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Stephen J. Gould's Legacy: Nature, History, Society

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Gerd Müller, Konrad Lorenz Institute for Evolution and Cognition Research, Altenberg and Istituto Veneto di Scienze, Lettere ed Arti

Bey ond Spandrels : S.J. Gould, EvoDevo,and the Extended Synthesis

Abstract

Today, the origin of Evolutionary Developmental Biology (EvoDevo) is usually associated with a methodological breakthrough, namely the isolation of regulatory genes and the visualization of their expression patterns in developing embryos, opening up the comparative study of gene regulation in diversified organismal lineages. The preceding conceptual considerations that initiated the theoretical integration of developmental biology into evolutionary theory are mostly neglected, and so is Stephen Gould's influential role in this process.
Many of the phenomena Gould addressed in his critique of the adaptationist program now find explanations in the properties of developmental systems that undergo evolutionary modification: non-gradual forms of change, biased variation, non-adaptive traits, phenotypic novelty, and others. The research field of EvoDevo has rapidly expanded and has generated numerous empirical and conceptual approaches to reveal the contributions of development in the evolution of organismal complexity. The theoretical consequences of these endeavors for the standard evolutionary framework are probably even more far reaching than foreseen by Stephen Gould. In concert with conceptual innovations emerging from other areas of evolutionary biology, EvoDevo elicits a shift in theory structure and a reinterpretation of the role of natural selection.