The inception of modularity in biology

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Abstract

The modern history of modularity starts with Modernism, as Le Corbusier merged in the "modulor" the ancient architectural measure with the new taylorist standardized mode of production. The term inspired in the 1960s early computer scientist for renaming the "subroutine", anticipated by Zuse's Plankalkül. This transposition involved a shift from "modularity in construction" to "modularity in design", as a strategy for dealing with increasingly complex software systems. Since the late 1970s, the two different acceptations both appear in biology: 1. along the line of the "constructional" meaning, as iteration of genets in clonal, renamed "modular organisms" by J.L. Harper. 2. with a prevailing "design" meaning, in protein architecture and metabolic control theory. But in either case the term broke through, neither conveyed a more general epistemic shift. A stemmatic analysis of early occurrences of the term in biology indicated that it didn't get established before the "second phase" of Evo-Devo, about 1995, with a significant delay with respect even to other kindred disciplinary fields, such as cognitive sciences. I will argue that further shifts were necessary for making the term palatable for life sciences, which made it possible as well to dispel the rigidity of the constructional meaning as to move from a "hierarchy-based" to a "network-based" notion of modularity.

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