

Genetic Sex Differentiation In Fish T J Pandian

Endocrine Sex Differentiation in Fish T. J. Pandian 2013-05-07 Of all vertebrates, fish exhibit unparalleled diversity of sexual plasticity and flexibility, ranging from gonochorism to unisexualism, and exceptional patterns of functional hermaphroditism. Fish farming and monosex aquaculture have led to reproductive dysfunction with males producing less milt, and females failing to ovulate and spawn. This book brings together relevant information on the role of the endocrine system on sexual differentiation in fish, and bridges the gap between molecular endocrinologists and fishery scientists.

Metamorphosis in Fish Sylvie Dufour 2012-03-08 This book gathers current data on the two types of fish metamorphoses and their endocrine controls. It will be of interest for fish biologists as well as comparative physiologists and endocrinologists.

Metamorphosis is a major developmental phase characterized by morphological and physiological changes. It prepares organisms for a drastic shift in habitat and behavior. Among vertebrates, besides the well-known larval metamorphosis in amphibians, two types of metamorphosis are also described in the life cycle of some fish species. Larval metamorphosis, also called first metamorphosis or true metamorphosis, is encountered in lampreys, representative species of basal vertebrates as well as in some teleost groups, elopomorphs and pleuronectiforms, and possibly also in some other teleost species. Secondary metamorphosis occurs in juveniles of some diadromic migratory teleosts, such as salmon and eels, and compared to larval metamorphosis, involves less drastic morphological changes.

Mitochondrial Dysfunction Caused by Drugs and Environmental Toxicants Yvonne Will 2018-03-23 Developed as a one-stop

reference source for drug safety and toxicology professionals, this book explains why mitochondrial failure is a crucial step in drug toxicity and how it can be avoided. • Covers both basic science and applied technology / methods • Allows readers to understand the basis of mitochondrial function, the preclinical assessments used, and what they reveal about drug effects • Contains both in vitro and in vivo methods for analysis, including practical screening approaches for drug discovery and development • Adds coverage about mitochondrial toxicity underlying organ injury, clinical reports on drug classes, and discussion of environmental toxicants affecting mitochondria

Temperature-Dependent Sex Determination in Vertebrates Nicole Valenzuela 2004 Edited by the world's foremost authorities on the subject, with essays by leading scholars in the field, this work shows how the sex of reptiles and many fish is determined not by the chromosomes they inherit but by the temperature at which incubation takes place.

Reproduction and Development in Minor Phyla T. J. Pandian 2021-05-14 The 26 recognized minor phyla comprise aberrant clades, as most of them terminate as blind offshoots. Untied from the discussion on their phylogenesis of minor phyla, this book is largely devoted, for the first time, to aspects of reproduction and development in minor phyletics. The minor phyla are not as speciose (1,795 species/phylum) as the major phyla (157,066 species/phylum) are. The accumulation of deleterious genes causes inbreeding depression among progenies arising from parthenogenesis, clonal multiplication and selfing hermaphrodites. The reason for the limited species diversity in minor phyla is traced to (i) eutelism in 65.7% of minor phyletics and (ii) existence of 21.6% clonals, (iii) 6.4% parthenogens and (iv) 1.2% selfing hermaphroditism. Gonochorism obligately requires motility to search for a mate. The combination of low motility and gonochorism from Placozoa to hemocoelomatic minor phyla has limited diversity to

The Second International Symposium on Tilapia in Aquaculture Roger S. V. Pullin 1988

Biology and Culture of Asian Seabass Lates Calcarifer Dean R. Jerry 2013-10-26 This book covers the biology, ecology, genetics and aquaculture of the Asian Seabass or barramundi (*Lates calcarifer*), a commercially and recreationally valuable species. It brings together in the one place reviews written by world experts in Asian seabass taxonomy, genetics, nutrition, ecology, aquaculture, reproductive and developmental biology, climate change impacts, harvest quality and health management.

Aquaculture Genome Technologies Zhanjiang (John) Liu 2008-02-28 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.

Fish Ecotoxicology Braunbeck 2013-03-07 In modern ecotoxicology, fish have become the major vertebrate model, and a tremendous body of information has been accumulated. This volume attempts to summarize our present knowledge in several fields of primary ecotoxicological interest ranging from the use of (ultra)structural modifications of selected cell systems as sources of biomarkers for environmental impact over novel approaches to monitoring the impact of xenobiotics with fish in vitro systems such as primary and permanent fish cell cultures, the importance of early life-stage tests with fish, the bioaccumulation of xenobiotics in fish, the origin of liver neoplastic lesions in small fish species, immunocytochemical approaches to monitoring effects in cytochrome P450-related biotransformation, the impact of heavy metals in soft water systems, the environmental toxicology of organotin compounds, oxidative stress in fish by environmental pollutants to effects by estrogenic substances in

aquatic systems.

Recent Advances in NGF and Related Molecules Laura Calzà

2021-08-27 More than fifty years after its initial discovery by Rita Levi Montalcini and Stanley Cohen and the proposal of the neurotrophic theory, nerve growth factor (NGF) has become the prototype of a family of biologically active molecules called neurotrophic factors (NTFs). This book addresses important advances in NTF research, from basic science to clinical medicine. It focuses mainly on NGF, but also includes individual chapters dealing with the brain-derived neurotrophic factor (BDNF) and ligands of the glial cell line-derived neurotrophic factor (GDNF) family, which have attracted increasing interest in the neuroscience community because of their diverse effects in the normal and diseased brain. In the first part of the book, the authors provide the necessary background for the following chapters and discuss the basic mechanisms and pathways of NGF signal transduction. In the following sections, they then examine the regenerative activity and neuroprotective capacity of NGF during development and in normal and diseased tissues in adulthood and discuss the role of NGF in Alzheimer's disease and nociception. In addition, the role of NGF in processing sensory information and its influence on behavior is further discussed. The book concludes with an overview of the diagnostic and therapeutic potential of NTF in psychiatric disorders and obesity management, as well as a highlight of NGF research in veterinary medicine. Many of the authors of this volume participated in the Second International Rita Levi-Montalcini Meeting, held in Bologna, Italy, in 2019. The book covers a wide range of important topics in past and current NTF research and will appeal to basic researchers and clinicians alike.

Genetic Sex Differentiation in Fish T. J. Pandian 2012-06-05 A

comprehensive study of sex differentiation gonochoric and hermaphroditic fishes, this book examines sex chromosomes and sex determining genes, emphasizing the need to search for more

than one sex-determining gene residing on different chromosomes. It traces the origin of hermaphrodites from secondary gonochores and explains the conservation of homologous sex differentiation and steroid receptor genes among gonochores and hermaphrodites. The author identifies the optimal broodstock size and the appropriate candidate species for bait. He shows that the analysis of steriles and mutants has demonstrated the value of fishes as a system for genetic dissection of human development and diseases.

Fish Genetics and Aquaculture Biotechnology T J Pandian 2005-01-02 To feed the growing world population, water is looked upon as a major source of food production. This book is an attempt to bring out a comprehensive volume on Fish Transgenesis, Chromosome Engineering and Sex Control, Molecular Endocrinology, Microbial Diseases and Vaccines, and Bioactive Compounds.

Sex Determination in Fish T. J. Pandian 2011-09-02 This book is the first to report that research in allogenis/xenogenics has conclusively shown that fishes have retained bisexual potency even after sexual maturity and spermiation. The XY genotype found in the unexpected female phenotypes sired by supermales (Y1Y2) and androgenic males (Y2Y2) points out the need to employ sex specific molecular ma

Evolution and Speciation in Animals T. J. Pandian 2021-09-23 This book represents the first attempt to quantify environmental factors and life history traits that accelerate or decelerate species diversity in animals. About 15%, 8% and 77% of species are distributed in marine (70% of earth's surface), freshwater (terra firma fosters more diversity. The harsh hadal, desert and elevated montane habitats restrict diversity to 0.5-4.2%. Costing more time and energy, osmotrophic and suspension modes of food acquisition limit diversity to Selfing hermaphrodites (0.9%), parthenogens (Incidence of heterogamety is four-times more in males than in females. Hence, evolution is more a male-driven

process. Egg size is determined by environmental factors, but lecithality is genetically fixed. In poikilotherms, sex is also determined by gene(s), but differentiation by environmental factors. The extra-ovarian vitellogenesis (> 96%), spermatozoan (81%) rather than spermatophore mechanism of sperm transfer, promiscuity and polygamy over monogamy, iteroparity (99.6%) over semelparity and internal fertilization (84%) are preferred, as they accelerate diversity. Body size and egg size determine fecundity. Indirect life cycle (82%) and incorporation of feeding larval stages accelerate diversity. Brooding and viviparity (6.4%) decelerate it. Parasitism extends life span and liberates fecundity from eutelism. Evolution is an ongoing process, and speciation and extinction are its unavoidable by-products. The in-built conservation mechanism of reviving life after a sleeping duration has been reduced from a few million years in microbial spores to a few thousand years in plant seeds and a few hundred years in dormant eggs in animals. Hence, animal conservation requires priority. The existence of temperature-resistant/insensitive individuals, strains and species shall flourish during the ongoing global warming and earth shall continue with such burgeoning species, hopefully inclusive of man.

Carp genetic resources for aquaculture in Asia David J. Penman 2005 There are over 1300 species of cyprinids in Asia, and these are utilized by people for food (capture fisheries and aquaculture) and as ornamental species. This publication focuses on cyprinid species that are bred in hatcheries and used in aquaculture and restocking activities. Introduced and threatened species of cyprinids in Asia are also discussed. We are well aware that we have not covered many other cyprinid species that are utilized by people in Asia in various ways: wild species in capture fisheries, self-recruiting species in aquaculture ponds and other water bodies, and aquarist species.

Reproduction and Development in Echinodermata and Prochordata T. J. Pandian 2018-04-17 Echinoderms and

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prochordates occupy a key position in vertebrate evolution. The genomes of sea urchin share 70% homology with humans. Researches on cell cycle in sea urchin and phagocytosis in asteroids have fetched Nobel Prizes. In this context, this book assumes immense importance. Echinoderms are unique, as their symmetry is bilateral in larvae but pentamerous radial in adults. The latter has eliminated the development of an anterior head and bilateral appendages. Further, the obligate need to face the substratum for locomotion and acquisition of food has eliminated their planktonic and nektonic existence. Egg size, a decisive factor in recruitment, increases with decreasing depths up to 2,000-5,000 m in lecithotrophic asteroids and ophiuroids but remains constant in their planktotrophics. Smaller (110 mm) asteroids generate planktotrophic eggs only. Publications on sex ratio of echinoderms indicate the genetic determination of sex at fertilization but those on hybridization, karyotype and ploidy induction do not provide evidence for heterogametism. But the herbivorous echinoids and larvacea with their gonads harboring both germ cells and Nutritive Phagocytes (NPs) have economized the transportation and hormonal costs on gonadal function. Despite the amazing potential just 2 and 3% of echinoderms undergo clonal reproduction and regeneration, respectively. Fission is triggered, when adequate reserve nutrients are accumulated. It is the most prevalent mode of clonal reproduction in holothuroids, asteroids and ophiuroids. However, budding is a more prevalent mode of clonal reproduction in colonial hemichordates and urochordates. In echinoderms, fission and budding eliminate each other. Similarly, autoregulation of early development eliminates clonal reproduction in echinoids and solitary urochordates. In pterobranchs, thaliaceans and ascidians, the repeated and rapid budding leads to colonial formation. Coloniality imposes reductions in species number and body size, generation time and life span, gonad number and fecundity as well as switching from gonochorism to simultaneous

hermaphroditism and oviparity to ovoviviparity/viviparity.
Genetic Improvement of Fish Stock and Resource Conservation P.
Das 1986

Endocrine Sex Differentiation in Fish T. J. Pandian 2013-05-07

Of all vertebrates, fish exhibit unparalleled diversity of sexual plasticity and flexibility, ranging from gonochorism to unisexualism, and exceptional patterns of functional hermaphroditism. Fish farming and monosex aquaculture have led to reproductive dysfunction with males producing less milt, and females failing to ovulate and spawn. This book

Lost Sex Isa Schön 2009-09-22 Sex is the queen of problems in evolutionary biology. Generations of researchers have investigated one of the last remaining evolutionary paradoxes: why sex exists at all. Given that sexual reproduction is costly from an evolutionary point of view, one could wonder why not all animals and plants reproduce asexually. Dozens of contemporary hypotheses attempt to explain the prevalence of sex and its advantages and predict the early extinction of fully asexual lineages. The major theme of this book is: what is the fate of animal and plant groups in which sex is lost? Initial chapters discuss theory behind asexual life: what major disadvantages do asexual groups have to face, what are the genetic and ecological consequences and what does this theory predict for more applied aspects of asexual life, for example in agricultural pests, diseases as well as in cultural crops such as grapes. Cases studies in many animals (focusing on both invertebrates and vertebrates) and plants reveal parallel, but also singularly novel adaptations to the absence of meiosis and syngamy. And last but not least, are asexuals really doomed to early extinction or do genuine ancient asexuals exist? This book assembles contributions from the most important research groups dealing with asexual evolution in eukaryotes. It is a milestone in research on parthenogenesis and will be useful to undergraduate as well as graduate students and to senior researchers in all fields of evolutionary biology, as the

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paradox of sex remains its queen of problems.

Genetic Sex Differentiation in Fish T. J. Pandian 2012-06-05 A

comprehensive study of sex differentiation gonochoric and hermaphroditic fishes, this book examines sex chromosomes and sex determining genes, emphasizing the need to search for more than one sex-determining gene residing on different chromosomes. It traces the origin of hermaphrodites from secondary gonochores and explains the conservation of homologous sex differentiation and steroid receptor genes among gonochores and hermaphrodites. The author identifies the optimal broodstock size and the appropriate candidate species for bait. He shows that the analysis of steriles and mutants has demonstrated the value of fishes as a system for genetic dissection of human development and diseases.

Polyploidy and Genome Evolution Pamela Soltis 2012-10-03

Polyploidy - whole-genome duplication (WGD) - is a fundamental driver of biodiversity with significant consequences for genome structure, organization, and evolution. Once considered a speciation process common only in plants, polyploidy is now recognized to have played a major role in the structure, gene content, and evolution of most eukaryotic genomes. In fact, the diversity of eukaryotes seems closely tied to multiple WGDs. Polyploidy generates new genomic interactions - initially resulting in "genomic and transcriptomic shock" - that must be resolved in a new polyplid lineage. This process essentially acts as a "reset" button, resulting in genomic changes that may ultimately promote adaptive speciation. This book brings together for the first time the conceptual and theoretical underpinnings of polyplid genome evolution with syntheses of the patterns and processes of genome evolution in diverse polyplid groups. Because polyploidy is most common and best studied in plants, the book emphasizes plant models, but recent studies of vertebrates and fungi are providing fresh perspectives on factors that allow polyplid speciation and shape polyplid genomes. The

emerging paradigm is that polyploidy - through alterations in genome structure and gene regulation - generates genetic and phenotypic novelty that manifests itself at the chromosomal, physiological, and organismal levels, with long-term ecological and evolutionary consequences.

Effects of Behavioral Interaction on Sex Determination in the Midas Cichlid Ronald G. Oldfield 2007

Selection and Breeding Programs in Aquaculture Trygve Gjedrem 2005-04-13 Although aquaculture as a biological production system has a long history, systematic and efficient breeding programs to improve economically important traits in the farmed species have rarely been utilized until recently, except for salmonid species. This means that the majority of aquaculture production (more than 90 %) is based on genetically unimproved stocks. In farm animals the situation is vastly different: practically no terrestrial farm production is based on genetically unimproved and undomesticated populations. This difference between aquaculture and livestock production is in spite of the fact that the basic elements of breeding theory are the same for fish and shellfish as for farm animals. One possible reason for the difference is the complexity of reproductive biology in aquatic species, and special consideration needs to be taken in the design of breeding plans for these species. Since 1971 AKVAFORSK, has continuously carried out large scale breeding research projects with salmonid species, and during the latest 15 years also with a number of fresh water and marine species. Results from this work and the results from other institutions around the world have brought forward considerable knowledge, which make the development of efficient breeding programs feasible. The genetic improvement obtained in selection programs for fish and shellfish is remarkable and much higher than what has been achieved in terrestrial farm animals.

Physiology and Ecology of Fish Migration Hiroshi Ueda

2013-08-07 Among the roughly 30,000 species of fish, migratory

species account for only 165 species, but most of them are very important fisheries resources. This book presents up-to-date innovative research results on the physiology and ecology of fish migration. It focuses on salmon, eels, lampreys, and bluefin tuna.

The book examines migratory behavior, sp

Sexuality in Fishes T. J. Pandian 2010-09-15 The unprecedented level of diversity recorded among the clones of self-fertilizing gynogenetic unisexuals and self-fertilizing simultaneous hermaphrodites challenges current ideas on the predominant role of recombination in promoting evolution of biological diversity. Though limited to a few species, the existence of self-fertilizing and cyclical sex changing hermaphrodites remains a puzzle to many geneticists and endocrinologists. Within a few days after the removal of a harem master or mistress, a successor changes sex and takes over the harem; the causes for the sex changing mechanism pose many challenges to socio-ecologists and behaviour specialists. This book is a synthesis of relevant and recent information on sexuality of fishes and points towards new directions of desired research.

Reproduction and Development in Mollusca T. J. Pandian

2018-09-07 This book is perhaps the first attempt to comprehensively project the uniqueness of molluscs, covering almost all aspects of reproduction and development from aplousobranchs to vampyromorphic cephalopods. Molluscs are unique for the presence of protective external shell, defensive inking, geographic distribution from the depth of 9,050 m to an altitude of 4,300 m, gamete diversity, the use of nurse eggs and embryos to accelerate the first few mitotic divisions in embryos, the natural occurrence of androgenesis in a couple of bivalves, viable induced tetraploids, gigantism induced by elevated ploidy, the complementary role played by mitochondrial genome in sex determination by nuclear genes and the uptake and accumulation of steroid hormone from surrounding waters. In molluscs, sexuality comprises of gonochorism (24%), protandry (

Theriogenology Rita Payan-Carreira 2017-09-06 Theriogenology, the field that studies animal reproductive health and disease, is a challenging field that shows a steady growth. It covers diverse aspects of reproduction in domestic and wild animals, including the assisted reproductive techniques, which have enormously enhanced the ability to rescue endangered species and provide a strong support to the high reproductive efficiency requested by livestock production. Reproductive success, as well as infertility, is the culmination of complex physiological and adaptive processes that guarantee, at the end, a species' ability to reproduce and its survival in a challenging and ever-changing environment. In this book, we present to you a collection of manuscripts exploring various aspects of the reproductive function of mammal and marine species. I hope you find this a useful book in your collection.

The Israeli Journal of Aquaculture 1998

Ichthyology Devendra Nath Saksena 1999 This volume provides a comprehensive survey of the biology of fish. It also includes contemporary studies in environmental changes affecting fish.

Mechanisms of Life History Evolution Thomas Flatt

2011-05-12 Life history theory seeks to explain the evolution of the major features of life cycles by analyzing the ecological factors that shape age-specific schedules of growth, reproduction, and survival and by investigating the trade-offs that constrain the evolution of these traits. Although life history theory has made enormous progress in explaining the diversity of life history strategies among species, it traditionally ignores the underlying proximate mechanisms. This novel book argues that many fundamental problems in life history evolution, including the nature of trade-offs, can only be fully resolved if we begin to integrate information on developmental, physiological, and genetic mechanisms into the classical life history framework. Each chapter is written by an established or up-and-coming leader in their respective field; they not only represent the state

of the art but also offer fresh perspectives for future research. The text is divided into 7 sections that cover basic concepts (Part 1), the mechanisms that affect different parts of the life cycle (growth, development, and maturation; reproduction; and aging and somatic maintenance) (Parts 2-4), life history plasticity (Part 5), life history integration and trade-offs (Part 6), and concludes with a synthesis chapter written by a prominent leader in the field and an editorial postscript (Part 7).

Biology of Butterflyfishes Morgan S. Pratchett 2013-09-11

Butterflyfishes (family Chaetodontidae) are a highly conspicuous component of fish fauna on coral reefs throughout the world. In light of their strong dependence on coral, they are often regarded as the epitome of coral reef fishes. This volume examines the ecology and conservation of coral reef butterflyfishes. It provides important insights on their evolution and key events and adaptations that have led to their proliferation within coral reef ecosystems. Key to the longevity of butterflyfishes is the evolution of coral-feeding—a central focus of the ecological chapters in this volume. The book also highlights key threats and challenges related to the conservation of butterflyfishes and ends with an overview of current and future research directions.

Sex Control in Aquaculture Hanping Wang 2018-11-08 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.

Reproduction and Development in Platyhelminthes T. J. Pandian
2020-01-28 This book is a comprehensive elucidation on aspects of reproduction and development in platyhelminthes covering from acoelids to taeniids. With the unique presence of neoblasts, turbellarians serve as a model for studies on cancer and

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senescence. Of ~ 27,000 species, ~ 77% are parasites; they are harmful to man and his food basket from livestock and fish. The stress hormone, cortisol level is responsible for susceptibility and resistance of the host. In digeneans, the propagatory multiplication potency is retained by all the larval forms and in either direction in sporocyst. The higher clonal diversity, mixing and selection in Second Intermediate Host (SIH) may purge inbreeding depression suffered by the fluke on propagatory multiplication in First Intermediate Host (FIH). Of 12,012 digeneans, 88% may engage 33,014 potential SIH species. They have the choice to select one among the available/awaiting 3.5 host species. The motility of vertebrate host and euryxenic flexibility/scope for selection of SIH species has increased lineage diversification in digeneans. The life cycle of cestodes is divided into aquatic and terrestrial patterns. The former includes (i) oncosphere and (ii) coracidium types and the latter (iii) hexacanth-cysticercoid, (iv) hexacanth-tetrathyridium and (v) hexacanth-cysticercus types. The share for the oncosphere, coracidium and hexacanth types is 17.0, 29.5 and 46.5%, respectively. The staggering fecundity and adoption of the intermediate host in the herbivorous/insectivorous food chain have enriched Taenioidea as the most (2,264) speciose order. Sex specific genes *Smed-dmd 1* and *macbol* have been identified, and neuropeptides and dipeptides are involved in sexualization. Trematodes are unable to parasitize elasmobranchs, as they cannot suck body fluid/blood containing a high level of urea. Relatively higher fecundity supplemented with propagatory multiplication, incorporation of SIH in 88% species, clonal selection in SIH, and euryxenic flexibility and the widest choice for selection of SIH have led to the highest lineage diversification to render digeneans as the most speciose order in Platyhelminthes.

Fish Energetics Peter Tytler 2012-12-06 It is almost thirty years since Professor G. G. Winberg established the basis for

experimental studies in fish energetics with the publication of his monograph, *Rate of Metabolism and Food Requirements of Fishes*. His ultimate aim was to develop a scientific approach to fish culture and management, and the immense volume of literature generated in the ensuing years has been mainly in response to the demand for information from a rapidly expanding, world-wide aquaculture industry and to the shortcomings of contemporary practices in fisheries management. The purpose of this book is not to review this literature comprehensively, but, assuming an informed readership, to focus attention on topics in which new knowledge and theory are beginning to be applied in practice. Most emphasis has been placed on food; feeding; production (growth and reproduction) and energy budgeting, as these have most influence on the development of fish culture. Some chapters offer practical advice for the selection of methods, and warn of pitfalls in previous approaches. In others the influence of new theory on the interpretation of studies in fish energetics is discussed in the context of resource allocation and adaptation. We hope that the scope of material presented here will have sufficient interest and value to help significantly to fulfil Winberg's original objectives.

Naga 1989

Tropical Fish Hobbyist 2007

Aquaculture and Biotechnology I. Karunasagar 1999

Aquaculture and Biotechnology deals with biotechnological approaches to disease diagnosis, pathogen detection, antibacterial therapy, immunoprophylaxis of disease and sex manipulation of fish.

North American Journal of Aquaculture 2006

Environmental Sex Differentiation in Fish T. J. Pandian

2014-12-22 Fish constitute an important natural renewable resource and any reduction in their ability to propagate as a result of human interference may have significant socioeconomic consequences. The negative effect of human activity on sex

differentiation and reproductive output in fish is so diverse that it has been difficult to encompass it in a single book. This book serves as the first attempt to do so. Unlike in mammals, the expression of a host of sex differentiation genes in fish is mostly controlled by environmental factors. Not surprisingly, environmental sex differentiation is ubiquitous in fish. Overexploitation by capture fisheries does not disrupt sex differentiation but crowding in aqua-farms does, by reducing accessibility to food supply. Some of the man-made chemicals routinely used worldwide mimic endogenous hormones. For example endosulfan, which is widely used in developing countries, disrupts endogenous hormones and feminizes fish. For the first time, this book views endocrine disruption from the point of labile early life and non-labile adult stages. It shows that sex can irreversibly be reversed, when exposed to endocrine disrupting chemicals (EDCs) during early labile stages but reversibly impairs reproductive output on exposure to EDCs during non-labile adult stage. A consequence of climate change, elevated temperature, and declining oxygen and pH levels is that it masculinises genetic female fish. Fish display a remarkable ability to postpone the labile period. Besides postponement, some primary and tertiary gonochores have two distinct labile periods amenable to temperature and hormonal manipulations. Hermaphrodites have retained the period until the end of the adult stage and are capable of sex change/reversal more than once in both male and female directions.

Evolution and Speciation in Fungi and Eukaryotic

Biodiversity T. J. Pandian 2023-10-13 Being sessile like autotrophic plants and heterotrophs as animals, fungi are fascinating eukaryotes. In them, the need for external digestion has demanded surface expansion and limited tissues to 2/y. The mycorrhizas facilitate 85% angiosperms to acquire water and minerals, enhance productivity and fight against drought and pollutants. During the geological past, lichens have weathered

rock and formed the present landscape. Only 121 fungal species excrete digestive enzymes to meet industrial demand. The beneficial fungi contribute 1,000 billion US\$. Parasitic fungi cause 1.6 million human deaths and > 20% loss of commercial crops. Despite their ecological and economic importance, no university offers a degree course in Mycology. For 2,056,907 eukaryotic species, this book elaborates the role played by environmental factors (i) spatial distribution, (ii) light-temperature, (iii) precipitation-liquid water and biological attributes, (iv) cellularity, (v) symmetry, (vi) clonality, (vii) sexuality, (viii) modality and (ix) motility that either accelerate or decelerate biodiversity. About 20 and 80% eukaryotes are aquatics and terrestrials. Decreasing light intensity and temperature reduce diversity from the equator toward the polar zones. Water availability also reduces the diversity from 5.4 - 65.5 species/km² in tropical evergreen forests to 2 in deserts and polar zones. Unicellularity and radial symmetry decelerate the diversity to 200 in mammals reduce clonality from 100 to 0%. Strategies developed by eukaryotes reduce selfing by

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and explores the platforms and strategies to ensure an enriching reading experience.

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