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Drlica, Karl. Understanding DNA and Gene Cloning: A Guide for the Curious. Fourth Edition. 2004. xiv + 369 pages; text; illustrations; photographs; questions for discussion; additional reading; glossary; index. John Wiley & Sons, Inc., Hoboken, New Jersey. ISBN: 0471-43416-7. Soft Cover. Price: US $44.95 Available from John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030.

Understanding DNA and Gene Cloning by Drlica stands apart from the numerous texts of molecular biology and genetics written for a general audience, for a variety of reasons. First, the author has succeeded in presenting in-depth concepts without relying on diagrams of chemical structures and equations. This makes the book more accessible to a wider audience. Second, each chapter concludes with an insightful "Perspective" section, which relates each chapter's concepts to historical and contemporary issues. Third, each chapter contains a set of "Questions for Discussion" that is both analytical and provocative.

The first two parts of Drlica's book, on "Basic Molecular Genetics" and "Manipulating [Deoxyribonucleic Acid] DNA," are well-written and full of helpful diagrams. There is an emphasis on basic molecular biological and microbiological techniques that will give readers, especially those new to molecular genetics, a good feel for the ways in which researchers have achieved the current level of understanding about macromolecules and cells. Techniques such as buoyant density centrifugation, filter hybridization, and colony hybridization are presented in a clear, concise manner, aided by excellent drawings and flow charts. Instead of needlessly sub-dividing the techniques in an encyclopedic fashion, Drlica organizes the major cloning techniques based on broader themes. For example, Chapter 8 presents the many techniques that rely on base pairing. As I often tell my students, if one has a good understanding of the parameters governing how nucleic acid molecules hybridize with each other one can easily understand dozens of the experimental techniques, some rather sophisticated, being used by molecular geneticists today.

Chapters 9 and 10 synthesize the techniques described in the earlier chapters, demonstrating how one can use the experimental tools to clone a eukaryotic gene and ultimately deduce its structure and function. Drlica pays homage to one of the seminal experiments in the history of molecular biology by describing the cloning of the rabbit beta-hemoglobin gene, which was the first mammalian gene cloned (in 1978). Chapter 10 gets a little bogged down in rather esoteric topics (use of phage M13 in DNA sequencing, and DNA footprint analysis), but otherwise flows nicely.

The second half of Understanding DNA and Gene Cloning presents various topics sure to intrigue a wide audience. Drlica presents well-crafted overviews of specific areas of investigation, most of which garnered Nobel prizes for their primary discoverers. These include ribonucleic acid (RNA) splicing by ribozymes, the production of antibody diversity by DNA rearrangement, and transposable genetic elements. Two chapters focus on arguably the two greatest health problems facing the world's human population today: acquired immunodeficiency syndrome (AIDS) and cancer. The chapter on AIDS approaches the problem from the point of view of the causative agent, the retrovirus (1), and the chapter on cancer focuses on the way in which genes, in somatic tissue, can

become altered in ways that affect the regulation of cell growth and cell death. In Chapters 14 and 15, Drlica does an admirable job of summarizing the important concepts of human genetics and genetic diseases, and the ways in which DNA-based techniques can be used to screen for genetic disorders, treat some disorders, and establish relationships (e.g. paternity or forensic) among individuals or events. The book closes with a summary of the field of genomics (2) that even a general audience will find very understandable – no small feat! Drlica provides a nice treatment of comparative genomics as well as functional genomics. He does not overwhelm the reader with too much emphasis on bioinformatics (3), and he provides a clear description of how DNA microarrays (4) are used in modern molecular genetics research.

Drlica's Understanding DNA and Gene Cloning is a very versatile and carefully written guide for a wide audience. Most impressive are the thought-provoking essays that conclude each chapter. These closing comments do indeed offer a wider "Perspective" on the topics presented in each chapter. Finally, I have a special admiration for the well-crafted, analytical questions posed at the end of each chapter. Students of molecular genetics would do well to read this book, for the value of the questions alone.

Explanation of Selected Terms:

1. Retrovirus – A type of single stranded RNA virus which encodes a reverse transcriptase enzyme capable of generating a DNA copy of the viral genome.
2. Genomics – A discipline characterized by the global analysis of gene structure as revealed by the entire DNA sequence of an organism's genome.
3. Bioinformatics – Application of computational tools for expanding the ability to acquire, organize, analyze, or visualize biological data.
4. DNA Microarrays – Robotically generated slides or chips consisting of an ordered grid of defined, synthetic DNA molecules representing specific clones or genes, usually numbering in the thousands.

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