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Meiosis and Gametogenesis Molecular Biology of the Cell An Atlas of the Fertilization and Karyokinesis of the Ovum Meiosis and Sexual Reproduction Concepts of Biology Signaling-Mediated Control of Cell Division Textbook of Human Reproductive Genetics Fertilization Fertilization Maternal Control of Development in Vertebrates Biology of Fertilization V1 Gametogenesis, Fertilization, and Meiosis in Trichonympha Fertilization The Molecular Biology of Fertilization Introduction to Plant Reproduction Fertilization Gametogenesis Fertilization and Its Biochemical Consequences Patterns in Biology Biology for AP ® Courses The Biology of Reproduction Mechanism of Fertilization: Plants to Humans Principles of Biology Meiosis Sex Chromosomes Reproductive and Developmental Strategies The Flowering of Apomixis The Cell in Development and Inheritance Cell Division and Reproduction Conifer Reproductive Biology Germ Cell Development in C. elegans In-Vitro Fertilization Molecular and Cellular Plant Reproduction Cells: Molecules and Mechanisms Quality Control of Mammalian Oocyte Meiotic Maturation: Causes, Molecular Mechanisms and Solutions Study of Meiosis Apomixis in Angiosperms Meiosis II A Study of the Chromosomes in Meiosis, Fertilization, and Cleavage in the Grasshopper Egg (Orthoptera) ... Fertilization in Higher Plants

Concepts of Biology is designed for the single-semester introduction to biology course for non-science majors, which for many students is their only college-level science course. As such, this course represents an important opportunity for students to develop the necessary knowledge, tools, and skills to make informed decisions as they continue with their lives. Rather than being mired down with facts and vocabulary, the typical non-science major student needs information presented in a way that is easy to read and understand. Even more importantly, the content should be meaningful. Students do much better when they understand why biology is relevant to their everyday lives. For these reasons, Concepts of Biology is grounded on an evolutionary basis and includes exciting features that highlight careers in the biological sciences and everyday applications of the concepts at hand.We also strive to show the interconnectedness of topics within this extremely broad discipline. In order to meet the needs of today's instructors and students, we maintain the overall organization and coverage found in most syllabi for this course. A strength of Concepts of Biology is that instructors can customize the book, adapting it to the approach that works best in their classroom. Concepts of Biology also includes an innovative art program that incorporates critical thinking and clicker questions to help students understand--and apply--key concepts. Meiosis and Sexual Reproduction Biology Although many unicellular organisms and a few multicellular organisms can produce genetically identical clones of themselves through asexual reproduction, many single-celled organisms and most multicellular organisms reproduce regularly using another method--sexual reproduction. This highly evolved method involves the production by parents of two haploid cells and the fusion of two haploid cells to form a single, genetically recombined diploid cell--a genetically unique organism. Haploid cells that are part of the sexual reproductive cycle are produced by a type of cell division called meiosis. Sexual reproduction, involving both meiosis and fertilization, introduces variation into offspring that may account for the evolutionary success of sexual reproduction. The vast majority of eukaryotic organisms, both multicellular and unicellular, can or must employ some form of meiosis and fertilization to reproduce. Chapter Outline: The Process of Meiosis Sexual Reproduction The Open Courses Library introduces you to the best Open Source Courses Plant reproduction is essential not only for producing offspring but also for increasing crop quality and yield. Moreover, plant reproduction entails complex growth and developmental processes, which provide a variety of opportunities for elucidating fundamental principles in biology. The combinational employment of molecular genetic approaches and emerging technologies, such as florescence-based imaging techniques and next generation sequencing, has led to important progresses in plant reproduction using model plants, crops, and trees. This e-book compiles 31 articles, including 1 hypothesis and theory, 4 perspectives, 12 reviews, and 14 original research papers. We hope that this E-book will draw attention of all plant biologists to exciting advances in the field of plant reproduction and help solve remaining challenging questions in the future. We wish to express our appreciation to all the authors, reviewers, and the Frontiers editorial office for their excellent contributions that made the publication of this e-book possible. Eggs of all animals contain mRNAs and proteins that are supplied to or deposited in the egg as it develops during oogenesis. These maternal gene products regulate all aspects of oocyte development, and an embryo fully relies on these maternal gene products for all aspects of its early development, including fertilization, transitions between meiotic and mitotic cell cycles, and activation of its own genome. Given the diverse processes required to produce a developmentally competent egg and embryo, it is not surprising that maternal gene products are not only essential for normal embryonic development but also for fertility. This review provides an overview of fundamental aspects of oocyte and early embryonic development and the interference and genetic approaches that have provided access to maternally regulated aspects of vertebrate development. Some of the pathways and molecules highlighted in this review, in particular, Bmps, Wnts, small GTPases, cytoskeletal components, and cell cycle regulators, are well known and are essential regulators of multiple aspects of animal development, including oogenesis, early embryogenesis, organogenesis, and reproductive fitness of the adult animal. Specific examples of developmental processes under maternal control and the essential proteins will be explored in each chapter, and where known conserved aspects or divergent roles for these maternal regulators of early vertebrate development will be discussed throughout this review. Table of Contents: Introduction / Oogenesis: From Germline Stem Cells to Germline Cysts / Oocyte Polarity and the Embryonic Axes: The Balbiani Body, an Ancient Oocyte Asymmetry / Preparing Developmentally Competent Eggs / Egg Activation / Blocking Polyspermy / Cleavage/ Mitosis: Going Multicellular / Maternal-Zygotic Transition / Reprogramming: Epigenetic Modifications and Zygotic Genome Activation / Dorsal-Ventral Axis Formation before Zygotic Genome Activation in Zebrafish and Frogs / Maternal TGF- and the Dorsal-Ventral Embryonic Axis / Maternal Control After Zygotic Genome Activation / Compensation by Stable Maternal Proteins / Maternal Contributions to Germline Establishment or Maintenance / Perspective / Acknowledgments / References" This book provides new insights into the universality of

biological systems in animal reproduction and development by a comparative study of a variety of mechanisms in animals ranging from basal invertebrates to vertebrates, including mammals. Animals accomplish genetic diversity through meiosis and fertilization, and during embryogenesis animals must produce specialized cell types, including germ cells, in accordance with their individual body plan. This series of phenomena is essential to the continuity of life in the animal kingdom, and animals show various reproductive and developmental strategies. This volume, comprising four parts, reviews animal kingdom diversity, including reproductive strategies and germ cell differentiation mechanisms (Part 1), sex determination and differentiation (Part2), the mechanisms of fertilization (Part 3), and body axis formation (Part 4). Readers will find descriptions of the reproduction or development of 180 species, 13 phyla, 35 classes, 74 orders, 117 families, and 151 genera in this book. Of particular interest is the diversity of molecules and mechanisms used to achieve the same biological purpose in different animals. Undergraduates, graduate students, and professional scientists who want a deeper understanding of animal reproductive and developmental mechanisms will find this book to be of great value. Biotechnological methods are opening new ways in plant breeding. They allow novel strategies for improving crop productivity and quality, especially in the agrofood sector. The molecular mechanisms underlying these biotechnological approaches are presented here. Topics included are: pollen development, pollen tube growth, macrosporogenesis and fertilization and the effects of pesticides on sexual plant reproduction. Fertilization in higher plants is a complex process consisting of two events, the fusion of the egg with one sperm cell resulting in the diploid zygote, and the fusion of embryosac nuclei with another sperm cell, leading to a triploid endosperm. This "double fertilization" is preceded by the pollination process and a long lasting interaction between the dipoid pistil and the haploid pollen tube (progamic phase). Fertilization of flowering plants results in the formation of seeds and fruits, our basic food supply. Reductional nature of meiosis is responsible to maintain the ploidy in eukaryotes. In sexual reproduction, Meiotic division produces gametes of half ploidy and fertilization restores original chromosome number. In the meiosis sister chromatids are monoorientated which leads to separation of homologous chromosomes. This is followed by separation of sister chromatid in meiosis II because of biorientation of sister chromatids. Comparison of meiosis with mitosis reveals that monoorientation of sister chromatids is the main reason for halving the ploidy. According to the present hypothesis, Monopolin complex, A four subunit complex, directs monopolar attachment of sister chromatids. Present study is done to reveal the nature and function of this complex. Cell cycle arrest mutants were created and verified to maximize the number of cells at particular stage by deleting or shuffling the promoter of a particular gene. Then, Csm1 subunit of monopolin complex was affinity tagged and verified in arrested cells. As future prospects of this work affinity purification of Csm1 can be done. Comparison of protein profiles obtained will help to reveal the functional properties of monopolin complex. Charts the fascinating interaction of specialized gamete cells, forming the early embryo and a blueprint of new life. This edition provides the reader with an introduction to this subject. During the past five years there has been a virtual explosion of information on the different phases of fertilization.This book should be of interest to advanced undergraduates and graduate students in developmental biology, zoology and cell biology; researchers entering the field. This volume covers the current knowledge base on the role of signaling and environmental pathways that control the normal development of germline stem cells, meiotic progression of oocytes, events of oocyte maturation and fertilization, and the birth of an embryo. Germ cells are uniquely poised to sustain life across generations through the fusion of oocyte and sperm. Because of the central importance of germ cells to life, much work has been dedicated to obtaining a clear understanding of the molecular and signaling events that control their formation and maintenance. Germ cells are set aside from somatic cells in the embryo and go through specialized meiotic cell cycles as the animal matures. These cell cycles are interspersed with long periods of arrest. In human females, meiosis I is initiated in the fetus. At birth, oocytes are arrested in meiosis I; after puberty, every month an oocyte initiates meiosis II – ovulation. Upon sperm availability these cells are fertilized, generate an embryo, and the cycle-of-life continues. During meiotic I progression and arrest, the fitness of oocytes and their progeny are likely influenced by environmental cues and signaling pathways. A lot of recent work has focused on understanding the mechanisms that regulate oocyte fitness and quality in humans and vertebrates. Much of our understanding on the events of meiosis I and germline stem cell populations comes from work in invertebrates, wherein the germline stem cells produce oocytes continuously through adult development. In both inverbrates and vertebrates nutritional and signaling pathways control the regulation of stem cells in such a manner so as to couple production of gametes with the nutritional availability. Additionally, mature oocytes arrest both in meiosis I and meiosis II, and signaling and nutritional pathways have been shown to regulate their formation, and maintenance, such that despite long periods of arrest, the oocyte quality is assured and errors in chromosome segregation and varied cytoplasmic events are minimal. "Yet another cell and molecular biology book? At the very least, you would think that if I was going to write a textbook, I should write one in an area that really needs one instead of a subject that already has multiple excellent and definitive books. So, why write this book, then? First, it's a course that I have enjoyed teaching for many years, so I am very familiar with what a student really needs to take away from this class within the time constraints of a semester. Second, because it is a course that many students take, there is a greater opportunity to make an impact on more students' pocketbooks than if I were to start off writing a book for a highly specialized upper- level course. And finally, it was fun to research and write, and can be revised easily for inclusion as part of our next textbook, High School Biology."--Open Textbook Library. In spite of the fact that the process of meiosis is fundamental to inheritance, surprisingly little is understood about how it actually occurs. There has recently been a flurry of research activity in this area and this volume summarizes the advances coming from this work. All authors are recognized and respected research scientists at the forefront of research in meiosis. Of particular interest is the emphasis in this volume on meiosis in the context of gametogenesis in higher eukaryotic organisms, backed up by chapters on meiotic mechanisms in other model organisms. The focus is on modern molecular and cytological techniques and how these have elucidated fundamental mechanisms of meiosis. Authors provide easy access to the literature for those who want to pursue topics in greater depth, but reviews are comprehensive so that this book may become a standard reference. Key Features * Comprehensive reviews that, taken together, provide up-to-date coverage of a rapidly moving field * Features new and unpublished information * Integrates research in diverse organisms to present an overview of common threads in mechanisms of meiosis * Includes thoughtful consideration of areas for future investigation Biology of Fertilization, Volume 1: Model Systems and Oogenesis is the first in a three-volume series that gathers various lines of research about reproduction in general and fertilization in particular. Knowledge about cell biology, immunobiology, biochemistry, biophysics, and molecular genetics has progressed significantly beyond our understanding of some aspects of fertilization. Components of these constitute ""model systems."" The present volume includes reviews of such systems, some relatively simple model systems in lower organisms, sex-determining

mechanisms, and oogenesis. The book contains 12 chapters organized into two sections. Section I includes studies on evolution, reproductive success, and immortality of the germ line; the structures and mechanisms involved in fertilization problems; and fertilization in Paramecium. Section II on oogenesis includes studies on gamete differentiation; sex-determining role of the H-Y antigen in mammals and non-mammals; the mechanism of starfish oocyte maturation; meiotic arrest in animal oocytes; and the mitotic and meiotic aspects of the mammalian germ cell life cycle. This new volume of Current Topics in Developmental Biology covers the area of gametogenesis, with contributions from an international board of authors. The chapters provide a comprehensive set of reviews covering such topics as germline stem cells, signaling modalities during oogenesis in mammals, and genomic imprinting as a parental effect established in mammalian germ cells. Covers the area of gametogenesis International board of authors Provides a comprehensive set of reviews covering such topics as germline stem cells, signaling modalities during oogenesis in mammals, and genomic imprinting as a parental effect established in mammalian germ cells The majority of scientists interested in fertilization and early developmental processes will undoubtably have encountered the works of Alberto Monroy at some time in their careers. Alberto's contribution to this field spans oogenesis to embryogenesis, where he used physiological, biochemical and morphological tools to answer a number of basic problems in cell biology. This multi-disciplinary approach, together with his remarkable intellectual flexibility and humour has had an enormous impact on this field and all those fortunate enough to have worked with him. The chapters in this book have been divided into four sections. The initial presentations revolve around late events of gameteogenesis, that lead to a physiologically mature gamete. Probably the most exciting area for research at the moment is the identification of the cytoplasmic mechanisms responsible for the meiotic arrest of oocytes and the factors responsible for initiating their maturation (Chapters 3 and 4). Less is known about the physiological changes in the male gamete in preparation for fertilization and this may be identified as a major area for future research. Although comparable data for the plant kingdom is presently restricted to studies on marine algae, new techniques for isolating angiosperm gametes (Chapters 1 and 17) promise rapid advances in this field. The second section looks at the events and molecules involved in gamete recognition, binding and fusion. One of the most controversial topics is when does sperm-egg fusion actually occur (Chapter 14). What happens with our genome and epigenome in the first fundamental days of our development? How can this be analysed? What do we need to know when faced with patients' questions about their own infertility, or how to prevent the birth of affected children? For the first time, this book brings together both scientists' and clinicians' viewpoints on human reproductive genetics, making for a more comprehensive discussion of interest to ART professionals and developmental biologists. With worldwide leaders in this burgeoning field guiding the reader through from the basics to the most exciting recent discoveries, this book presents the wider picture of how reproductive medicine and biology links with genetics. The editors also address the new challenges raised in how to treat and counsel patients at fertility and genetic clinics, as well as eliciting vivid bioethical debates. This book brings together genetics, reproductive biology and medicine for practitioners and geneticists. The Principles of Biology sequence (BI 211, 212 and 213) introduces biology as a scientific discipline for students planning to major in biology and other science disciplines. Laboratories and classroom activities introduce techniques used to study biological processes and provide opportunities for students to develop their ability to conduct research. Biology for AP® Courses covers the scope and sequence requirements of a typical two-semester Advanced Placement® biology course. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology for AP® Courses was designed to meet and exceed the requirements of the College Board's AP® Biology framework while allowing significant flexibility for instructors. Each section of the book includes an introduction based on the AP® curriculum and includes rich features that engage students in scientific practice and AP® test preparation; it also highlights careers and research opportunities in biological sciences. As a part of plant science, plant reproduction is concerned with the study of production of new plants through asexual and sexual processes. It focuses on the crucial aspects of asexual reproduction, which include vegetative reproduction and apomixis and sexual reproduction, which include processes like meiosis and fertilization. This book presents the different concepts and methods related to the field of plant reproduction. Different approaches, evaluations and methodologies have been included in it. This textbook aims to serve as a resource guide for students and experts alike and contribute to the growth of the discipline. The Molecular Biology of Fertilization focuses on the different aspects of fertilization in several models, including insects, clams, sea urchins, ascidians, cows, pigs, sheep, rats, hamsters, and humans. This book examines the experimental approaches using methods of molecular biology, cell biology, biochemistry, biophysics, immunology, and enzymology. Comprised of three parts encompassing 15 chapters, this book starts by discussing the ability of egg factors to affect sperm motility and initiate the acrosome reaction by modifying ion movements across the sperm plasma membrane. This text then provides an overview of the different aspects of egg architecture, ranging from extracellular remodeling to nuclei organization, which is involved in embryogenesis and fertilization. Finally, the last part deals with oncogenes, gene expression, and nuclear determination during embryogenesis and at fertilization. This book will be a great value to molecular biologists, cell biologists, reproductive biologists, developmental biologists, biophysicists, biochemists, geneticists, researchers, scientists, and students. Norphological and physiological aspects of fertilization; Biochemical aspects of fertilization. A look into the phenomena of sex and reproduction in all organisms, taking an innovative, unified and comprehensive approach. This book should Apomixis in Angiosperms: Nucellar and Integumentary Embryony is based on original cytoembryological data and critically reviewed literature on more than 250 species from 57 families of angiosperms. The book covers the complete process of nucellar and integumentary embryo formation and viable seed development within species, families, and among angiosperms in general. Many species (some of which are economically important) characterized by adventive embryony are listed. The book also provides an original simple classification of apomixis and offers a new approach to differentiating embryological structures in cases of apomixis and amphimixis. Apomixis in Angiosperms: Nucellar and Integumentary Embryony will be a useful reference for embryologists, botanists, cytologists, geneticists, and plant breeders. It will also benefit any researcher interested in studying somatic embryo formation in tissue culture. Germ cells in sexually reproducing metazoa, through the germline lineage, are the route by which genetic material and cytoplasmic constituents are passed from one generation to the next in the continuum of life. Chapters in this book review germ cell development in the model organism Caenorhabditis elegans, discussing the biology, the genetics and the molecular mechanisms for various processes, as well as drawing comparisons with other organisms. Processes discussed include specification of germ cell fate, meiosis, gametogenesis, environmental/ physiological controls, epigenetics and translational control, fertilization and the oocyte-to-embryo transition. This book thus provides a comprehensive picture of the germline lineage and the continuum of life for the worm. Sex Chromosomes focuses on the study of sex chromosomes, including

human chromosomal abnormalities, behavior and characteristics of chromosomes, and cell division. The book first offers information on the chromosomal basis of sex determination, as well as development of the cell theory, mitosis, fertilization, meiosis, and discovery of sex chromosomes. The publication also ponders on the mitosis, meiosis, and formation of gametes. Discussions focus on the special characteristics of sex chromosomes, abnormalities of cell division, and sexual differentiation. The manuscript reviews sex chromosomes in plants, Drosophila, and Lepidoptera. The book also examines sex-chromosome mechanisms that differ the classic type; sex chromosomes in fishes, amphibia, reptiles, and birds; and sex chromosomes in man. Discussions focus on normal human sex chromosomes, Turner's syndrome, Klinefelter's syndrome, true hermaphrodites, testicular feminization, and pseudohermaphrodites. Sex chromosomes in mammals other than man, including monotremata, marsupialia, insectivora, rodentia, and carnivora, are discussed. The publication is a dependable reference for readers interested in the study of sex chromosomes. This fully updated new edition of a successful and popular practical guide is an indispensable account of modern in-vitro fertilization practice. Initial chapters cover theoretical aspects of gametogenesis and embryo development at the cellular and molecular level, while the latter half of the book describes the requisites for a successful IVF laboratory and the basic technologies in ART. Advanced techniques, including pre-implantation genetic diagnosis, vitrification and stem-cell technology, are comprehensively covered, providing up-to-date analyses of these groundbreaking technologies. This edition includes: • New practical techniques, including preservation of fertility for cancer patients, stem-cell biology/technology, vitrification and in-vitro maturation • A 'refresher' study review of fundamental principles of cell and molecular biology • The latest information available from animal and human research in reproductive biology Packed with a wealth of practical and scientific detail, this is a must for all IVF practitioners. When it comes to reproduction, gymnosperms are deeply weird. Cycads and co- fers have drawn out reproduction: at least 13 genera take over a year from polli- tion to fertilization. Since they don’t apparently have any selection mechanism by which to discriminate among pollen tubes prior to fertilization, it is natural to w- der why such a delay in reproduction is necessary. Claire Williams’ book celebrates such oddities of conifer reproduction. She has written a book that turns the context of many of these reproductive quirks into deeper questions concerning evolution. The origins of some of these questions can be traced back Wilhelm Hofmeister’s 1851 book, which detailed the revolutionary idea of alternation of generations. This alternation between diploid and haploid generations was eventually to become one of the key unifying ideas in plant evolution. Dr. Williams points out that alter- tion of generations in conifers shows strong divergence in the evolution of male and female gametes, as well as in the synchronicity of male and female gamete development. How are these coordinated to achieve fertilization? Books on conifer reproduction are all too rare. The only major work in the last generation was Hardev Singh’s 1978 Embryology of Gymnosperms, a book that summarized the previous century’s work. Being a book primarily about embry- ogy, it stopped short of putting conifer reproduction in a genetic or evolutionary context.

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- Apomixis In Angiosperms
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