6-2006

(Review) Green Fluorescent Proteins

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Recommended Citation
Zimmer, M. Green Fluorescent Proteins. *Q. Rev. Biol.* **2007**, *81*, 165. http://www.jstor.org/stable/10.1086/506045.

MOLECULAR BIOLOGY

Present at the Flood: How Structural Molecular Biology Came About.

By Richard E Dickerson. Sunderland (Massachusetts): Sinauer Associates. $34.95 (paper). viii + 307 p + 16 pl; ill.; index. ISBN: 0–87893–168–6. 2005.

Dickerson has not only done a scholarly job of plotting a route through the scientific literature to reveal the key advances in structural molecular biology, he also introduces the experimental techniques (with many helpful diagrams) to explain X-ray diffraction and protein crystallography. The book provides the basis for a stimulating postgraduate course, or could be read by anyone who wants a better understanding of the "giants" of 20th-century biology.

The author reprints key extracts (or sometimes complete papers) at the end of each chapter. Going through the original evidence in this historical manner is a much richer experience than being presented with the conclusions in a totally cut-and-dried form. Questions at the end of each chapter (with answers at the back of the book) allow readers or teachers to test that the main points have been understood. Besides the original publications, some chapters include important review papers by authors with personal knowledge of the work. The final list of further reading suggests books of a similar nature.

The story begins with rival theories of whether proteins are disordered glue-like suspensions or specific large molecules in solution, with the eventual triumph of the idea of a linear chain of amino acids connected in a predetermined order and folded up into a specific structure. The core of the book then covers the journey from Pauling's astonishing insight into the nature of covalent bonds, which was necessary before *anyone* could have predicted the geometry of α-helices and β-sheets in proteins, to the final success of Perutz and Kendrew in applying the techniques that allowed them to "see" these features in crystal structures. The analogous chemical insight into base pairing, needed to solve the structure of the DNA double helix, is discussed in a separate chapter. As indicated by the title of the book, the author's personal experience and photographs add interest, as do the occasional touches of humor. His working relationship with Irving Geis, the *Scientific American* artist, means that the volume includes some beautiful illustrations of protein structures.

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Landmark Papers in Yeast Biology.

Edited by Patrick Linder, David Shore, and Michael N Hall. Cold Spring Harbor (New York): Cold Spring Harbor Laboratory Press. $95.00. xiv + 306 p; ill.; index. ISBN: 0–87969–643–5. [CD-ROM included.] 2006.

Green Fluorescent Protein: Properties, Applications, and Protocols. *Second Edition. Methods of Biochemical Analysis, Volume 47.*

Edited by Martin Chalfie and Steven R Kain. Hoboken (New Jersey): Wiley-Interscience. $89.95. xv + 443 p + 24 pl; ill.; index. ISBN: 0–471–73682–1. 2006.

Green fluorescent protein (GFP) and GFP-like proteins have revolutionized the fields of cell and molecular biology. Their ubiquitous use in modern biology is best demonstrated by the following fact, which the editors of this book mention in the preface: in 2004, roughly 50, 35, 60, and 20% of the articles in *Cell, Development, Journal of Cell Biology,* and *Neuron,* respectively, used or mentioned GFP-like proteins. The field is so large and rapidly changing that it is impossible to write a complete and up-to-date review on the topic. This book makes an excellent effort and is certainly the best we can hope for.

Since the first edition of this volume was published, much has changed in the field and so has the book. It has 17 chapters, each written by experts in the area. The first seven chapters focus on the biochemistry of GFP, while the final ten chapters are devoted to describing uses and applications of GFP. Many practical tips are given, and the appendix contains a methods and protocols section. New chapters not found in the first edition include Discovery and Properties of GFP-Like Proteins from Nonbioluminescent Anthozoa, Evolution of Function and Color in GFP-Like Proteins, Pharmaceutical Applications of GFP and RCFP, Practical Considerations for Use of Reef Coral Fluorescent Proteins in Mammalian Cells: Applications in Fluorescence Microscopy and Flow Cytometry, and Reassembled GFP: Detecting Protein-Protein Interactions and Protein Expression Patterns. The volume also contains a 22-page insert of color photographs, which strangely also appear in black and white in the text.

Any researcher, graduate student, or educator with an interest in using GFP should read this book. It will become the "bible" for GFP users. I would have liked to have seen a complete table of all the GFP and GFP-like proteins with their commercial names, sources, and properties.

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