Gene Sharing and Evolution: The Diversity of Protein Functions

Joram Piatigorsky
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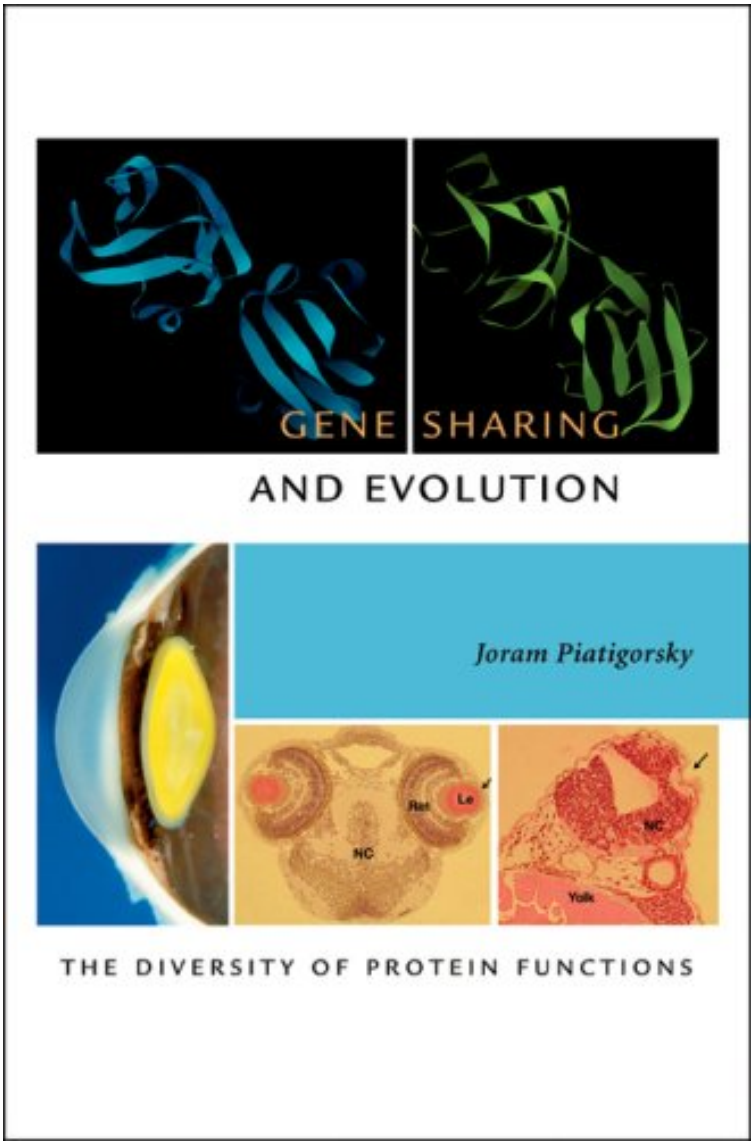

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Joram Piatigorsky : Gene Sharing and Evolution: The Diversity of Protein Functions before purchasing it in order to gage whether or not it would be worth my time, and all praised Gene Sharing and Evolution: The Diversity of Protein Functions:

"Gene sharing" means that the different functions of a protein may share the same gene--that is, a protein produced by

a gene evolved to fulfill a specialized function for one biological role may also perform alternate functions for other biological roles.In the 1980s and early 1990s, Joram Piatigorsky and colleagues coined the term "gene sharing" to describe the use of multifunctional proteins as crystallins in the eye lens. In Gene Sharing and Evolution Piatigorsky explores the generality and implications of gene sharing throughout evolution and argues that most if not all proteins perform a variety of functions in the same and in different species, and that this is a fundamental necessity for evolution. How is a gene identified, by its structure or its function? Do the boundaries of a gene include its regulatory elements? What is the influence of gene expression on natural selection of protein functions, and how is variation in gene expression selected in evolution? These are neither new nor resolved questions. Piatigorsky shows us that the extensiveness of gene sharing and protein multifunctionality offers a way of responding to these questions that sheds light on the complex interrelationships among genes, proteins, and evolution.

Every textbook of molecular evolution has a section on gene sharing but this is the first book entirely devoted to the topic. Piatigorsky considers almost all aspects of gene sharing, provides numerous examples, and discusses the importance and contribution of gene sharing to evolution. He argues forcefully that gene sharing is widespread in many genomes. His arguments will likely alter the prevailing view of gene sharing as a unique phenomenon to crystallins. (Jianzhi George Zhang, Associate Professor of Ecology and Evolutionary Biology at the University of Michigan)This book introduces, explains and elaborates on the very interesting fact that some genes produce proteins that serve different (and important) functions in the same organism. This is a remarkable story well told and interesting from both evolutionary and functional perspectives. (Russell D. Fernald, Benjamin Scott Crocker Professor of Biological Sciences at Stanford University)It has been a dogma of evolutionary biology that gene duplication precedes the evolution of new gene and protein function. Joram Piatigorsky stands this scenario on its head by showing that, in the case of lens crystallins and probably other protein families, functional diversity can precede gene duplication. His revolutionary perspective provides unexpected insight into how biological systems evolve. (Austin Hughes, Professor of Biological Sciences, University of South Carolina)I have not encountered such an interesting, intellectually stimulating and exciting biological monograph in many years. Piatigorsky discusses the phenomenon of gene sharing on all levels, the molecular and cellular, as well as in the context of system biology and finally its ramifications on our views on evolution. He manages to concentrate a tremendous amount of information in this book and whatever he says has experimental backing. His precise and detailed technical descriptions are presented in a very readable style that also projects a sense of wonder and surprise. This is an extraordinary book that I hope will have an important impact on future biological thinking. (Dr. Alex Keynan, Professor at Hebrew University and Special Adviser to the President of the Israeli National Academy of Sciences)[Gene Sharing and Evolution] provides great motivation for evolutionists to continue investigating the origins of new protein function, a topic central to evo-devo biology. The book is a parade of interesting molecular biology with abundant and clear color illustrations. The work is copiously referenced. With over 1100 references in the bibliography, most anyone is certain to find new and interesting literature. As such, I recommend Gene Sharing and Evolution for a graduate seminar, as a reference book on gene multi-functionality with many detailed examples, and for anyone pondering the evolutionary origins of novelty at the molecular level. (Todd H. Oakley Evolution Development)A masterpiece for a broad medical and scientific readership. The text provides a powerful reminder that genes and proteins do not function as isolated entities but are components of a dynamic and elaborate temporal network. With the recent advent of the -omics disciplines, we are witnessing fundamental changes that propel biomedical sciences toward a new level, in which the global perspectives become the fundamental priority. (Richard A. Stein Journal of the American Medical Association 2007-09-19)About the AuthorJoram Piatigorsky is a molecular biologist in Bethesda, Maryland.