

Thinking beyond the "epidemic of epidemics"¹

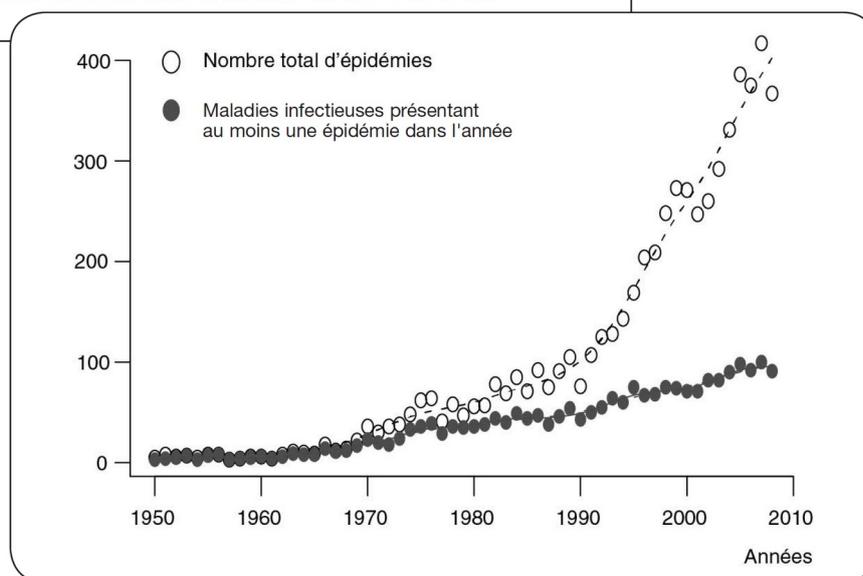
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One of the major challenges of any historical science is the role of forecasting. Biology is a historical science, because organisms can only be understood in a temporal, phylogenetic and ontogenetic, perspective. In particular, the time of biology, and therefore of correlated sciences (ecology etc.), is a time of change in the "space of possibilities" (of "phases" as we say in physics, of ecosystems and species in biology), punctuated by rare events - evolutionary novelties, speciation. In physics, the space (of phases) is fixed as "a priori" of knowledge, as "condition of possibility" for "writing equations", explain Newton and Kant: it a priori contains all possible trajectories - unpredictability is within these trajectories (the randomness of a dice concerns six possibilities, no more, no less). In biology, to physical randomness is added the unpredictability of changes of the space of possibilities and of rare events, to which one cannot even assign probability values, see (1). The historian of human affairs will recognize there elements of his theorization, although, of course, symbolic culture, in all its forms, imposes an important change in the tools of analysis.

Faced with the intrinsic unpredictability of the history of the living, should we remain silent? No, science is not (or not only) the analytical game of "experience/observation, theory, prediction, verification/falsification", but first of all a construction of objectivity, or even objects of knowledge, through difficult operations of "carving-out" (separating/distinguishing) and "qualification" of reality. This is how Darwinian theory offers us a remarkable historical theory of the living, of "species", a notion that is constantly being re-carved-out and re-qualified. This theory does not allow us to predict, but, by making us understand, it allows us to act, if we assume the risk of relying on the best available knowledge. We then decide to measure "biodiversity", an admittedly arbitrary partition of species and life forms, which is always open to discussion and revision; to assess the impact of man on an ecosystem, a difficult qualification of the consequences of activities that are sometimes centuries old. We can also give ourselves a measure of the notion of 'epidemic' and draw the historical diagram shown here ("The Evolution of the number of epidemics of infectious diseases in the world from 1950 to 2010").

Figure 2. Évolution du nombre d'épidémies de maladies infectieuses dans le monde de 1950 à 2010.



D'après Morand, 2015.

Partial and revisable knowledge: is it enough to act? Yes, it is. Since the 1990s, many epidemiologists have been warning us: the notion of "epidemic of epidemics" dates back to 1993 and this 2015 diagram shows it to us. The reasons are well described in (2): some cases may be due to a synthetic biology that claims to be all-powerful and let us believe that we can fully control living organisms by modifying ("editing") their DNA/RNA, but more than 70% of these emerging infectious diseases come from animals, at new interfaces with the environment. Deforestation for agricultural settlement accompanied by intensive livestock farming enables the passage of bacteria and viruses from wild animals to livestock and then to humans. None of these cases and microorganisms were individually predictable, and none will be in the future: they and their causes are known a posteriori.

The self-serving denial of the history of life, of the evolutionary construction of ecosystems, of their specificity and diversity, is the main cause of the activities that destroy them. Often this denial finds its justification in a new scientism, which rules our science: on the one hand, the spontaneity of the man/economy/nature dynamics would choose the best possible path - a misuse of the mathematics for the equilibrium physics of the 19th century; on the other hand, nature itself would be an adjustable, even programmable machine, with disposable material and biological "resources". A new awareness and a science of these phenomena is being built, change is possible: the knowledge of a history, as in the diagram above, and a vision of organisms in their autonomy and their dependence on the ecosystem make it possible to act.

(1) Longo G. 2020. Naturalizing Physics. *To appear* : <https://www.di.ens.fr/users/longo/files/NaturPhysics.pdf>

(2) Morand S., Figuié M. (coord.) 2015. *Émergence de maladies infectieuses*. Éditions Quæ
<https://www.quae.com/produit/1365/9782759224920/emergence-de-maladies-infectieuses>