



EVOLUTION
OF
SEX DETERMINING
MECHANISMS

James J. Bull

Evolution Of Sex Determining Mechanisms

James Ralph Urton



Evolution Of Sex Determining Mechanisms:

Evolution of Sex Determining Mechanisms James J. Bull, 1983

The Evolution of Sex Determination Leo Beukeboom, Nicolas Perrin, 2014-06-12 Sexual reproduction is a fundamental aspect of life. It is defined by the occurrence of meiosis and the fusion of two gametes of different sexes or mating types. Sex determination mechanisms are responsible for the sexual fate and development of sexual characteristics in an organism, be it a unicellular alga, a plant, or an animal. In many cases, sex determination is genetic; males and females have different alleles or different genes that specify their sexual morphology. In animals, this is often accompanied by chromosomal differences. In other cases, sex may be determined by environmental factors, e.g., temperature or social variables, e.g., the size of an organism relative to other members of its population. Surprisingly, sex determination mechanisms are not evolutionarily conserved but are bewilderingly diverse and appear to have had rapid turnover rates during evolution. Evolutionary biologists continue to seek a solution to this conundrum. What drives the surprising dynamics of such a fundamental process that always leads to the same outcome: two sex types, male and female? The answer is complex, but the ongoing genomic revolution has already greatly increased our knowledge of sex determination systems and sex chromosomes in recent years. This novel book presents and synthesizes our current understanding and clearly shows that sex determination evolution will remain a dynamic field of future research. *The Evolution of Sex Determination* is an advanced research level text suitable for graduate students and researchers in genetics, developmental biology, and evolution.

Evolution of Sex Determining Mechanisms James J. Bull, 1983

Classical sex determining mechanisms: Male and female heterogamety, 2 factor systems, Multiple factor systems, Genetics of sex development and the nature of sex factors, A combinatorial enumeration of sex determining mechanisms, 2 factor and multiple factor systems, Evolution in multiple factor systems, Evolution of the heterogametic mechanism of sex determination, Polyfactorial sex determination, Environmental sex determination, ESD, Evolution of environmental sex determination, Uniparental males, arrhenotoky, Haplo-diploidy and paternal genome loss, Advantages of producing uniparental males, Cytoplasmic sex determination, A parental mechanism of sex determination, maternal monogeny, Sex chromosome evolution, Characteristics of sex chromosomes, extreme X-Y heteromorphism, Slight X-Y heteromorphism and evidence of a transition, Evolution of sex chromosome differences, models and theory.

The Genetics and Biology of Sex Determination Derek J. Chadwick, Jamie A. Goode, 2002-04-26 Nature employs a wide variety of sex determining mechanisms and it is only comparatively recently that the tools have become available for these to be explored at the cellular and molecular levels. A major landmark was the discovery in 1990 of the SRY gene and the subsequent demonstration of its key role in triggering male sex determination in transgenic mice. This book reviews and discusses our current understanding of the molecular genetic pathways of sex determination with special emphasis on vertebrates. It features comparisons with other modes of sex determination, consideration of the biology of sexual development, and discussion of the evolution of sex determining

mechanisms By bringing together an international and interdisciplinary group of experts who study many different aspects of the problem the book highlights much new and exciting work in this area and serves to identify and stimulate promising new research directions

Theoretical Studies on Sex Ratio Evolution Samuel Karlin,Sabin Lessard,2020-03-31 This book deals with a key area of population genetics the ratio of the sexes in a population or the allocation of resources to male versus female reproductive function Samuel Karlin and Sabin Lessard establish the formal theoretical aspects of the evolution of sex ratio within the constraints of genetic mechanisms of sex determination Their results generalize and unify existing work on the topic strengthening previous conceptions in some cases and in other instances offering new directions of research There are two main approaches to understanding the causes and effects of sex ratio One approach focuses on the optimization and adaptive functions of sex allocation while the other emphasizes the consequences of genetic sex determination mechanisms In discussing the utility of these two approaches Professors Karlin and Lessard examine the principal sex determining mechanisms and facts involved in sex ratio representations the various genetic and environmental factors that contribute to adaptive sex expression and the evolution of sex determining systems and controls From a population genetic perspective the authors derive evolutionary properties in support of the high incidence of 1:1 sex ratio in natural populations and investigate the conditions that can explain the occurrence of biased sex ratio

Evolution of Sex-determining Mechanisms Irma Virginia Lagomarsino,1990 **Evolution of Sex-determining Mechanisms in Reptiles** Alexander E. Quinn,2008 **The Genetics and Biology of Sex Determination (Novartis Foundation**

Symposia Book 244) Derek' J. Chadwick,Jamie' A. Good'e,Novartis' Foundatio'n,2021-04-29 Nature employs a wide variety of sex determining mechanisms and it is only comparatively recently that the tools have become available for these to be explored at the cellular and molecular levels A major landmark was the discovery in 1990 of the SRY gene and the subsequent demonstration of its key role in triggering male sex determination in transgenic mice This book reviews and discusses our current understanding of the molecular genetic pathways of sex determination with special emphasis on vertebrates It features comparisons with other modes of sex determination consideration of the biology of sexual development and discussion of the evolution of sex determining mechanisms By bringing together an international and interdisciplinary group of experts who study many different aspects of the problem the book highlights much new and exciting work in this area and serves to identify and stimulate promising new research directions

Molecular-Genetic Mechanisms of Sex Determination in Animals Aleksandr F. Smirnov,A. V. Trukhina, Gender sex is a set of morphological and physiological characteristics of the organism underlying sexual reproduction the essence of which is reduced to fertilization i.e the fusion of male and female gametes gametes zygote which develops into a new organism Sexual reproduction of a species is considered as one of the mechanisms of its homeostasis Thanks to this mechanism numerous species have an evolutionary advantage In the book two authors will discuss the types of genetic sex determination and

differentiation mostly in multicellular animal organisms Sex determination is both genetic and environmental process the sex of an individual being established through an alternative physiological solution There are two main postulated mechanisms of sex determination genetic GSD Genetical Sex Determination and environmental ESD Environmental Sex Determination

The Evolution of Sex Chromosomes and Sex Determination Mechanisms in Stickleback Fishes (Gasterosteidae) James Ralph Urton,2011 **The Evolution of Sex and its Consequences** S.C. Stearns,2013-11-21 *Genes and Mechanisms in Vertebrate Sex Determination* Gerd Scherer,Michael Schmid,2013-04-17 Following an opening chapter by the late Susumu Ohno on paralogues of sex determining genes the five best studied genes essential for early mammalian gonadal development are portrayed in detail SF 1 and WT1 and their roles in early events in gonadal development SRY and SOX9 in testis determination and the anti testis gene DAX 1 Subsequent chapters look at the roles of these genes in sex determination in marsupial mammals birds reptiles amphibians and fish and review the different sex determining mechanisms genetic and environmental that operate in these different vertebrate classes Two insights emerge one that the same basic set of genes appears to operate during early gonadal development in all vertebrates despite the differences in mechanisms the other that sex determination in vertebrates results from a complex network of regulatory interactions and not from a simple hierarchical cascade of gene actions **Strickberger's Evolution** Brian Keith Hall,Benedikt Hallgrímsson,Monroe W. Strickberger,2014 The fifth Edition of Strickberger s Evolution is updated with the latest data and updates from the field The authors took care to carefully modify the chapter order in an effort to provide a more clear and student friendly presentation of course material The original scope and theme of this popular text remains as it continues to present an overview of prevailing evidence and theories about evolution by discussing how the world and its organisms arose and changed over time New boxed features concentrating on modern and exciting research in the field are included throughout the text New and Key Features of the Fifth Edition New Full color design and art program Maintains the student friendly engaging writing style for which it is known A reorganized chapter order provides a more clear and accessible presentation of course material Chapters on the evolution of biodiversity are now found on the text s website Access to the companion website is included with every new copy of the text New boxed features highlight new and exciting research in the field Evolution Brian Hall,2011-08-24 If you want to know whether evolution is a science how life began what Charles Darwin really said about evolution why a fungus is more closely related to humans than to a plant how experiments in evolution can be carried out why birds are flying dinosaurs how we manipulate the evolution of other species and if you want a clear treatment of the processes that result in evolution then this is the book for you Written for those with a minimal science background Evolution Principles and Processes provides a concise introduction of evolutionary topics for the one term course Using an engaging writing style and a wealth of full color illustrations Hall covers all topics from the origin of universe Earth the origin of life and on to how humans influence the evolution of other species He brings together the principles and processes that explain

evolutionary change and discusses the patterns of life that have resulted from the operation of evolution over the past 3.5 billion years. This overview coupled with numerous case studies and examples helps readers understand and truly appreciate the origin and diversity of life. The American Naturalist, 1918

Sex Determination and Differentiation in Reptiles Ettore Olmo, 2010. Reptiles are a fascinating group for the study of sexual development because they exhibit a wide range of sex determining mechanisms from strict genetic sex determination (GSD) to strict thermal sex determination (TSD) and intermediate systems of GSD that are to various degrees overridden by environmental effects. This thematic issue presents the latest data on different aspects of sex determination in reptiles. Following an evolutionary perspective on why reptiles might be predisposed to evolve TSD, the papers in this issue explore in detail the different genetic and molecular mechanisms of sex determination and differentiation. They consider recent findings such as the discovery of new genes differentially expressed at male and female sex determining temperatures, a new model of the role of aromatase and the contribution of heat shock proteins to TSD in the American alligator. Further studies examine the role played by sex allocation, the advantage of viviparity and the effects of anthropogenic climate change on the sex ratio in TSD reptile populations. Providing a valuable overview for both students and researchers, this publication is essential reading for developmental and reproductive biologists, herpetologists, comparative endocrinologists, evolutionary biologists and geneticists.

The Genetics and Biology of Sex Determination Derek J. Chadwick, Jamie A. Goode, 2002-04-26. Nature employs a wide variety of sex determining mechanisms and it is only comparatively recently that the tools have become available for these to be explored at the cellular and molecular levels. A major landmark was the discovery in 1990 of the SRY gene and the subsequent demonstration of its key role in triggering male sex determination in transgenic mice. This book reviews and discusses our current understanding of the molecular genetic pathways of sex determination with special emphasis on vertebrates. It features comparisons with other modes of sex determination, consideration of the biology of sexual development and discussion of the evolution of sex determining mechanisms. By bringing together an international and interdisciplinary group of experts who study many different aspects of the problem, the book highlights much new and exciting work in this area and serves to identify and stimulate promising new research directions.

Evolution of Sex Ratios and Sex Determination Mechanisms Manish Parihar, 2017. In sexually reproducing species, the decision to allocate resources towards male and female reproductive function is called sex allocation. Although theoretical and empirical work has been largely successful, the underlying mechanisms of sex allocation are not very well known. For instance, little is known about how the parents adjust the sex of the offspring in response to specific environmental conditions. According to Mendel's law of segregation, in species that have two genders, a cross between a male and a female should give an equal proportion of male and female progeny. However, there are some species that deviate from this genetic norm and produce skewed sex ratios. For example, some parasitic nematodes, e.g. *Strongyloides*, produce exclusively XX females after crossings between XX females and XO males.

Although very intriguing the molecular mechanisms and selective pressures leading to such sex ratio distortions are difficult to study in parasites as they cannot be cultured outside the host Here we are using a free living nematode species that shows sex ratio distortion and that could be used as a model to understand mechanisms of sex ratio distortion in parasites For my dissertation I have uncovered a molecular mechanism in the male germline of the free living nematode strain SB347 that regulates the sex ratio of the cross progeny A large proportion of spermatids that can potentially produce males after fertilization are selectively eliminated in the male gonad Thus the result of crosses is mostly biased against male offspring By understanding the mechanisms of sexual allocation and reproduction in free living nematodes hopefully new strategies can be created to hamper the propagation of harmful parasites I have also studied the evolution of sperm size which seems to correlate with sperm competition in nematodes with three genders males females and hermaphrodites I found that sperm competition is likely to be influenced by several factors such as availability of females proportion of hermaphrodites in a population and production of male attractant pheromones by females Unbalanced sex ratios can lead to the evolution of sex determination mechanisms that may restore the equal proportion of sexes This is one of the reasons thought to drive the rapid evolution of sex determination mechanisms To understand the mechanisms of sex determination I also undertook comparative studies between *Pristionchus pacificus* and *Caenorhabditis elegans* *The Role of SDC-3 in Sex Determination and in Assembling the C. Elegans Dosage Compensation Complex* Tamara Lynn Davis,1996 **A Functional Analysis of Sex Determination in D. Virilis** Lisa Ann Megna,2001

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