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Sommario/riassunto

Today's biodiversity is the spectacular product of hundreds of millions of years of evolution. Understanding how this diversity of living organisms appeared is one of the most intriguing and challenging question in biology. Because organismal morphology is established during embryonic development, and because morphological traits diversified from ancestral forms during evolution, it can be inferred that changes in the mechanisms controlling embryonic development are instrumental for morphological evolution. This syllogism lies at the very heart of a new discipline called Evo-Devo which is centered in the identification of the cellular and genetic mechanisms that, through modifications in developmental programmes, were at the base of morphological innovations during evolution. After the discovery of the broad conservation of gene content and regulatory networks in the animal kingdom, as well as in plants, Evo-Devo is orienting towards the study of differences through experimental and functional approaches. Given the wide range of species, gene families, and developmental processes considered, a concerted effort is still required to shed light on the genetic, cellular and molecular mechanisms involved in phenotypic evolution. It is a particularly exciting time for this field of evolutionary developmental biology, as the advent of novel imaging, genome editing and sequencing technologies allows the study of almost any organism in ways that were unthinkable only a few years ago. Therefore, the aim of this Frontiers Research Topic is to gather an

original collection of experimental approaches, concepts and hypotheses reflecting the current diversity of the Evo-Devo field. We have organized the articles according to the mechanistic depth with which they tackle specific evolutionary issues. Hence, comparisons of expression patterns have been grouped in Chapter 1, changes in regulatory interactions and gene networks are presented in Chapter 2, while Chapter 3 focuses on the evolution of developmental processes and biological patterns.