**Chapter Overview**

**Chapter 5: Genomics, Proteomics, and Systems Biology**

Recent years have seen major changes in the way scientists approach cell and molecular biology, with large-scale experimental and computational approaches being applied to understand the complexities of biological systems. Traditionally, cell and molecular biologists studied one or a few genes or proteins at a time. This was changed by genome sequencing projects, which introduced large-scale experimental approaches that generated vast amounts of data to the study of biological systems. The complete genome sequences of a wide variety of organisms, including many individual humans, provide a wealth of information that forms a new framework for studies of cell and molecular biology and opens new possibilities in medical practice. Not only can the sequences of complete genomes be obtained and analyzed, but it is also now possible to undertake large-scale analyses of all of the RNAs and proteins expressed in a cell. These global experimental approaches form the basis of the new field of systems biology, which seeks a quantitative understanding of the integrated behavior of complex biological systems. This chapter considers the development of these new technologies and their impact on understanding the molecular biology of cells.