

# THE EVOLUTIONARY BIOLOGY OF PLANTS

KARL J. NIKLAS



# Evolutionary Biology Of Plants

**Tao Wei**



## **Evolutionary Biology Of Plants:**

The Evolutionary Biology of Plants Karl J. Niklas, 1997-06-08 Provides a comprehensive synthesis of modern evolutionary biology as it relates to plants This text recounts the saga of plant life from its origins to the radiation of the flowering plants Through computer generated walks it shows how living plants might have evolved **Plant Evolution** Karl J. Niklas, 2016-08-12 Although plants comprise more than 90% of all visible life and land plants and algae collectively make up the most morphologically physiologically and ecologically diverse group of organisms on earth books on evolution instead tend to focus on animals This organismal bias has led to an incomplete and often erroneous understanding of evolutionary theory Because plants grow and reproduce differently than animals they have evolved differently and generally accepted evolutionary views as for example the standard models of speciation often fail to hold when applied to them Tapping such wide ranging topics as genetics gene regulatory networks phenotype mapping and multicellularity as well as paleobotany Karl J Niklas s *Plant Evolution* offers fresh insight into these differences Following up on his landmark book *The Evolutionary Biology of Plants* in which he drew on cutting edge computer simulations that used plants as models to illuminate key evolutionary theories Niklas incorporates data from more than a decade of new research in the flourishing field of molecular biology conveying not only why the study of evolution is so important but also why the study of plants is essential to our understanding of evolutionary processes Niklas shows us that investigating the intricacies of plant development the diversification of early vascular land plants and larger patterns in plant evolution is not just a botanical pursuit it is vital to our comprehension of the history of all life on this green planet *Introduction to Plant Population Biology* Jonathan Silvertown, Deborah Charlesworth, 2009-04-01 This completely revised fourth edition of *Introduction to Plant Population Biology* continues the approach taken by its highly successful predecessors Ecological and genetic principles are introduced and theory is made accessible by clear accurate exposition with plentiful examples Models and theoretical arguments are developed gradually requiring a minimum of mathematics The book emphasizes the particular characteristics of plants that affect their population biology and evolutionary questions that are particularly relevant for plants Wherever appropriate it is shown how ecology and genetics interact presenting a rounded picture of the population biology of plants Topics covered include variation and its inheritance genetic markers including molecular markers plant breeding systems ecological genetics intraspecific interactions population dynamics regional dynamics and metapopulations competition and coexistence and the evolution of breeding systems and life history An extensive bibliography provides access to the recent literature that will be invaluable to students and academics alike Effective integration of plant population ecology population genetics and evolutionary biology The new edition is thoroughly revised and now includes molecular techniques The genetics chapters have been completely rewritten by a new co author Deborah Charlesworth **Plant Evolutionary Biology** L. Gottlieb, 2012-12-06 There are still heroes in science They are recognized because the issues and problems they chose to

study became the issues and problems of a major field of research. They are also recognized because their insights and solutions are the ones that are tested and evaluated when new ideas and technologies become available. In the field of plant evolutionary biology the hero is George Ledyard Stebbins. His first scientific publication appeared in 1929 and has been followed by nearly 60 magnificent years of seminal ideas, proofs and proposals that defined much of what was worth doing in plant biosystematics, evolution and biological conservation. His energy, enthusiasm and good humor widely shared at many congresses and symposia in the Singalongs with Stebbins made him a wonderful teacher for both undergraduates and graduate students. He is the mentor of several generations of botanists, plant geneticists and evolutionists. A brief biography and publication list were included in *Topics in Plant Population Biology* edited by Otto T. Solbrig, Subodh Jain, George Johnson and Peter Raven, Columbia University Press, 1979, which resulted from a symposium held on the occasion of Ledyard Stebbins' 70th birthday. In this volume, population biology and physiological ecology received major attention, particularly in relation to plant form and function.

**Plant Evolutionary Biology** L. Gottlieb, 1988-07-07

**Plant Evolutionary Developmental Biology** Alessandro Minelli, 2018-03-01

Compared to animals, plants have been largely neglected in evolutionary developmental biology. Mainstream research has focused on developmental genetics, while a rich body of knowledge in comparative morphology is still to be exploited. No integrated account is available. In this volume, Minelli fills this gap using the same approach he gave to animals: revisiting traditional concepts and providing an articulated analysis of genetic and molecular data. Topics covered include leaf complexity and the evolution of flower organs, handedness, branching patterns, flower symmetry and synorganization, and less conventional topics such as fractal patterns of plant organization. Also discussed is the hitherto neglected topic of the evolvability of temporal phenotypes like a plant's annual, biennial or perennial life cycle, flowering time and the timing of abscission of flower organs. This will be informative reading for anyone in the field of plant evolution, from students to lecturers 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.

**Plant Variation and Evolution** David Briggs, Stuart Max Walters, 1997-11-13

Considers how the study of variation in plants has developed over the last 300 years.

*Molecular Systematics and Plant Evolution* Peter M. Hollingsworth, Richard M. Bateman, Richard J. Gornall, 1999-08-19

*Molecular Systematics and Plant Evolution* discusses the diversity and evolution of plants with a molecular approach. It looks at population genetics, phylogeny, history of evolution and developmental genetics to provide a framework from which to understand evolutionary patterns and relationships amongst plants. The international panel of contributors are all respected systematists and evolutionary biologists who have brought together a wide range of topics from the forefront of research while keeping the text accessible to students. It has been written for senior undergraduates, postgraduates and researchers in the fields of botany, systematics, population conservation, genetics, phylogenetics and evolutionary biology.

, *Ecology and Evolutionary Biology of Clonal Plants*, 2001 *Biological*

*Approaches and Evolutionary Trends in Plants* Shoichi Kawano, 2012-12-02 Biological Approaches and Evolutionary Trends in Plants is a collection of papers presented at the Fourth International Symposium of Plant Biosystematics held on July 10-14, 1989 in Kyoto, Japan. Contributors, some of the world's leading plant biologists, discuss the findings in evolutionary biology and issues in plant biosystematics in light of the evidence and ideas brought forward at various levels of biological organization from molecule to cell, individual, population, species, and community levels. This volume is organized into four sections encompassing 22 chapters and begins with an overview of discoveries concerning parapatric differentiation of weed populations including adaptive evolution in herbicide-resistant biotypes and complex evolutionary patterns in weed crop complexes of various groups. The next section explores molecular approaches in plant biosystematics focusing on amino acid sequencing of proteins, restriction site variations of cpDNA, mtDNA, rDNA, etc., and chromosome banding patterns revealed by differential staining. The discussion shifts to a wave of research in plant population biology and evolutionary ecology since the 1970s and its impact on biology and biosystematics. The book considers various aspects of reproductive biology and evolutionary changes in significant reproductive parameters and attempts to demographically quantify these parameters. The final chapter is devoted to the use of functional phylogenetic systematics for predictive ecology. This book will be of interest to plant biologists and scientists and researchers in fields such as biochemistry, botany, microbiology, ecology, and evolutionary biology.

**Encyclopedia of Evolutionary Biology**, 2016-04-14 Encyclopedia of Evolutionary Biology Four Volume Set is the definitive go-to reference in the field of evolutionary biology. It provides a fully comprehensive review of the field in an easy-to-search structure. Under the collective leadership of fifteen distinguished section editors, it is comprised of articles written by leading experts in the field, providing a full review of the current status of each topic. The articles are up-to-date and fully illustrated with in-text references that allow readers to easily access primary literature. While all entries are authoritative and valuable to those with advanced understanding of evolutionary biology, they are also intended to be accessible to both advanced undergraduate and graduate students. Broad topics include the history of evolutionary biology, population genetics, quantitative genetics, speciation, life history, evolution, evolution of sex and mating systems, evolutionary biogeography, evolutionary developmental biology, molecular and genome evolution, coevolution, phylogenetic methods, microbial evolution, diversification of plants and fungi, diversification of animals, and applied evolution. Presents fully comprehensive content allowing easy access to fundamental information and links to primary research. Contains concise articles by leading experts in the field that ensure current coverage of each topic. Provides ancillary learning tools like tables, illustrations, and multimedia features to assist with the comprehension process.

*Ecology and Evolutionary Biology of Clonal Plants* Josef F. Stuefer, Brigitta Erschbamer, Heidrun Huber, Jun-ichirou Suzuki, 2013-06-29 Spontaneous self-cloning or clonality is a widespread phenomenon in the plant kingdom and has a wide array of ecological and evolutionary implications. This volume is the outcome of an international workshop on clonal plant biology aimed at illustrating current progress and

recent developments in the scientific study of clonality in plants The first section of this book includes a collection of original research articles which demonstrate the wide variety of approaches and scientific challenges linked to clonality in plants The topics covered in this section include ecological and evolutionary implications of sexual versus asexual propagation including life history evolution and sex ratio dynamics the importance of internal resource transport and remobilization of storage products for the invasiveness and competitiveness of clonal plants a survey of clonal growth forms in grassland communities and studies on the interactions between clonal plants and animals and fungi The approaches used range from experimental studies on a broad variety of systems to mathematical modeling of clonal growth and its consequences The second part features discussion and review papers on a diverse array of subjects ranging from developmental considerations of clonality principles of selection and evolution in clonal plants a survey of clonality in algae to potential implications of clonality for plant mating and beyond This part of the volume aims at presenting novel ideas and hypotheses and at summarizing existing knowledge in previously under researched areas thereby providing directions for future research initiatives This book captures ongoing cutting edge research in the field of clonal plant ecology and evolution It is directed to anyone from the undergraduate to specialist level who is interested in the biology of the intriguing phenomenon of asexual propagation in plants

*Evolutionary Biology* Mitchell B. Cruzan, 2018-09-11 Many of the characteristics that distinguish plants from other living organisms can be traced to their origin early in the history of life Features such as a multicellular haploid life stage prevalent hermaphroditism self fertilization and general dependence on biotic and abiotic vectors for reproduction stem directly from the ability of plants to obtain energy from the sun This novel mode of energy capture had far ranging implications for plant evolution It not only fueled the tremendous diversification of life on Earth but also had far ranging implications for the evolution of early photosynthetic organisms and eventually land plants Understanding the evolutionary processes for the proliferation and diversification of plants requires an appreciation of their unique biological features While the processes of mutation selection genetic drift and gene flow are the same for both plants and animals there are specific characteristics of plants that affect their evolution Unique traits of plants affect everything from the fate of mutations to exposure to selection in the haploid life stage to the distribution of genetic variation within and among populations and ultimately the rates and patterns of diversification This book examines the origins of the unique features of plants and the implications of these features for evolutionary processes Author Mitchell B Cruzan provides discussion of contemporary topics such as population genetics phylogeography phylogenetics ecological genetics and genomics The content covered is essential to a wide range of advanced courses in plant biology

*Evolutionary Ecology of Plant-Herbivore Interaction* Juan Núñez-Farfán, Pedro Luis Valverde, 2020-07-30 Plant herbivore interactions are a central topic in evolutionary ecology Historically their study has been a cornerstone for coevolutionary theory Starting from classic ecological studies at the phenotypic level it has since expanded to molecular and genomic approaches After a historical perspective the book s

subsequent chapters cover a wide range of topics from populations to ecosystems plant and herbivore focused studies in natural and in man modified ecosystems and both micro and macro evolutionary levels All chapters include valuable background information and empirical evidence Given its scope the book will be of interest to both students and researchers and will hopefully stimulate further research in this exciting field of evolutionary biology

**Plant Development and Evolution**, 2019-01-04 Plant Development and Evolution the latest release in the Current Topics in Developmental Biology series highlights new advances in the field with this new volume presenting interesting chapters on the Evolution of the plant body plan Lateral root development and its role in evolutionary adaptation the Development of the vascular system the Development of the shoot apical meristem and phyllotaxis the Evolution of leaf diversity the Evolution of regulatory networks in land plants The role of programmed cell death in plant development the Development and evolution of inflorescence architecture the Molecular regulation of flower development the Pre meiotic another development and much more Provides the authority and expertise of leading contributors from an international board of authors Presents the latest release in the Current Topics in Developmental Biology series Updated release includes the latest information on Plant Development and Evolution

Origins and Evolution of Plants on the Earth and the Descendants of ANITA Subir Ranjan Kundu, 2018-09-13 Evolutionary biology may still be a complicated field of study for many but in Origin and Evolution of Plants on the Earth and the Descendants of ANITA by Subir Ranjan Kundu the concept has been simplified with regard to angiosperms The book walks the readers through the pathway of a series of events resulting in the evolution in different branches of life on Earth over the last 4 billion years The theory explains the green planet from the pre existing dark planet to the blue planet while touching areas like spatiotemporal changes aquatic life as well as organic and inorganic evolution While the mystery of evolution has stirred all from the shape of a flower to sliding continents the writer explains and elaborates on his standpoint with relevance This non fictional piece of work changes perspective on life and leaves the readers to ponder the source material long after they have finished reading

*Evolutionary Ecology of Plant Reproductive Strategies* Thomas Johannes de Jong, Petrus Gerardus Leonardus Klinkhamer, 2005-10-13 This book places the wealth of data that have been collected on plants into the unifying framework of game theory

Plant Cell Death Processes Larry D. Nooden, 2003-12-09 Programmed cell death is a common pattern of growth and development in both animals and plants However programmed cell death and related processes are not as generally recognized as central to plant growth This is changing fast and is becoming more of a focus of intensive research This edited work will bring under one cover recent reviews of programmed cell death apoptosis and senescence Summaries of the myriad aspects of cell death in plants Discussion of the broadest implications of these disparate results A unification of fields where there has been no cross talk Enables easy entry into diverse but related lines of research

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web step 1 what you need what you need rubber bands for making the bracelets you can get at a craft store c clips or paper clips i m using c clips step 2 grab one start by getting 1 rubber band step 3 pinch pinch it together step 4 get another get another rubber band pinch it the same way step 5 pinch and place

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web jul 22 2023 step 5 stop this process when you reach your desired length of chain now put another empty rubber band through the pencils make sure you don t twist it again pull the rubber band just below it to the top of the empty rubber band similar to the previous steps attach hook between the empty rubber bands at both ends and remove the pencils

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