

Preface

Science is about discovery. The *creation* of knowledge from where once there was none. The process of discovery is *the* passion that drives research, is the fuel that has built our society, and spurred great technological advancement and achievement for the human race. Arguably the greatest monument to our kind has been the unraveling of our complete DNA sequence, the human genome. The wealth of underlying secrets and mysteries that scientists may reveal from this scroll of life has only begun to be tapped. The now mature fields of genomics and proteomics are merely conduits for future discovery and expansion of knowledge through the many other realms of cellular and molecular biology and their growing interdependence on computer science, physical science, and biological engineering. Through all this is that underlying thread of life, DNA, and its universal role as the primary code for how cells, microbes, viruses, animals, plants, and humans reproduce and function. Could there be a greater quest or adventure than to investigate the underlying mechanisms of nature?

College and university life is about discovery too. As students progress through their most formative years of self-growth and independence, capturing the essence of the learning experience is often lost in the practical laboratory environment. Although any accomplished researcher can appreciate a finely devised and written experimental protocol, it is clear to even the novice that *actual* discovery is not possible in the context of the 'cookbook recipes' common to laboratory-based classroom experience. We strive to change this widely held paradigm.

Integrated Genomics is an outgrowth of a highly successful laboratory course taught for the past six years at The University of Alabama. This course was originally devised to meet the formative expectations of the Howard Hughes Medical Institute Undergraduate Biological Sciences Education Program Grant awarded to The University of Alabama

and has been modified with subsequent support from the National Science Foundation CAREER program. Both of these fine institutions share the common goal of fostering inquiry-based pedagogy and modernizing biological science education. This text provides the instructor with a broad and innovative strategy through which they may present a true *discovery-based* experience for their students. *Integrated Genomics* represents a continuum of flexible yet organized exercises, wherein concepts of basic microbiology, genetics, molecular biology, genomics, proteomics, and bioinformatics are enmeshed within a framework of experiments for which the results are *not* predetermined. The application of simple model organisms such as bacteria, yeast and worms in this course not only keeps the overall cost of implementing the class down, but equally introduces students to the unity of biological function and the power of comparative genomic analysis. Unequivocally, the burden of discovery-based pedagogy is a challenge, but one that is welcomed by the more ambitious of teachers, where the rewards for both the instructor and students are immeasurable. In this regard, the experimental design of *Integrated Genomics* is inherently adaptable and enables the instructor to 'plug and play' with their own favorite genes and proteins. We sincerely hope that this philosophy will be embraced and extended by inventive professors, and we welcome their feedback.

Discovering the process of discovery is what this book is all about. Moreover, it is a process that is addictive – and simply a lot of fun! Enjoy!

You can find further information about *Integrated Genomic* instructional materials and experimental reagents, including all strains and plasmids at www.wiley.com/go/caldwell

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