
Preface

Gametogenesis is a truly remarkable differentiation program that produces haploid gametes from somatic diploid progenitor cells. A central and highly conserved feature of gamete formation is the chromosome divisions that occur during meiosis. The reduction in ploidy that results from two rounds of meiotic chromosome division without an intervening S-phase is essential to allow for the chromosome doubling that occurs upon fertilization or gamete fusion. The relatively large chromosomes of some organisms like the evening primrose *Oenothera Biennis* and the grasshopper *Chorthippus brunneus* have made the study of meiosis accessible through cytology investigations for over a century. Genetic approaches to the study of meiosis have a similar long and productive history. The dynamic movements and reorganization of the chromosomes that are observable during this process in addition to the diverse forms of gametes produced have intrigued scientists to the present day.

Despite the extensive study of meiosis and other aspects of gametogenesis, many of the finer details crucial to understanding the process remain to be teased out. Advances in imaging technology, genomics, proteomics, bioinformatics, and computer modeling have been applied to the study of meiosis and have further elucidated the intricacies of this essential process. *Methods in Molecular Biology: Meiosis, Second Edition* includes methods ranging from classical genetic approaches with budding yeast to high resolution microscopy and computational methods for the analysis of recombination and modeling gene expression networks. Cutting-edge procedures for the analysis of double-strand breaks at single nucleotide resolution, analysis of translation by ribosome profiling, the use of fluorescent markers to analyze recombination, and strategies for the use of conditional expression to study chromatin protein dynamics are detailed. Advanced cytology methods for live and fixed cell microscopy and image analysis for yeast, drosophila, and mouse are included. This volume also includes chapters detailing computational strategies for studies of meiotic chromosome crossovers and for modeling gene expression networks. The chapters provide step-by-step instruction in contemporary methods and technologies that will be invaluable to biologists, geneticists, biochemists, and anyone investigating meiosis, recombination, and cellular differentiation.

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Meiosis

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