

# The first book to examine gene duplication across all levels of biological organization

The duplication of genes and genomes has long been postulated to have played a major role in the rise of biological novelty through evolution of new function and gene expression patterns. This biological novelty is represented on multiple levels, ranging from new genes, proteins, network interactions, and expression patterns to new species. *Evolution after Gene Duplication* is the first venue in which gene duplication is examined across all levels of biological organization in order to present a comprehensive picture of the mechanistic process by which gene duplication may have played a part in generating biodiversity.

Bringing together experts from various disciplines, the book:

- Links the evolutionary process associated with gene duplication through structure to function
- Describes the link between the process of gene duplication and protein structure
- Presents a procedure for linking changes in gene copy number through evolution to functional and gene expression evolution
- Offers an overview of model and parsimony-based approaches for gene tree/species tree reconciliation
- Explains the energetic costs of gene duplication, the interplay between systems-level constraints and duplicate gene retention, and the complementary interplay between duplication and the structure of biological networks
- Explores comparative genomics, genome evolution studies, and analysis of multi-gene families such as *Hox*, globins, olfactory receptors, and MHC (immune system)
- Taps the significant increase in multi-gene family data that has resulted from comparative genomics
- Features opposing theoretical viewpoints, comparative genomics data, theoretical and empirical evidence, and the role of bioinformatics in the study of gene duplication
- Includes the fate of associated regulatory pathways

Organized into five sections, the book lays out a hierarchy of chapters extending from evolutionary principles and molecular details to increasingly higher levels of biological organization, a design intended to help the reader appreciate the interconnectedness of these levels. There is also an up-to-date overview of theory, mathematical models, and practical examples spanning research fields such as biophysics, biochemistry, bioinformatics, molecular biology, and systematics.

*Evolution after Gene Duplication* is suitable for scientists across various levels of biology as well as instructors and graduate students. It is pertinent to anyone involved in comparative genomics, genome evolution studies, or analysis of any of the multi-gene families.

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