LIFE — THE UNFINISHED PROJECT
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Since Turing, the question "What is life" has been discussed by computer scientists. Life (just like the brain) was taken out of its "natural carbon-based context". The birth of Artificial Intelligence was followed by the concept of Artificial Life. The term Artificial Life applies on the one hand to forms of life without any natural substances being involved, for instance computer-simulated dynamical systems consisting of character strings (beings composed of characters) capable of growth and reproduction, of exchanging energy and information, creating and controlling themselves. These forms of Artificial Life can be either represented audio-visually or be actually three-dimensional (e.g. robots). On the other hand, the term Artificial Life covers a multitude of human interventions in natural life, ranging from modifications of the genetic code to organ transplants. In this artificial context of life, the old dreams of mankind do not appear so far away any longer — a long life, the opportunity to modify both, a person's physical characteristics and mental abilities, protection against illness, against intemal and external misdevelopments, the very creation of life. The task of artificially creating life can be approached from two directions: from the hardware and the software side. The challenge thereby consists in generating living organisms from non-living elements. The first synthesis of organic molecules by Wöhrer took place more than 100 years ago and constitutes an important step in the direction of an artificial re-creation of life. But Wöhrer chose a hardware approach and this proved to be insufficient. The software approaches defining life as a system property and dynamic process appear to be more promising. Artificial life is thus not only the simulation of biological processes on a computer (ranging from cell growth to virtual ants) but also includes the notion that the "synthesis of life", the artificial generation of life by human beings, will not be possible on a material basis alone. This implies that the artificial creation of life does not require natural materials (from Golem's loam to the carbohydrates and proteins of our modern times) and that the programs involved, the software, will distinguish between life and all other types of natural phenomena. The program requires material information carriers, for instance nucleotides. But these computer-aided visions of artificial life imply that other, synthetic substances may just as well serve as information carriers for the program of life. Genetic engineering and organ technology, recreation through cell nucleus grafting, the cloning of animals, plants and genes, prosthesis surgery — all combine natural and synthetic, living and non-living materials and allow us to cast a glance into the future. While Artificial Life is dedicated to studying the rules of life, genetic engineering aims at changing organisms.

Genetic engineering creates great expectations. Genetic engineering is thought to find an effective weapon to be used in the fight against cancer, Aids and other lethal illnesses. Genetic engineering is furthermore expected to solve the world nutrition problem, to bring about the development of new, environmental-oriented techniques and even to create the "ideal" human being, the genetically engineered person. The research discipline "Artificial Life" has originated in the form of a computer program called "cellular automata", that was developed by the Hungarian mathematician John von Neumann. A cellular automaton is capable of reproduction on the basis of certain rules. The result is a living, self-organizing community of cells.

In the eighties, the AI researcher Christopher Langton developed "cellular automaton loops" which are able to reproduce in a way similar to living structures, like DNA molecules. On the basis of these self-producing cells — later digital ants, birds and other virtual creatures and organisms were created — scientists can generate "living systems" on their computers, that grow and reproduce, that can develop and adapt to their environment. Scientists, however,

have also developed types of artificial life the outward appearance of which resembles that of human beings and animals: robots and highly developed automatons.

Live, death, immortality, reproduction, heredity, development, evolution, growth, adaption — all these concepts have been given a new dimension by the computer culture. Computer culture enforced the shift of paradigm from defining life as substance, material hardware or mechanism to conceiving life as code, language, immaterial software, dynamical system. Handling computers has taught us that the "logical structure" of an organism can be separated from its material basis and that life is a property of the former, not the latter.