

Re-programming organisms, from cancer to Evolution: a myth resisting acknowledged "debacles"; which alternative ways?

Giuseppe Longo

Centre Cavaillès

I will first hint at the distortion in cancer research induced by the prevailing genocentric approach. For more than 50 years, gene therapies were promised by the following decade : since Nixon's « war on cancer » (1971), which provided huge financial support to the search and fixing of the mutation(s) inducing cancer, to the 2001 human genome decoding and the 2003 promise to “Eliminate Suffering And Death Due To Cancer By 2015” (von Eschenbach, NCI president). This cascades of failing promises may be understood within the persisting myth of the possibility of programming the organism by DNA editing and the hope that we can by this “control Evolution” (Doudna, Nobel Award, 2020). Understanding cancer instead requires understanding a failure of a triangular relation tissue-organism-ecosystem in an evolving system. The Tissue Organization Field Theory (Sonnenschein, Soto) will be mentioned as an alternative approach to cancer, within the frame of an approach to Evolution as a historical co-constitutive process in changing “phase spaces” and “theoretical symmetries”, along an “heterogenesis” well beyond current theories in physics.

References:

Giuseppe Longo. Information and Causality: Mathematical Reflections on Cancer Biology. In *Organisms. Journal of Biological Sciences*, vo. 2, n. 1, 2018:

<https://www.di.ens.fr/users/longo/files/BiologicalConseq-ofCompute.pdf>

Giuseppe Longo. Programming Evolution: a Crack in Science. A Review of the book by Jennifer A. Doudna and Samuel H. Sternberg "A Crack in Creation: Gene Editing and the Unthinkable Power to Control Evolution", 2021:

<https://www.di.ens.fr/users/longo/files/LongoReview-DoudnaBook.pdf>