

The background of the cover is a collage of various microspores. These include a large, flat, hexagonal spore with a honeycomb-like surface pattern in the top left; several oval and circular spores with different surface textures (some smooth, some with fine lines or granules) in the top right; a large, spiky, spherical spore in the middle right; and several other spores of various shapes and sizes scattered throughout the bottom half. The spores are rendered in a golden-brown color against a black background.

# Microspores

## Evolution and Ontogeny

Edited by

**S Blackmore**  
**R B Knox**

# Microspores Evolution And Ontogeny

**Pamela Soltis,J.J. Doyle**



## **Microspores Evolution And Ontogeny:**

**Microspores Evolution and Ontogeny** S. Blackmore, R. B. Knox, 2016-04-20 An understanding of the processes of plant reproduction is increasingly important in the exploitation of plant resources Microspore formation is a major event in the life cycles of land plants allowing the transition from diploid sporophyte generation to the haploid gametophyte generation and varies greatly between taxa in the diversity of processes involved Despite the wealth of information available there are very few sources which bring together the results of research work on the reproduction in all the major plant groups Microspores fills this gap by reviewing microsporogenesis from a systematic and evolutionary perspective in groups ranging from algae to angiosperms Special chapters focus on structure function cell and molecular processes and potential biotechnological applications of plant spores and pollen The result is an up to date guide to the applications of modern techniques in the classic area of botany This work bridges several disciplines to provide a coherent and authoritative account which will be essential reading for research scientists and lecturers in botany evolution ultrastructure reproductive and developmental biology and palynology

**The Evolution of Plant Physiology** Alan R. Hemsley, Imogen Poole, 2004-02-05 Coupled with biomechanical data organic geochemistry and cladistic analyses utilizing abundant genetic data scientific studies are revealing new facets of how plants have evolved over time This collection of papers examines these early stages of plant physiology evolution by describing the initial physiological adaptations necessary for survival as upright structures in a dry terrestrial environment The Evolution of Plant Physiology also encompasses physiology in its broadest sense to include biochemistry histology mechanics development growth reproduction and with an emphasis on the interplay between physiology development and plant evolution Contributions from leading neo and palaeo botanists from the Linnean Society Focus on how evolution shaped photosynthesis respiration reproduction and metabolism Coverage of the effects of specific evolutionary forces variations in water and nutrient availability grazing pressure and other environmental variables

*Evolution and Diversification of Land Plants* Kunio Iwatsuki, Peter H. Raven, 2012-12-06 It is agreed by most scientists that there is a real possibility of mankind's being plunged into crisis around the middle of the twenty first century because of insufficient crop production to support the explosively increasing world population and because of serious pollution of the global environment Plants should play the major role in alleviating this crisis Consequently plant science will become of crucial importance in the next century The application of plant science to crop improvement and the production of plants resistant to environmental pollution will be achieved through complete understanding of the basic functions of plants Fundamental understanding of individual species and the evolution of plants is also important The Botanical Society of Japan which was established in 1882 decided to publish a series of special issues of the Botanical Magazine Tokyo now the Journal of Plant Research The aim of this series was to present overviews of recent advances in various fields of plant sciences As a result The Botanical Society of Japan published Controlling Factors in Plant Development in 1978 Regulation of

Photosynthetic Processes in 1991 and Cellular and Molecular Biology in Plant Cell Cultures in 1993 The contributions to these high quality special issues were written by leading international scientists in each field and these publications had a great impact worldwide

*Molecular Systematics of Plants II* Pamela Soltis, J.J. Doyle, 2012-12-06 In the five years since the publication of *Molecular Systematics of Plants* the field of molecular systematics has advanced at an astonishing pace This period has been marked by a volume of new empirical data and advances in theoretical and analytical issues related to DNA Comparative DNA sequencing facilitated by the amplification of DNA via the polymerase chain reaction PCR has become the tool of choice for molecular systematics As a result large portions of the *Molecular Systematics of Plants* have become outdated *Molecular Systematics of Plants II* summarizes these recent achievements in plant molecular systematics Like its predecessor this completely revised work illustrates the potential of DNA markers for addressing a wide variety of phylogenetic and evolutionary questions The volume provides guidance in choosing appropriate techniques as well as appropriate genes for sequencing for given levels of systematic inquiry More than a review of techniques and previous work *Molecular Systematics of Plants II* provides a stimulus for developing future research in this rapidly evolving field *Molecular Systematics of Plants II* is not only written for systematists faculty graduate students and researchers but also for evolutionary biologists botanists and paleobotanists interested in reviewing current theory and practice in plant molecular systematics

**International Review of Cytology**, 1992-12-02 *International Review of Cytology* Pollen and Pollination Amots Dafni, Michael Hesse, Ettore Pacini, 2012-12-06 Pollen studies make important contributions nature into three main themes pollen structure to our knowledge in many interdisciplinary fields and constituents pollen evolutionary arenas Pollen identification is widely used in ecology and the pollen pollinator interface reconstruction of e.g. vegetation the climate Several papers overlap somewhat or are of the past and plant biodiversity Studies perhaps even somewhat contradictory and concerning pollen structure size and form are reflect the author's own ideas and experience key issues in basic sciences as e.g. plant Some could be understood more deeply by taxonomy and evolution but are also of consulting other closely related articles The importance in applied fields as e.g. plant reader is strongly referred to the respective breeding In pollination studies pollen is literature list of each article generally used specifically to identify food of anther ripening and pollen The last steps development Pacini and the mature pollen sources of visitors and to reconstruct their foraging routes Fewer have been devoted to wall structure Hesse are key factors to pollen collection mechanisms and to the structure understand pollen dispersal mechanisms in time and content of pollen in relation to its biotic pollination Stroh as well as abiotic pollination Ackerman Pollen size shape function

The Timetree of Life S. Blair Hedges, Sudhir Kumar, 2009-04-23 The evolutionary history of life includes two primary components phylogeny and timescale Phylogeny refers to the branching order relationships of species or other taxa within a group and is crucial for understanding the inheritance of traits and for erecting classifications However a timescale is equally important because it provides a way to compare phylogeny directly with the evolution of other

organisms and with planetary history such as geology climate extraterrestrial impacts and other features The Timetree of Life is the first reference book to synthesize the wealth of information relating to the temporal component of phylogenetic trees In the past biologists have relied exclusively upon the fossil record to infer an evolutionary timescale However recent revolutionary advances in molecular biology have made it possible to not only estimate the relationships of many groups of organisms but also to estimate their times of divergence with molecular clocks The routine estimation and utilization of these so called time trees could add exciting new dimensions to biology including enhanced opportunities to integrate large molecular data sets with fossil and biogeographic evidence and thereby foster greater communication between molecular and traditional systematists They could help estimate not only ancestral character states but also evolutionary rates in numerous categories of organismal phenotype establish more reliable associations between causal historical processes and biological outcomes develop a universally standardized scheme for biological classifications and generally promote novel avenues of thought in many arenas of comparative evolutionary biology This authoritative reference work brings together for the first time experts on all major groups of organisms to assemble a timetree of life The result is a comprehensive resource on evolutionary history which will be an indispensable reference for scientists educators and students in the life sciences earth sciences and molecular biology For each major group of organism a representative is illustrated and a timetree of families and higher taxonomic groups is shown Basic aspects of the evolutionary history of the group the fossil record and competing hypotheses of relationships are discussed Details of the divergence times are presented for each node in the timetree and primary literature references are included The book is complemented by an online database [www.timetree.net](http://www.timetree.net) which allows researchers to both deposit and retrieve data Accelerating Hybrid Rice Development , **Fertilization in**

**Higher Plants** Mauro Cresti, Giampiero Cai, Alessandra Moscatelli, 2012-12-06 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 diploid pistil and the haploid pollen tube progamic phase Fertilization of flowering plants results in the formation of seeds and fruits our basic food supply Embryology of Flowering Plants: Terminology and Concepts, Vol. 1 T B Batygina, 2002-01-09 The book is divided into three parts Flower Anther and Ovule The principal aim of this volume along with the other 3 volumes in the series is to summarize the classical and current concepts about flower generative organs their structure and development and about seed formation processes The book contains ample material that can be employed Handbook of Seed Science and

Technology Amarjit Basra, 2024-11-01 A reference text with the latest information and research for educators students and researchers World hunger and malnutrition remain an alarming concern that spurs researchers to develop quality technology The Handbook of Seed Science and Technology is an extensive reference text for educators students practitioners and researchers that focuses on the underlying mechanisms of seed biology and the impact of powerful biotechnological approaches on world hunger malnutrition and consumer preferences This comprehensive guide provides the latest available research from noted experts pointing out the likely directions of future developments as it presents a wealth of seed biology and technological information Seed science is the all important foundation of plant science study The Handbook of Seed Science and Technology provides an integrative perspective that takes you through the fundamentals to the latest applications of seed science and technology This resource provides a complete overview divided into four sections Seed Developmental Biology and Biotechnology Seed Dormancy and Germination Seed Ecology and Seed Technology The Handbook of Seed Science and Technology examines the molecular control of ovule development female gametophyte development cytokinins and seed development grain number determination in major grain crops metabolic engineering of carbohydrate supply in plant reproductive development enhancing the nutritive value of seeds by genetic engineering the process of accumulation of seed proteins and using biotechnology to improve crops synthetic seeds dormancy and germination hormonal interactions during dormancy release and germination photoregulation of seed germination seed size seed predation natural defense mechanisms in seeds seed protease inhibitors soil seed banks the ecophysiological basis of weed seed longevity in the soil seed quality testing seed vigor and its assessment diagnosis of seed borne pathogens seed quality in vegetable crops vegetable hybrid seed production practical hydration of seeds of tropical crops seed technology in plant germplasm The Handbook of Seed Science and Technology is extensively referenced and packed with tables and diagrams and makes an essential source for students educators researchers and practitioners in seed science and technology

*Bryophyte Biology* Bernard Goffinet, 2008-10-30 Bryophyte Biology provides an extensive overview of the hornworts liverworts and mosses diverse groups of land plants that occupy a great variety of habitats throughout the world This edition covers essential aspects of bryophyte biology from morphology physiological ecology and conservation to speciation and genomics Revised classifications incorporate contributions from recent phylogenetic studies Six new chapters complement fully updated chapters from the original book to provide a completely up to date resource New chapters focus on the contributions of Physcomitrella to plant genomic research population ecology of bryophytes mechanisms of drought tolerance a phylogenomic perspective on land plant evolution and problems and progress of bryophyte speciation and conservation Written by leaders in the field this book offers an authoritative treatment of bryophyte biology with rich citation of the current literature suitable for advanced students and researchers

**Diversity and Evolutionary Biology of Tropical Flowers** Peter K. Endress, 1996-07-25 A unique account of the structure biology and evolution of tropical flowering plants

*Sexual Plant Reproduction* Mauro Cresti, Antonio Tiezzi, 2012-12-06 In recent years there has been a growing awareness of the importance of reproductive biology to crop production and there has been a tremendous increase in research on reproductive structures of higher plants Presented here is a wide information of different aspects of micro and macrosporogenesis pollen stigma interaction and recognition pollen tube growth cytoskeleton in vitro and in vivo gamete fusion and incompatibility The most advanced techniques employed in studies on reproductive biology of higher plants are described in detail

**Genetic control of self-incompatibility and reproductive development in flowering plants**

Elizabeth G. Williams, A.E. Clarke, R.B. Knox, 2013-03-09 Plant reproductive biology has undergone a revolution during the past five years with the cloning sequencing and localization of the genes important in reproduction These advantages in plant molecular biology have led to exciting applications in plant biotechnology including the genetic engineering of male sterility and other reproductive processes This book presents an interesting and contemporary account of these new developments from the scientists in whose laboratories they have been made The chapters focus on two areas the molecular biology of self incompatibility which is the system of self recognition controlled by the S gene and related genes and the cellular and molecular biology of pollen development and genetic dissection of male sterility Some chapters feature Arabidopsis with its unique genetic system Reproduction is vital for seed production in crop plants and this book presents new approaches to manipulate plant breeding systems for the 21st century

**Molecular and Cellular Aspects of Plant Reproduction**

Rod J. Scott, A. D. Stead, 1994-11-24 Molecular aspects of flower morphogenesis for researchers and students from SEB Seminar The book will appeal to students and researchers in floral physiology

*Transformative Paleobotany* Michael Krings, Carla J. Harper, N. Ruben Cuneo, Gar W. Rothwell, 2018-07-14 Transformative Paleobotany Papers to Commemorate the Life and Legacy of Thomas N Taylor features the broadest possible spectrum of topics analyzing the structure function and evolution of fossil plants microorganisms and organismal interactions in fossil ecosystems e g plant paleobiography paleoecology early evolution of land plants fossil fungi and microbial interactions with plants systematics and phylogeny of major plant and fungal lineages biostratigraphy evolution of organismal interactions ultrastructure Antarctic paleobotany The book includes the latest research from top scientists who have made transformative contributions Sections are richly illustrated well conceived and characterize and summarize the most up to date understanding of this respective and important field of study Features electronic supplements such as photographs diagrams tables flowcharts and links to other websites Includes in depth illustrations with diagrams flowcharts and photographic plates many in color for enhanced utility tables and graphs

Androgenesis and Haploid Plants Yves Chupeau, 1998-05-20 Jointly published with INRA Paris The use of haploid plants is of increasing importance in plant biology and plant breeding This book illustrates how the advances in plant molecular and cell biology provide an exciting means for the analysis of androgenesis in terms of pollen development and the initiation of embryogenesis It provides both an appraisal of techniques and their practical application and is the most up to date source of

information about the biology of gametophytes      **Advances in Botanical Research** ,1993-06-10 Advances in Botanical Research is a multi volume publication bringing together reviews by recognized experts on subjects of importance to those involved in botanical research The four essays in this volume reflect the very latest in botanical research with their broad scope of interest to plant scientists in many areas The articles include a detailed examination of oligosaccharins the role of plant hormones in root to shoot communications second hand chloroplasts and the gametophyte sporophyte junction in land plants SPECIAL FEATURES Four reviews covering broad range of subject areas      **In vitro Haploid Production in Higher Plants** S. Mohan Jain,S.K. Sopory,R.E. Veilleux,2013-11-27 Since the beginning of agricultural production there has been a continuous effort to grow more and better quality food to feed ever increasing populations Both improved cultural practices and improved crop plants have allowed us to divert more human resources to non agricultural activities while still increasing agricultural production Malthusian population predictions continue to alarm agricultural researchers especially plant breeders to seek new technologies that will continue to allow us to produce more and better food by fewer people on less land Both improvement of existing cultivars and development of new high yielding cultivars are common goals for breeders of all crops In vitro haploid production is among the new technologies that show great promise toward the goal of increasing crop yields by making similar germplasm available for many crops that was used to implement one of the greatest plant breeding success stories of this century i e the development of hybrid maize by crosses of inbred lines One of the main applications of anther culture has been to produce diploid homozygous pure lines in a single generation thus saving many generations of backcrossing to reach homozygosity by traditional means or in crops where self pollination is not possible Because doubled haploids are equivalent to inbred lines their value has been appreciated by plant breeders for decades The search for natural haploids and methods to induce them has been ongoing since the beginning of the 20th century

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