Towards a theory of organisms

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Abstract

The theory of evolution has provided an increasingly adequate explanation of phylogeny. However, biologists have yet to generate a theory of organisms that would encompass ontogeny and life cycles, and thus phenomena on the time-scale from conception to death.
We propose that theoretical extensions of physics are required in order to grasp the living state of matter that will help to describe the proper biological observables, i.e. the phenotypes. Biological entities must also follow the underlying principles that we use to understand the inert matter. However, these physical laws and principles may not suffice to make the biological dynamics intelligible at the phenotypic level. Like Galileo, who proposed a principle of inertia as default state in mechanics, we have proposed two aspects of the default state in biology, and a framing principle, namely: i) Default state: cell *proliferation* with variation as a constitutive property of the living. Variation is generated by the mere fact that cell division generates two overall similar, but not identical cells. ii) Default state: *motility*, which encompasses cell and organismic movements as well as movement within cells. iii) Framing principle: life phenomena are never identical iterations of a morphogenetic process. Organisms are the consequence of the inherent variability generated by proliferation, motility and auto-organization which operate within the framing principle. From these basic premises, we will elaborate on the generation of robustness, the structure of determination, and the identification of biological proper observables.

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