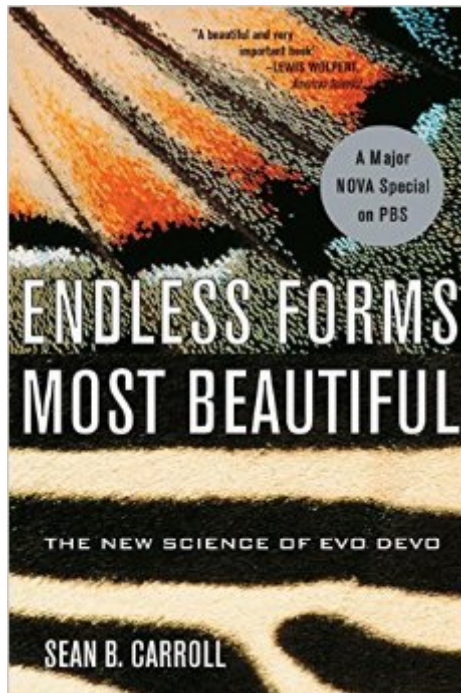


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Endless Forms Most Beautiful: The New Science Of Evo Devo



Synopsis

•A beautiful and very important book. •Lewis Wolpert, American Scientist For over a century, opening the black box of embryonic development was the holy grail of biology. Evo Devo •Evolutionary Developmental Biology• is the new science that has finally cracked open the box. Within the pages of his rich and riveting book, Sean B. Carroll explains how we are discovering that complex life is ironically much simpler than anyone ever expected.

Book Information

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Classical experimental and comparative embryology is a field that has fallen on hard times until recently. When I attended the University of Arizona there was a full blown course in embryology, both descriptive and experimental. By the time I was a graduate student at the same institution the course had been rolled into Organismic Biology in which all of embryology was loaded into a third of a semester. In essence developmental biology in relation to evolutionary studies gave way to molecular. Still some pretty good work went on in the background that impinged on development and was to result in the discovery of HOX genes. HOX genes (or homeotic genes) proved to be the "organizer" that was postulated by various experimental embryologists such as Spemann. Even more astoundingly they proved to be pretty much the same, no matter which organism was being studied. HOX genes in humans were essentially identical to those of insects! This remarkable fact offers proof for the idea that all life is related and that development is a key factor in evolution. In "Endless Forms Most Beautiful" Sean B. Carroll explains the significance of such discoveries as the genetic "tool kit" (including HOX genes) on our understanding of evolution and of development.

Indeed, this is a fascinating story that has already caused me to rethink some of my understanding of evolutionary principles. We live in an amazing world in an amazing universe. The genetic material made up of DNA is a very remarkable material. What other materials could have developed huge numbers of organisms (as many as 30 million extant) that vary from zebras to sulfur bacteria? Yet that complexity appears to have developed from a very simple beginning. Carroll was influenced by Steven J.

Despite vast differences in form and function common principles coordinate animal development from a single fertilized egg. Master genes that control development are found across widely divergent species - *Drosophila* fruit flies and humans share a deep genetic legacy - many of the genes identified as controllers of vertebrate development were originally discovered in these flies. Multicellular plants and animals are essentially societies of cells that vary in configuration and complexity. Darwinian evolution shaped these multitudinous forms as a result of small changes in offspring and natural selection of those best adapted to their environment. Variation arises from mutations in genes that control how cells in developing embryos behave. This tight linkage between evolution and development lies at the heart of the questions *evo devo*, shorthand for evolutionary developmental biology, is attempting to answer. Sean B. Carroll is perfectly positioned to explain *evo devo*, and his comprehensive understanding illuminates "Endless Forms Most Beautiful" *The New Science of Evo Devo and the Making of the Animal Kingdom*. "When and where genes are expressed determines how animals develop. The control regions of these genes - switches that change existing patterns of gene activity into new patterns - are crucial and a single gene can have many control regions. This flexibility underlies the fact that 95% of genes coding for proteins are similar in humans and mice. Evolution of control regions has made us human - and different from our primate ancestors. *Drosophila* is utilized to explain the basic developmental tool kit shared by all animals. Carroll introduces the master Hox genes and intercellular signaling molecules such as proteins specified by hedgehog genes.

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