

Functional Genomics In Aquaculture

[#functional genomics](#) [#aquaculture](#) [#fish genetics](#) [#sustainable aquaculture](#) [#gene expression](#)

Explore the pivotal role of functional genomics in advancing aquaculture practices. Functional genomics tools and techniques, such as transcriptomics, proteomics, and metabolomics, are revolutionizing our understanding of gene function and regulation in aquatic species. This knowledge is crucial for improving disease resistance, growth performance, and overall sustainability in aquaculture, paving the way for more efficient and environmentally responsible food production from aquatic resources.

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Functional Genomics in Aquaculture

Genomics has revolutionized biological research over the course of the last two decades. Genome maps of key agricultural species have offered increased understanding of the structure, organization, and evolution of animal genomes. Building upon this foundation, researchers are now emphasizing research on genome function. Published with the World Aquaculture Society, Functional Genomics in Aquaculture looks at the advances in this field as they directly relate to key traits and species in aquaculture production. Functional Genomics in Aquaculture opens with two chapters that provide a useful general introduction to the field of functional genomics. The second section of the book focuses on key production traits such as growth, development, reproduction, nutrition, and physiological response to stress and diseases. The final five chapters focus on a variety of key aquaculture species. Examples looking at our understanding of the functional genomes of salmonids, Mediterranean sea bass, Atlantic cod, catfish, shrimp, and molluscs, are included in the book. Providing valuable insights and discoveries into the functional genomes of finfish and shellfish species, Functional Genomics in Aquaculture, will be an invaluable resource to researchers and professionals in aquaculture, genetics, and animal science.

Functional Genomics in Aquaculture

Genomics in Aquaculture is a concise, must-have reference that describes current advances within the field of genomics and their applications to aquaculture. Written in an accessible manner for anyone—non-specialists to experts alike—this book provides in-depth coverage of genomics spanning from genome sequencing, to transcriptomics and proteomics. It provides, for ease of learning, examples from key species most relevant to current intensive aquaculture practice. Its coverage of minority species that have a specific biological interest (e.g., Pleuronectiformes) makes this book useful for countries that are developing such species. It is a robust, practical resource that covers foundational,

functional, and applied aspects of genomics in aquaculture, presenting the most current information in a field of research that is rapidly growing. Provides the latest scientific methods and technologies to maximize efficiencies for healthy fish production, with summary tables for quick reference. Offers an extended glossary of technical and methodological terms to help readers better understand key biological concepts. Describes state-of-the-art technologies, such as transcriptomics and epigenomics, currently under development for future perspective of the field. Covers minority species that have a specific biological interest (e.g., Pleuronectiformes), making the book useful to countries developing such species.

Genomics in Aquaculture

Through the use of next generation sequencing and microarray analysis, as well as many other techniques, the authors of this book address issues such as how captivity may affect the genome, whether there is evidence for growth-related genes, what genes are associated with infection, disease, or deformity, and how the use of dietary supplementation affects gene expression.

Functional Genomics in Aquaculture

Mapping of animal genomes has generated huge databases and several new concepts and strategies, which are useful to elucidate origin, evolution and phylogeny. Genetic and physical maps of genomes further provide precise details on chromosomal location, function, expression and regulation of academically and economically important genes. The series *Genome Mapping and Genomics in Animals* provides comprehensive and up-to-date reviews on genomic research on a large variety of selected animal systems, contributed by leading scientists from around the world. This volume summarizes the first era of genomic studies of aquaculture species, in which the tools and resources necessary to support whole-genome sequencing were developed. These tools will enhance efforts toward selective breeding of aquaculture species. Included in this volume are summaries of work on salmonids, cyprinids, catfish, tilapias, European sea bass, Japanese flounder, shrimps and oysters.

Genetic Dissection of Important Traits in Aquaculture: Genome-scale Tools Development, Trait Localization and Regulatory Mechanism Exploration

From a global perspective aquaculture is an activity related to food production with large potential for growth. Considering a continuously growing population, the efficiency and sustainability of this activity will be crucial to meet the needs of protein for human consumption in the near future. However, for continuous enhancement of the culture of both fish and shellfish there are still challenges to overcome, mostly related to the biology of the cultured species and their interaction with (increasingly changing) environmental factors. Examples of these challenges include early sexual maturation, feed meal replacement, immune response to infectious diseases and parasites, and temperature and salinity tolerance. Moreover, it is estimated that less than 10% of the total aquaculture production in the world is based on populations genetically improved by means of artificial selection. Thus, there is considerable room for implementing breeding schemes aimed at improving productive traits having significant economic impact. By far the most economically relevant trait is growth rate, which can be efficiently improved by conventional genetic selection (i.e. based on breeding values of selection candidates). However, there are other important traits that cannot be measured directly on selection candidates, such as resistance against infectious and parasitic agents and carcass quality traits (e.g. fillet yield and meat color). However, these traits can be more efficiently improved using molecular tools to assist breeding programs by means of marker-assisted selection, using a few markers explaining a high proportion of the trait variation, or genomic selection, using thousands of markers to estimate genomic breeding values. The development and implementation of new technologies applied to molecular biology and genomics, such as next-generation sequencing methods and high-throughput genotyping platforms, are allowing the rapid increase of availability of genomic resources in aquaculture species. These resources will provide powerful tools to the research community and will aid in the determination of the genetic factors involved in several biological aspects of aquaculture species. In this regard, it is important to establish discussion in terms of which strategies will be more efficient to solve the primary challenges that are affecting aquaculture systems around the world. The main objective of this Research Topic is to provide a forum to communicate recent research and implementation strategies in the use of genomics in aquaculture species with emphasis on (1) a better understanding of fish and shellfish biological processes having considerable impact on aquaculture systems; and (2) the

efficient incorporation of molecular information into breeding programs to accelerate genetic progress of economically relevant traits.

Genome Mapping and Genomics in Fishes and Aquatic Animals

Genomics is a rapidly growing scientific field with applications ranging from improved disease resistance to increased rate of growth. *Aquaculture Genome Technologies* comprehensively covers the field of genomics and its applications to the aquaculture industry. This volume looks to bridge the gap between a basic understanding of genomic technology to its practical use in the aquaculture industry.

Genomics in Aquaculture to Better Understand Species Biology and Accelerate Genetic Progress

Bioinformatics derives knowledge from computer analysis of biological data. In particular, genomic and transcriptomic datasets are processed, analysed and, whenever possible, associated with experimental results from various sources, to draw structural, organizational, and functional information relevant to biology. Research in bioinformatics includes method development for storage, retrieval, and analysis of the data. *Bioinformatics in Aquaculture* provides the most up to date reviews of next generation sequencing technologies, their applications in aquaculture, and principles and methodologies for the analysis of genomic and transcriptomic large datasets using bioinformatic methods, algorithm, and databases. The book is unique in providing guidance for the best software packages suitable for various analysis, providing detailed examples of using bioinformatic software and command lines in the context of real world experiments. This book is a vital tool for all those working in genomics, molecular biology, biochemistry and genetics related to aquaculture, and computational and biological sciences.

Aquaculture Genome Technologies

Following the extremely well-received structure of the first edition, this carefully revised and updated new edition now includes much new information of vital importance to those working and researching in the fisheries and aquaculture industries. Commencing with chapters covering genetic variation and how it can be measured, the authors then look at genetic structure in natural populations, followed by a new chapter covering genetics in relation to population size and conservation issues. Genetic variation of traits and triploids and the manipulation of ploidy are fully covered, and another new chapter is included, entitled 'From Genetics to Genomics'. The book concludes with a chapter covering the impact of genetic engineering in aquaculture. With the inclusion of a wealth of up-to-date information, new text and figures and the inclusion of a third author, Pierre Boudry, the second edition of *Biotechnology and Genetics in Fisheries and Aquaculture* provides an excellent text and reference of great value and use to upper level students and professionals working across fish biology, aquatic sciences, fisheries, aquaculture, genetics and biotechnology. Libraries in all universities and research establishments where biological sciences, fisheries and aquaculture are studied and taught should have several copies of this excellent new edition on their shelves. Completely updated, revised and expanded new edition
Subject area of ever increasing importance Expanded authorship Commercially useful information for fish breeders

Bioinformatics in Aquaculture

This important book looks at a broad spectrum of biotech research efforts and their applications to the aquaculture industry. *Aquaculture Biotechnology* provides key reviews that look at the application of genetic, cellular, and molecular technologies to enable fish farmers to produce a more abundant, resilient, and healthier supply of seafood. *Aquaculture Biotechnology* is divided into seven sections and nineteen chapters that cover topics ranging from broodstock improvement to fish health and gene transfer. With chapters provided by leading researchers and skillfully edited by top scientists in the field, this will be a valuable tool to researchers, producers, and students interested in better understanding this dynamic field of aquaculture.

Biotechnology and Genetics in Fisheries and Aquaculture

Genetics and Fish Breeding gives an intensive survey of this vital subject, featuring species which are reproduced economically, for example, salmon, trout, carp and goldfish. The writer, has drawn together an abundance of data, giving a book which ought to be purchased by all fish researcher, fisheries researchers, geneticists and aquarists. A training initially created to deliver quality seed in imprisonment, actuated rearing has made awesome walks in angle populaces for India. The book offers

a functional and concise diagram-from existing methods and operations to late patterns and their effects on aquaculture for what's to come. Provides point by point data about observational rearing practices like blended bringing forth and aimless hybridization; Presents the environmental and hormonal impact on development and bringing forth of fish with genuine fish rearing cases from around the globe; Includes well ordered logical measures to help tackle issues emerging from regular fish-cultivating botches; Provides genuine cases to maximize fish and seed creation to help general maintainability in aquaculture.

Aquaculture Biotechnology

The foundation of quantitative genetics theory was developed during the last century and facilitated many successful breeding programs for cultivated plants and t- restrial livestock. The results have been almost universally impressive, and today nearly all agricultural production utilises genetically improved seed and animals. The aquaculture industry can learn a great deal from these experiences, because the basic theory behind selective breeding is the same for all species. The ?rst published selection experiments in aquaculture started in 1920 s to improve disease resistance in ?sh, but it was not before the 1970 s that the ?rst family based breeding program was initiated for Atlantic salmon in Norway by AKVAFORSK. Unfortunately, the subsequent implementation of selective breeding on a wider scale in aquaculture has been slow, and despite the dramatic gains that have been demonstrated in a number of species, less than 10% of world aquaculture production is currently based on improved stocks. For the long-term sustainability of aquaculture production, there is an urgent need to develop and implement e- cient breeding programs for all species under commercial production. The ability for aquaculture to successfully meet the demands of an ever increasing human p- ulation, will rely on genetically improved stocks that utilise feed, water and land resources in an ef?cient way. Technological advances like genome sequences of aquaculture species, and advanced molecular methods means that there are new and exciting prospects for building on these well-established methods into the future.

Genetics and Fish Breeding

Genetics, Genomics and Fish Phenomics provides the latest information on the rapidly evolving field of genetics, presenting new medical breakthroughs that are occurring as a result of advances in our knowledge of genetics. The book continually publishes important reviews of the broadest interest to geneticists and their colleagues in affiliated disciplines, critically analyzing future directions, with hhis volume focusing on genetics, genomics, and phenomics of fish. Includes a critical analysis of future directions for the study of clinical genetics Written and edited by recognized leaders in the field Presents new medical breakthroughs that are occurring as a result of advances in our knowledge of genetics

Selective Breeding in Aquaculture: an Introduction

Molecular Research in Aquaculture Molecular research and biotechnology have long been fields of study with applications useful to aquaculture and other animal sciences. Molecular Research in Aquaculture looks to provide an understanding of molecular research and its applications to the aquaculture industry in a format that allows individuals without prior experience in this area to learn about and understand this important field. Molecular Research in Aquaculture opens with an introductory chapter giving background information on the aquaculture industry and the development of the science and research methods to what is currently being used. From there it discusses how new, innovative techniques are now being converted and used for research in this field. Introductory chapters on basic molecular biological techniques, such as PCR, cloning, and hybridization, and their rationale provide the foundation for an in-depth look at molecular research and its specific applications. The remaining chapters review key areas of molecular research such as microarray analysis, quantitative PCR, and transgenics. Molecular Research in Aquaculture will be a valuable reference for professionals and researchers with an interest in the development of molecular technologies and their applications to the field of aquaculture. Coverage of basic molecular biological techniques and their rationale In-depth look at molecular research and their applications to aquaculture Valuable reference on the developments of this key area in aquaculture research

Advances in Genome Assembly for Fisheries and Aquaculture

Recent developments in DNA marker technologies, in particular the emergence of Single Nucleotide Polymorphism (SNP) discovery, have rendered some of the traditional methods of genetic research outdated. Next Generation Sequencing and Whole Genome Selection in Aquaculture comprehensively

covers the current state of research in whole genome selection and applies these discoveries to the aquaculture industry specifically. The text begins with a thorough review of SNP and transitions into topics such as next generation sequencing, EST data mining, SNP quality assessment, and whole genome selection principles. Ending with a discussion of the technology's specific applications to the industry, this text will be a valuable reference for those involved in all aspects of aquaculture research. Special Features: Unique linking of SNP technologies, next generation sequencing technologies, and whole genome selection in the context of aquaculture research Thorough review of Single Nucleotide Polymorphism and existing research 8-page color plate section featuring detailed illustrations

Genetics, Genomics and Fish Phenomics

From a global perspective aquaculture is an activity related to food production with large potential for growth. Considering a continuously growing population, the efficiency and sustainability of this activity will be crucial to meet the needs of protein for human consumption in the near future. However, for continuous enhancement of the culture of both fish and shellfish there are still challenges to overcome, mostly related to the biology of the cultured species and their interaction with (increasingly changing) environmental factors. Examples of these challenges include early sexual maturation, feed meal replacement, immune response to infectious diseases and parasites, and temperature and salinity tolerance. Moreover, it is estimated that less than 10% of the total aquaculture production in the world is based on populations genetically improved by means of artificial selection. Thus, there is considerable room for implementing breeding schemes aimed at improving productive traits having significant economic impact. By far the most economically relevant trait is growth rate, which can be efficiently improved by conventional genetic selection (i.e. based on breeding values of selection candidates). However, there are other important traits that cannot be measured directly on selection candidates, such as resistance against infectious and parasitic agents and carcass quality traits (e.g. fillet yield and meat color). However, these traits can be more efficiently improved using molecular tools to assist breeding programs by means of marker-assisted selection, using a few markers explaining a high proportion of the trait variation, or genomic selection, using thousands of markers to estimate genomic breeding values. The development and implementation of new technologies applied to molecular biology and genomics, such as next-generation sequencing methods and high-throughput genotyping platforms, are allowing the rapid increase of availability of genomic resources in aquaculture species. These resources will provide powerful tools to the research community and will aid in the determination of the genetic factors involved in several biological aspects of aquaculture species. In this regard, it is important to establish discussion in terms of which strategies will be more efficient to solve the primary challenges that are affecting aquaculture systems around the world. The main objective of this Research Topic is to provide a forum to communicate recent research and implementation strategies in the use of genomics in aquaculture species with emphasis on (1) a better understanding of fish and shellfish biological processes having considerable impact on aquaculture systems; and (2) the efficient incorporation of molecular information into breeding programs to accelerate genetic progress of economically relevant traits.

Molecular Research in Aquaculture

This volume brings together, for the first time, a wide range of up-to-the-minute and traditional techniques and approaches to the study of genetics of organisms living in freshwater or marine habitats. Carefully edited chapters are headed by broad review articles against which are set a number of more specific experience papers which demonstrate the breadth and range of approaches currently being undertaken.

Next Generation Sequencing and Whole Genome Selection in Aquaculture

The genetic improvement of fish for aquaculture and related fisheries has seen huge advances over recent years. Building upon the previous two editions of *Aquaculture and Fisheries Biotechnology: Genetic Approaches*, this 3rd edition offers a presentation of traditional selective breeding, modern genetic biotechnology, genomics, gene transfer and gene editing, and the latest developments in genetic biotechnology such as epigenetics, xenogenesis and genome-wide association study coupled with commercial application, the impact of government regulation and expectations for the future. It provides a firm grounding in relevant aspects of classical genetics, before focusing on particular aspects such as sex reversal and breeding as applied in aquaculture and fisheries. It also explores how more recent molecular genetics, genomics and biotechnology techniques can be used and combined in

improvement programmes for fish and aquaculture species. A glossary explains the latest terminology used in biotechnology and genetics. This book will be useful for research scientists and students in marine biotechnology, aquaculture biotechnology, and fish genetics and breeding.

Genetics and Molecular Breeding in Aquaculture Animals

"It includes a review of the state of the art in animal genomics and its applications to animal health. The contributions describe the new tools available, such as HapMaps for chicken and cattle, and show how the understanding of gene structure and function can be successfully applied to delineate the molecular mechanisms of disease and determine complex phenotypes associated with health traits. A critical evaluation of future needs and future applications of animal genomics is also presented. The integration of animal genomics in animal health research is likely to revolutionize the way scientists approach the challenges of discovering highly effective drugs and vaccines for animal diseases."--BOOK JACKET.

Genomics in Aquaculture to Better Understand Species Biology and Accelerate Genetic Progress

This book sheds light on the major functions of microbial communities in aquaculture ecosystems, showing that by recycling nutrients, degrading organic matter and preventing disease outbreaks, a variety of microbes are truly beneficial to a wide range of aquaculture industries. It discusses how deteriorating environmental quality enables some microbial strains to trigger disease, describes the development of highly sustainable tools to improve water quality, and identifies crucial factors that endanger microbial homeostasis in aquaculture ecosystems. The book also covers post-antibiotic approaches for preventing and treating opportunistic microbial infections based on harnessing environmental and fish-associated microbial communities. Furthermore, it explores how manipulating and engineering these complex microbial communities using bio-agents such as probiotics, phages, natural nutritional additives, or with fine-tuned biofilters will open the door for new ways to develop a more sustainable and cost-effective aquaculture industry. Including an accessible presentation of modern high-throughput sequencing technology to identify host-microbial interactions in aquaculture ecosystems, this book is a valuable resource for scientists, aquaculture and fishery experts, sustainability enthusiasts and scholars in the areas of biology and marine agriculture.

Genetics and Evolution of Aquatic Organisms

The book covers various biotechnological research efforts and their applications in fisheries and aquaculture, especially in the area of fish breeding, health management, nutrition and culture. Application of the recent biotechnological tools, like Transcriptomics, Transgenesis, Nanotechnology, Metabolomics, RNAi and CRISPRi Technologies in the field of fisheries research are included in the book. Topics like conservation genetics for management of fishery resources are also covered in the book. It aims at addressing the growing need of the biotechnology in advancing the cause of aquaculture with a view to provide food and nutritional security to the world. This book will be of immense use to teachers, researchers, academicians, development officials and policymakers, involved in R&D of fisheries and aquaculture sectors. Also, the book serves as an additional reading material for undergraduate and graduate students of fisheries, marine sciences, ecology, aquaculture, and environmental sciences. The research in aquaculture biotechnology is likely to have significant impact on aquaculture and fisheries by way of supporting nutritional food security to the growing population.

Aquaculture and Fisheries Biotechnology

Functional genomics and proteomics play a crucial role in analysing available genetic data and gathering key information for further use. The book emphasizes on the dynamic aspects of genomics and proteomics such as regulation of genes, transcription, translation and protein-protein interactions, large scale protein structures, etc. Researches and case-studies included in this book attempt to provide methods, models and techniques to analyze and gather information from large pool of available genomic data of various organisms. This book provides a detailed explanation on structure determination and structural genomics. Students and researchers will find this book beneficial.

Animal Genomics for Animal Health

This authored book is focused on SDG 14: Life below water, comprehensively addressing all facets of biotechnology and bioinformatics related to fisheries. It offers an extensive exploration of the detail on structure, function and types of nucleic acids, concepts of gene and genetic code, mutations, and their

implications. The book provides essential information on gene regulation and expression in prokaryotes and eukaryotes. Step-by-step descriptions are provided for technologies such as gene transfer, rDNA, transgenic fish production, animal cell culture, hybridoma technology and cryopreservation technology in fishes. Special emphasis has been given to topics like RNA in gene regulation, epigenetics, and DNA and protein sequencing. Various molecular techniques and markers have been discussed in detail. Further, various topics on bioinformatics including different databases, formats, sequence retrieval, manipulation, analysis, primer design, molecular visualization, genomics, and proteomics are also covered. This volume will prove invaluable to aquaculturists, equipping them with essential techniques and protocols. It constitutes essential reading for students enrolled in aquaculture or fisheries courses within tropical and sub-tropical regions.

Microbial Communities in Aquaculture Ecosystems

Recent developments in DNA marker technologies, in particular the emergence of Single Nucleotide Polymorphism (SNP) discovery, have rendered some of the traditional methods of genetic research outdated. Next Generation Sequencing and Whole Genome Selection in Aquaculture comprehensively covers the current state of research in whole genome selection and applies these discoveries to the aquaculture industry specifically. The text begins with a thorough review of SNP and transitions into topics such as next generation sequencing, EST data mining, SNP quality assessment, and whole genome selection principles. Ending with a discussion of the technology's specific applications to the industry, this text will be a valuable reference for those involved in all aspects of aquaculture research. Special Features: Unique linking of SNP technologies, next generation sequencing technologies, and whole genome selection in the context of aquaculture research Thorough review of Single Nucleotide Polymorphism and existing research 8-page color plate section featuring detailed illustrations

Advances in Fisheries Biotechnology

The zebrafish is the most important fish model in developmental and genetic analyses. This book contains 19 review articles covering a broad spectrum of topics, from development to genetic tools. The contents range from early development, the role of maternal factors and gastrulation, to tissue differentiation and organogenesis, such as development of the organizer, notochord, floor plate, nervous system, somites, muscle, skeleton and endoderm. The genetic tools cover morpholino knock-down, transgenics, fish cloning, transposons and genome evolution. The book also includes two chapters on genome mapping and embryonic stem cells in medaka, another important model fish. Summarizing the state-of-the-art studies of the zebrafish model and focusing on the molecular aspects of development, this book is a valuable reference for students learning the basic aspects of the zebrafish model, and for researchers seeking resources in zebrafish research. Contents: The Role of Maternal Factors in Early Zebrafish Development (F Pelegri) Gastrulation in Zebrafish (F Ulrich & C-P Heisenberg) Development of the Zebrafish Organizer and Notochord (K A Thomas & D L Stemple) Formation and Functions of the Floor Plate (J Tian & K Sampath) Form and Function in the Zebrafish Nervous System (M Hendricks & S Jesuthasan) Development of the Primary Nervous System of the Zebrafish Embryo (U Strähle & V Korzh) Making Scents: Development and Function of the Olfactory Sensory System (K E Whitlock) Somites Segmentation: A View from Fish (H Takeda & Y Saga) Vertebrate Somite Development, Notch Signaling and Others (Y-J Jiang) Molecular Regulation of Fish Muscle Development and Growth (S J Du) Skeletogenesis in Zebrafish *Danio rerio*: Evolutionary and Developmental Aspects (S Fisher & P M Mabee) Endoderm Formation in Zebrafish (N B David et al.) Gene 'Knockdown' Approaches Using Unconventional Antisense Oligonucleotides (E Chen et al.) Transgenic Fish for Developmental Biology Studies (Z-Y Gong et al.) Cloning the Zebrafish (B Ju et al.) Applications of Transposable Elements in Fish for Transgenesis and Functional Genomics (P B Hacketts et al.) Evolution of the Zebrafish Genome (J H Postlethwait) Medaka Genome Mapping for Functional Genomics (H Mitani et al.) Medaka Embryonic Stem Cells (Y-H Hong & M Scharl) Readership: Upper level undergraduates, graduate students, academics and researchers in cell & molecular biology, fish & marine biology and genetics. Keywords: Zebrafish; Medaka; Embryonic Development; Axial Structures; Neurogenesis; Somites; Transgenics; Genome Key Features: Contributed by active researchers working in the field of developmental biology of the zebrafish and medaka Covers essentially all major topics from early development to organogenesis as well as several most important genetic tools Represents most updated reviews in selected areas of the rapidly developing field

Functional Genomics and Proteomics

This book is for the students starting their research projects in the field of metagenomics, for researchers interested in the new developments and applications in this field; and for teachers involved in teaching this subject. The book is divided into three sections as indicated from its title, namely; the basics of metagenomics, metagenomic analysis, and applications of metagenomics. It covers the basics of metagenomics from its history and background, to the analysis of metagenomic data as well as its recent applications in different fields. The book contains excellent texts at both the introductory and advanced levels, that describe the latest metagenomic approaches and applications, from sampling to data analysis for taxonomic, environmental, and medical studies. Finally, the publication of this book was an interesting journey for me and I hope the readers will enjoy reading it.

Practical Genetics for Aquaculture

Bioinformatics derives knowledge from computer analysis of biological data. In particular, genomic and transcriptomic datasets are processed, analysed and, whenever possible, associated with experimental results from various sources, to draw structural, organizational, and functional information relevant to biology. Research in bioinformatics includes method development for storage, retrieval, and analysis of the data. Bioinformatics in Aquaculture provides the most up to date reviews of next generation sequencing technologies, their applications in aquaculture, and principles and methodologies for the analysis of genomic and transcriptomic large datasets using bioinformatic methods, algorithm, and databases. The book is unique in providing guidance for the best software packages suitable for various analysis, providing detailed examples of using bioinformatic software and command lines in the context of real world experiments. This book is a vital tool for all those working in genomics, molecular biology, biochemistry and genetics related to aquaculture, and computational and biological sciences.

Fisheries Biotechnology and Bioinformatics

Awarded Bookauthority's "Best Aquaculture Books of all Time" A comprehensive resource that covers all the aspects of sex control in aquaculture written by internationally-acclaimed scientists Comprehensive in scope, Sex Control in Aquaculture first explains the concepts and rationale for sex control in aquaculture, which serves different purposes. The most important are: to produce monosex stocks to rear only the fastest-growing sex in some species, to prevent precocious or uncontrolled reproduction in other species and to aid in broodstock management. The application of sex ratio manipulation for population control and invasive species management is also included. Next, this book provides detailed and updated information on the underlying genetic, epigenetic, endocrine and environmental mechanisms responsible for the establishment of the sexes, and explains chromosome set manipulation techniques, hybridization and the latest gene knockout approaches. Furthermore, the book offers detailed protocols and key summarizing information on how sex control is practiced worldwide in 35 major aquaculture species or groups, including fish and crustaceans, and puts the focus on its application in the aquaculture industry. With contributions from an international panel of leading scientists, Sex Control in Aquaculture will appeal to a large audience: aquaculture/fisheries professionals and students, scientists or biologists working with basic aspects of fish/shrimp biology, growth and reproductive endocrinology, genetics, molecular biology, evolutionary biology, and R&D managers and administrators. This text explores sex control technologies and monosex production of commercially-farmed fish and crustacean species that are highly in demand for aquaculture, to improve feed utilization efficiency, reduce energy consumption for reproduction and eliminate a series of problems caused by mixed sex rearing. Thus, this book: Contains contributions from an international panel of leading scientists and professionals in the field Provides comprehensive coverage of both established and new technologies to control sex ratios that are becoming more necessary to increase productivity in aquaculture Includes detailed coverage of the most effective sex control techniques used in the world's most important commercially-farmed species Sex Control in Aquaculture is the comprehensive resource for understanding the biological rationale, scientific principles and real-world practices in this exciting and expanding field.

Next Generation Sequencing and Whole Genome Selection in Aquaculture

The large potential of RNA sequencing and other "omics" techniques has contributed to the production of a huge amount of data pursuing to answer many different questions that surround the science's great unknowns. This book presents an overview about powerful and cost-efficient methods for a comprehensive analysis of RNA-Seq data, introducing and revising advanced concepts in data analysis using the most current algorithms. A holistic view about the entire context where transcriptome is inserted

is also discussed here encompassing biological areas with remarkable technological advances in the study of systems biology, from microorganisms to precision medicine.

Fish Development and Genetics

This comprehensive but easy-to-use guide to biotechnology and genetics in fisheries and aquaculture covers major areas such as the uses of genetic knowledge to captive breeding programmes and the use of gene transfer in fish to improve quality and resistance to disease. It should be a useful guide for fish biologists, fisheries and aquaculture workers, animal geneticists and biotechnologists.

Metagenomics

Of the workshop -- Background of the workshop -- Report of the workshop -- Conclusions and recommendations of the workshop -- Contributed papers. Developing policies for the management of fishery genetic resources / D.M. Bartley and A. Toledo -- Status and trends in genetic resources of capture fisheries / W.S. Grant -- Issues, status and trends in deep-sea fishery genetic resources / P.J. Smith -- Genetic resources for aquaculture : status and trends / R.S.V. Pullin -- Fish genomics and analytical genetic technologies, with examples of their potential applications in management of fish genetic resources / Z. Liu.

Bioinformatics in Aquaculture

Fish Vaccines: Health Management for Sustainable Aquaculture is a timely reference book that highlights the role of vaccination in the fast-growing aquaculture industry. It discusses topics such as vaccine formulation, vaccine delivery and enhancing the immune response of fish using nanoparticles. Information related to vaccine safety, ethical approval and regulations is also discussed, together with dissemination of vaccines to fish farms across the globe. This cutting-edge book presents novel strategies to meet the growing demand for vaccines in finfish aquaculture. The book is useful to students, academics, clinicians, and professionals in the field of fisheries sciences, aquaculture, and veterinary sciences.

Sex Control in Aquaculture

This volume explores the conceptual framework and the practical issues related to genomic prediction of complex traits in human medicine and in animal and plant breeding. The book is organized into five parts. Part One reminds molecular genetics approaches intending to predict phenotypic variations. Part Two presents the principles of genomic prediction of complex traits, and reviews factors that affect its reliability. Part Three describes genomic prediction methods, including machine-learning approaches, accounting for different degree of biological complexity, and reviews the associated computer-packages. Part Four reports on emerging trends such as phenomic prediction and incorporation into genomic prediction models of “omics” data and crop growth models. Part Five is dedicated to lessons learned from cases studies in the fields of human health and animal and plant breeding, and to methods for analysis of the economic effectiveness of genomic prediction. Written in the highly successful Methods in Molecular Biology series format, the book provides theoretical bases and practical guidelines for an informed decision making of practitioners and identifies pertinent routes for further methodological researches. Cutting-edge and thorough, Complex Trait Predictions: Methods and Protocols is a valuable resource for scientists and researchers who are interested in learning more about this important and developing field. Chapters 3, 9, 13, 14, and 21 are available open access under a Creative Commons Attribution 4.0 International License via link.springer.com.

Applications of RNA-Seq and Omics Strategies

Marine Bivalve Molluscs Marine Bivalve Molluscs is a comprehensive and thoroughly updated Second Edition of Bivalve Molluscs, covering all major aspects of this important class of invertebrates. As well as being an important class biologically and ecologically, many of the bivalves are fished and cultured commercially (e.g. mussels, oysters, scallops and clams) in a multi-billion dollar worldwide industry. Elizabeth Gosling has written a landmark book that will stand for many years as the standard work on the subject. Chapters in Marine Bivalve Molluscs cover morphology, ecology, feeding, reproduction, settlement and recruitment, growth, physiology, fisheries, aquaculture, genetics, diseases and parasites, and public health issues. A full understanding of many of these aspects is vital for all those working in bivalve fisheries and culture. An essential purchase for anyone concerned with this important

class of animals, copies of Marine Bivalve Molluscs should be on the shelves of biologists, ecologists, environmental scientists, fisheries scientists and personnel within the aquaculture industry. Copies of the book should be available in all libraries and research establishments where these subjects are studied or taught. **REVIEWS OF THE FIRST EDITION** An admirable achievement...a valuable addition to marine sciences libraries everywhere. The back cover of this book says that it is a landmark text that will stand for many years as the standard work on this subject. I can only agree with this sentiment. ~ Aquaculture A welcome addition to the literature and provides the reader with a comprehensive overview of biological and environmental factors that affect and control both natural populations of marine bivalves and culture operations. ~ Aquaculture International The author has done an admirable job in compiling a wealth of information into a readable text. ~ Transactions of the American Fisheries Society Will serve well as a description of much of both the experimental biology and the aquaculture of bivalves. ~ Journal of Experimental Marine Biology and Ecology Provides excellent reviews of all major aspects...an extremely important reference for anyone engaged in bivalve research, fisheries management, and aquaculture. ~ Quarterly Review of Biology The book is very readable, in an easy style. It is well illustrated and there is a wealth of data and statistics presented. ~ Bulletin of the Malacological Society of London

Biotechnology and Genetics in Fisheries and Aquaculture (Epz

Over recent years there have been major advances in the application of molecular, biotechnological and genetic techniques to a wide range of aquatic species. Many working in a hands-on capacity in the area of aquaculture have not previously known what the benefits of this work could be to them. This book redresses this situation, providing clear details of the available scientific information and the direct application of techniques under simple and practical situations.

Workshop on Status and Trends in Aquatic Genetic Resources

Fish Vaccines