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Explanation in Biology: Reduction, Pluralism, and Explanatory Aims

Brigandt, Ingo (2011) *Explanation in Biology: Reduction, Pluralism, and Explanatory Aims*. [Preprint]



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Abstract

This essay analyzes and develops recent views about explanation in biology. Philosophers of biology have parted with the received deductive-nomological model of scientific explanation primarily by attempting to capture actual biological theorizing and practice. This includes an endorsement of different kinds of explanation (e.g., mathematical and causal-mechanistic), a joint study of discovery and explanation, and an abandonment of models of theory reduction in favor of accounts of explanatory reduction. Of particular current interest are philosophical accounts of complex explanations that appeal to different levels of organismal organization and use contributions from different biological disciplines. The essay lays out one model that views explanatory integration across different disciplines as being structured by scientific problems. I emphasize the philosophical need to take the explanatory aims pursued by different groups of scientists into account, as explanatory aims determine whether different explanations are competing or complementary and govern the dynamics of scientific practice, including interdisciplinary research. I distinguish different kinds of pluralism that philosophers have endorsed in the context of explanation in biology, and draw several implications for science education, especially the need to teach science as an interdisciplinary and dynamic practice guided by scientific problems and explanatory aims.

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Item Type: Preprint

Additional Information: Preprint of a paper forthcoming in *Science & Education*. doi: 10.1007/s11191-011-9350-7

Keywords: biology, explanation, integration, mechanisms, pluralism, reduction, scientific aims, scientific practice, scientific problems

Subjects: [Specific Sciences > Biology > Evolutionary Theory](#)
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