

Toward a theory of organisms

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ABSTRACT

The theory of evolution, the only global theory in biology, deals with common descent and thus encompasses a large time-scale. Biology has yet to produce a theory of organisms that would encompass ontogeny and life cycles, phenomena on the time-scale from conception to death. This theory would complement the theory of evolution and would posit theoretical extensions to accepted physical principles and default states in order to grasp the living state of matter and define proper biological observables. A theoretical transition between physics and biology requires defining a default state that is a limit case. By describing inertia as the default state in mechanics, Galileo could focus on the analysis of the forces constraining it such as gravity and friction. We propose adopting the default state implicit in Darwin's theory, namely, cell proliferation with variation plus motility, and a framing principle, namely, life phenomena manifest themselves as non-identical iterations of morphogenetic processes. From this perspective organisms become a consequence of the inherent variability generated by proliferation, motility and self-organization. Morphogenesis would then be the result of the default state plus physical constraints, like gravity, and those present in living organisms, like muscular tension.