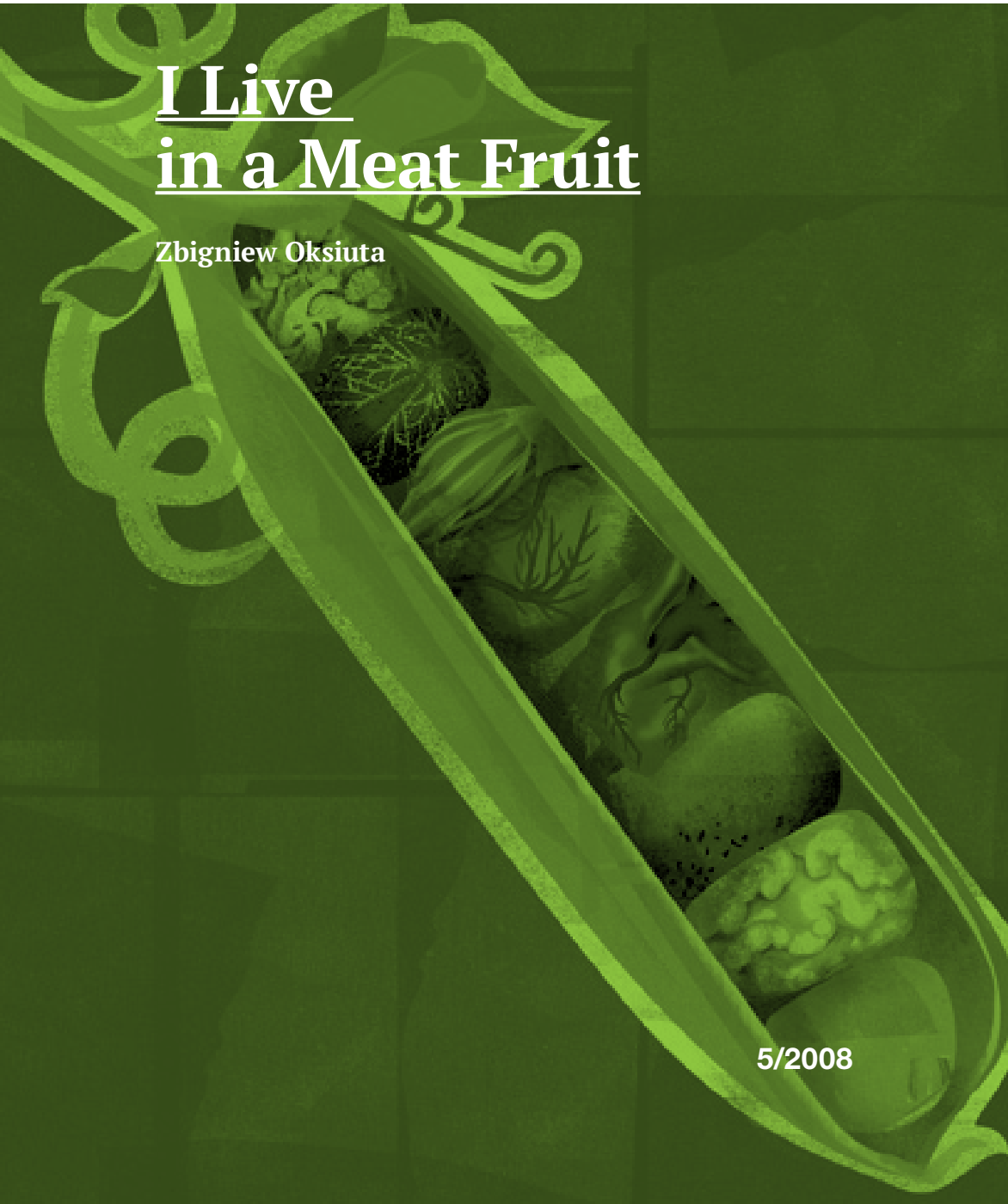
I Live in a Meat Fruit

Zbigniew Oksiuta



5/2008

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In the introduction to his classic work *Botanica*, Edward Strasburger juxtaposed the qualities that distinguished plants from animals[1]:

Plants	**Animals**
chlorophyll	no chlorophyll
autotrophic	heterotrophic
direct acquisition of solar energy	indirect use acquisition of solar energy by taking up nutrients in the form of high quality organic matter
producers	consumers
unlimited growth	limited growth
"open" system	"closed" system
rooted to the soil	moves freely
rigid cell walls	naked cells

1 E. Strasburger, *Botanika*, Warszawa 1971, p. 6.

Plants have chlorophyll, which makes it possible for them to derive energy directly from sunlight. In contrast to animals, which must look for food, plants are self-sufficient and autotrophic; they are producers. Because they derive energy from the sun, they do not need to move as animals do. Their growth is not subject to external limitations related to movement and, as opposed to animals, they are characterised by unlimited growth (they grow all their lives) and possess an "open" form. They also have unique regenerative capacities. Their organs grow back, and it is possible to grow a new plant from almost every cell.

If I were not only an artist but also a good farmer and were to decide which qualities seem more trustworthy to me, and on which I would found my farm, I would not hesitate to choose plants. Without the plant world, life on the earth would not be possible. The earthly biosphere is, after all, a complicated system composed of various beings – producers, consumers and decomposers responsible for the cyclical circulation of matter and energy. Animals constitute a huge step in evolutionary development. Detachment from the soil and free movement in space, in the air and underwater are revolutionary stages of the evolution.

Although animals, seeking protection from the scorching sun, take shelter in the shade of the trees and plants, it is plants and decomposers – bacteria and fungi – which, as silent servants, live in the shadow of the animal world. No vegetarian questions the consumption of plants, although, as organisms, they are more complex

than animals. The genome of cabbage (Brassica oleracea) includes four times more genes than the human genome.

Animals have blood which contains haemoglobin. Plant have juice which contains chlorophyll. Animals have eyes, plants possess chloroplasts. Plants use chloroplasts to acquire energy, animals use eyes to receive information. Plants are blind but satiated while hungry animals must see to acquire food. The immobility of plants, their locality accompanied by energy self-sufficiency, autonomy, and a kind of freedom, are all qualities close to the notion of habitat as a living organism, and they play a decisive role in my research on the vision of a biological future.

Biological habitat

Biological habitat is a living spatial system that will be based on organic-chemical principles. The transmission of energy and information will take place in liquid matter. In order to develop and function, the habitat will assimilate solar energy by means of photosynthesis, and function as a symbiotic relation of living organisms in the cyclical metabolism of biosphere.

The first stage of work on this project was devoted to the testing of materials, or, more specifically, the use of biological polymers derived from plants and animals, such as gelatine and agarwood, as construction material. After numerous trials and experiments, I developed a technique for creating spatial objects out of gelatine, membranes and vesicles that were architectural in scale. The main

principle applied was the use of liquid technology and the shaping of whole objects. For this purpose, I employ as a framework transparent plastic balloons, inside of which a polymeric mass creates liquid air-filled pneumatic membranes.

Spatium Gelatum

Research and experiments over many years have proved that the application of soft technology and the use of the molecular forces of self-organisation in polymers allow for the creation of stable spatial forms. During the process of drying out the liquid membranes, they gel, harden and change into a shell independently, without any "creative" interventions, assuming amorphic shapes with maximal stability.

Such processes are known to occur in nature and constitute the foundations of order and beauty in the animate world. The *Spatium Gelatum* made it possible to create them *in vitro* on a large scale in the laboratory. The membranes and shells produced are merely a spatial structure, a shell construction, as it were. It is true that they are organic, biologically renewable and edible, but they are dead. Nonetheless, they have an incomparably greater biological potential as atypical materials to be used in construction, like concrete, metal or glass. Flowers will not grow on grass, while life thrives on polymeric spaces infused with hormones and nutritive agents. The application of tissue engineering technologies makes it possible to breed previously unknown live objects.

A turning point in research on biological habitats has been discoveries which culminated in a project entitled *Breeding Spaces*. Research is carried out in biological laboratories with the aid of Petri dishes, plastic, transparent containers in which organisms are grown on a layer of gelling agar. While I was working on the *Spatium Gelatum* project and experimenting with liquid technologies, I realised the superiority of agar vesicles and pneu. This involves much more than flat Petri dishes – it is a new universal biological instrument. In living organisms the membrane or skin enveloping cells and tissues do not serve as an inanimate barrier, as in Petri dishes, but as a live membrane which not only protects organisms against their surroundings, but is also an inherent part of them, actively participating in their functioning. A similar thing happens in the liquid and gelling vesicles produced by means of the Spatium Gelatum method: circular membranes of agar form a closed space and create the conditions for breeding autonomous worlds in their own interior. By injecting live organisms into such a form, the system functions as a universal container – a chemical pot, alchemical crucible and a biological reactor – and the architectural scale of the object opens up previously unknown possibilities.

House as a bioreactor

The shell of a normal building, walls, floor and roof, are only an enclosed space. For the house to be usable it must be finished and equipped with a whole system of installations that will make possible and regulate its functioning. The house as a bioreactor is more than a biological

envelope; it is a cluster of biological organs transforming matter and information within itself.

An important theme of my research is the physiology of architecture: nourishment and excretion as metabolic processes, work as the action of a body in a gravitational field, rest and sleep as an escape from the ubiquitous law of gravity. Everyday functions then acquire universal meanings, and the architecture of the interior gains new dimensions. The kitchen becomes a chemical laboratory; the toilet an extension of the alimentary tract; ordinary, everyday actions turn into efforts to overcome acceleration at 9.81 m/s2, and a soft bed into an instrument simulating weightlessness.[2] I imagine the biological habitat as a plant membrane, a kind of three-dimensional leaf or fruit in whose juicy interior there is a symbolical bustle of various organisms.

I was born on my grandfather's farm in a small village near Białystok in eastern Poland. The farm was around 100 x 800 meters in size. On one side it bordered a forest in which there was an old graveyard and pits where potatoes were kept, and, on the other, a river in which I was fished for burbots. The fields were sown with cereals and potatoes, and a meadow served as a pasture for horses and cows. By the road, there was a house surrounded by a garden and an orchard, and in the farmyard there were a barn, a stable and a pigsty. Almost everything we produced was intended to satisfy our family's own needs. We baked bread,

2 Z. Oksiuta, *Formy, procesy, konsekwencje, exhibition catalogue*, Warszawa 2007, p. 16.

made our own cheese and butter, spun fabric from linen, and most of tools were produced on the farm. During the times of my childhood there was no electricity. The power source for the simple machines was a horse mill.

It was a universal, autonomous system, both a manufacturing and processing plant, and a workshop and laboratory in which cereal, vegetables and fruit were grown, trees were planted and grafted, and people and animals were born. Everything happened on the space of a few acres. In our present times of specialisation, a modern farm manufactures just a few products. The production of objects necessary for life is scattered all over the world. In the framework of the global economy, Argentinean apples traverse oceans to find their way to European tables, although just outside the window there is a local apple tree under which its fruit rots. We can imagine how much it all costs. In our earliest classes in physics we learnt that the transportation of matter, the sending of energy through space, results in losses. Only a slight part of the initial energy reaches the destination. In an automobile, less than one percent of the fuel is used to perform the genuinely useful task of transporting a human rather than a car. The rest are losses, and losses equal pollution.[3] Dynamics is a very expensive enterprise. The efficiency of global civilisation constitutes barely a few percent. From the point of view of the economy of gains, which is deprived of any ecological equivalent, it is still profitable, but from the point of view of the biosphere it is not.

3 A.B. Lovins, "Rezygnacja z węgla to czysty zysk", Świat Nauki, special issue, 10/2005, p. 58.

From a global perspective, local agricultural systems are primitive methods of farming. Attached to the soil, static and dependent on the local soil conditions, they produce only a few, particular products. Deprived of contact with the world, they are a symbol of poverty and backwardness. "In primitive history every invention had to be made daily anew and in each locality independently. (...) Only when commerce has become world commerce and has as its basis large-scale industry (...) is the permanence of the acquired productive forces assured,"[4] Karl Marx wrote. Local natural and agricultural systems are, however, a source of invaluable wealth. In nature, the basic driving force is local adaptation since locality is a source of diversity, while globality is a cause of monotony.

The autonomy of particular organisms and the lack of external coordinating organisation, a kind of biological UN, enables evolution, which includes only local adaptation. "In nature local rules generate a global order,"[5] and not the other way round. A global order exists and can exist only within the framework of the universal laws of nature and "[t]his is not a principle that governs human engineering. Pyramids are always built from the bottom up, but the organization of the building process, since the days of the pharaohs, has been top down, under the control of a single autocrat who had a clear and literally commanding vision of the whole [...]. 'Global' direction from on high puts in motion a hierarchical cascade of 'local' projects. This is

4 K. Marx, E. Frederick, *Collected Works*, *Volume 5*, trans. W. Lough, London 1975, p. 67.

5 S. Kauffman, *The Origins of Order: Self-Organisation and Selection in Evolution*, New York 1993.

such a common feature of large-scale human projects that we have a hard time imagining alternatives."[6]

The majority of technological achievements – from the invention of print and the development of electrical power networks to the invention of radio, television and the Internet – promised us a local freedom and decentralisation. Each of us was to have equal access to goods and information and was to develop to the level of his or her potential. These promises have never come true, but perhaps we are too passive and self-indulgent and do not exploit the potential we have. It is true that we have increasing access to the material achievements of technology and to information, but we do not have access to all of it, and the ultimate decisions belong to an increasingly small, elite group of decision makers.

> *[M]uch of human communication makes sense when you realise that humans* distrust *each other, that humans work against the best interests of other humans. There is a struggle between those who wish to obtain illicit information from a communication system and those who wish to withhold that information from them. Much of human technology is the product of arms races and can only be understood in those terms."*[7]

The history of biotechnology began ten thousand years ago, at the moment when humans began to sow seeds consciously, tamed and domesticated a wild animal, built

6 D. Dennet, *Darwin's Dangerous Idea, Evolution and the Meanings of Life*, New York 1995, p. 224.

7 R. Dawkins, *Extended Phonotype. The Long Reach of the Gene*, Oxford 1975, p. 163.

a roof over their heads, and thereby liberated themselves from passive dependence on nature and took control over it. It has not been long since we first realised that the nature surrounding us is not only a source of energy, nutrition and biomass, but it also has enormous informational potential. "[A]ll food is matter that was once alive."[8] "When you eat a steak, you are shredding the equivalent of more than 100 billion copies of *Encyclopedia Brittanica*."[9]

For now, we use information as energy. We burn books in the oven to get warm. The genetic information, the fruit of billions of years of evolution, is our greatest wealth.

I am working now to consolidate my grandfather's farm and to scale it down to a minimal size, to a few cubic metres, or even less – to the size of a cocoon or a coat enveloping my body. I think this aim can be achieved when the billions of years of knowledge written in living matter allows us to breed previously unknown objects and spaces. When the ubiquitous solar energy feeds the processes of self-organisation in the new reactors, it will create decentralised hubs of life, and the non-material network of information covering the global planet will make their operation possible.

Let us imagine a transparent membrane, live skin which surrounds the space around our body. It is covered with

8 R. P. Kapleau, *To Cherish All Life. A Buddhist View on Animal Slaughter and Meat Eating*, [n.d.] 1981, p. 89

9 R. Dawkins, *Blind Watchmaker: Why the Evidence of Evolution Reveals a Universe Without Design*, New York-London 1996, p. 18.

chloroplasts, which absorb and process solar energy. In this introvert garden, condensed patrimony and virgin forest, various organisms live in symbiosis, just like plants, animals and people live on a grandfather's acres. There are warm-blooded flowers that heat the interior. Genetic fabricators[10] equipped with universal DNAs "produce" indispensable objects and tools on the spot. In the internal bubbles, as in living organs, life is thriving. These are bioreactors for the production of food: plant and meat proteins. It will not be necessary to harm animals to produce a necessary portion of meat calories. This space was "born" with you, it is a part of your body. It develops, swells and blooms. It is beautiful when you are young, but it will not survive a thousand years like a stone – it will soon wrinkle, age and wither away.

You are the nucleus of an autonomous megacell. As a biological being, a carrier of cells, you are a part of nature, but by possessing consciousness, you transcend it. You are the creator of visions and ideas, and you change the face of the planet at a blazing speed. You have initiated your own new evolution and become a creator of replicators – cultural memes. Perhaps a house, a living organism, will be able to become a universal incubator in which nature will stand a chance of coexisting with culture. Memes will fertilise genes, new replicators will be born, and they will initiate a new, metabiological future.

10 Personal fabricator, a description of the printer of the future analogous to personal computer. The printer, instead of printing marks on paper, will allow to produce three-dimensional objects. I create here a new idea of a personal biological "factory" steered by genetic inscription.

> *To "green" Mars, to colonize other planets, or to live for extended periods in space", Lynn Margulis says, "will, of course, require (...) organised, efficient communities. Living together will be as crucial to the colonization of outer space as symbiosis and diversity were to the Paleozoic Era colonization of dry land. Life in space, if it is to occur, will require physical alliances, including new symbioses, among differing life forms.*[11]

Biological habitat, as a universal cosmic spore, could be a cradle of the future not only on our planet but also, as an earthly ambassador, it could make it possible to sow life beyond it.

translated by Joanna Maciulewicz

11 L. Margulis, *Symbiotic Planet. A New Look At Evolution*, London 2001, pp. 133–134.