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# Complex Objects and Integrative Pluralism

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## Abstract

In *Unsimple Truths* (2009), Sandra D. Mitchell argues that studying complex systems in the biological and other sciences requires a new approach, called ‘integrative pluralism’, to scientific explanation, generalization, models, and laws. In this paper I characterize proteins as complex objects (rather than systems), and diagnose the multiplicity of protein classification systems as arising from their complexity. In doing so, I extend Mitchell’s view of complex systems to include complex objects, and adapt her approach of integrative pluralism to apply to classification in addition to her other targets.

Mitchell’s complex systems are characterized by multilevel organization, multicomponent causal interaction, contextual plasticity, and evolved contingency. I argue that certain objects display these (or closely related) features as well, and that these objects can therefore also be designated as complex. Using proteins as a paradigmatic case, I show how what I call entity complexity arises from their multilevel organization, multipart causal interaction, and contextual plasticity.

As a result of their complexity, there are many different ways of classifying proteins. Looking carefully at the proteins within one particular superfamily, I show how their evolved contingency both generates a plurality of classifications even within this one superfamily and inhibits the total integration of these classification systems with one another. But some integration of the systems does occur during scientific investigation of the proteins within the superfamily. So, I develop an account of this partial integration and show that it is a species of Mitchell’s integrative pluralism.

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