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A Formal Basis for Metabiology

Biology has always been the poor relation of physics when it comes to mathematical constructions. Metabiology appears to have no clear definition and no pedigree, unlike metaphysics which has a clear definition, going back to the Greeks. This is partly due to the perceived difficulty of describing the complex organisms and their transitions that underpin biology. But another important factor has been the lack of tools at the appropriate conceptual level. We review prior attempts at defining metabiology. Arturo Carsetti discusses metabiology in terms of Husserl's phenomenology sensory intuition and categorial intuition, Gödel's sentences, Lawvere's Cartesian closed categories, Halmos' self-organising/intensional net with polyadic algebras and Atlan's higher-order cybernetics (self-organizing). Chaitin coined the term metabiology in attempting to prove Darwinian theory through algorithms. Turing developed wavelike patterns for biology that are the chemical basis for morphogenesis. Another potential tool is Whitehead's process as defined in his book *Process & Reality*, which has been discussed at previous ANPA and International Whitehead Conferences in terms of category theory. There is empathy between the single substance approaches taken in Whitehead's philosophy as the process and that in category theory as the arrow. In this paper we explore further the feelings, developed in Whitehead's work as a mechanism for organisms to evolve through conceptual prehension and concrescence. The feelings develop from conceptual prehension, involving eternal objects which possess sensory qualities and aesthetic valuations. The extent to which Whitehead's ideas can be taken forward and formalised in category theory will be examined, with a view to developing metabiological constructions, analogous to those in metaphysics. Particular questions are: what are the objects? what are the processes? and what are the types?