

## Article

# Reproductive Behavior and Sexual Patterns in Two Cales, *Heteroscarus acroptilus* and *Olisthops cyanomelas* (Odacidae) at Rocky Reefs in Temperate Australia

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**Abstract:** We investigated reproductive behavior and sexual patterns in two odacid fish—Rainbow cale *Heteroscarus acroptilus* and Herring cale *Olisthops cyanomelas*—inhabiting temperate reefs in Australia on the basis of underwater observations and histological studies. The males of both species established a territory and continuously courted females they encountered in the territory. The males and females went up in the water column to release gametes in pairs. We found ovarian cavities in the gonadal tissue of *H. acroptilus* males, suggesting that protogynous sex change occurred in this species. Dichromatism is reported in *O. cyanomelas*, with males having a dark blue body color while females have a brown body color; however, we found small mature males also included among brown individuals. Furthermore, we diagnosed *O. cyanomelas* with gonochorism, which is rare in closely related labrids. We compared the similarities and differences in reproductive behavior and sexual patterns between the two species and with labrids.

**Keywords:** spawning ecology; reproductive tactics; sex reversal; protogyny; gonochorism; monoandry; hermaphroditism; gonadal tissue; southern hemisphere; Tasman Sea

**Key Contribution:** We revealed the reproductive behavior of odacid fish through underwater observations for the first time. We found two sexual patterns of protogyny and gonochorism in two odacid species.



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## 1. Introduction

Odacidae is one of three families in Labriformes [1], in which six genera with 12 species are reported [2]. All odacid species are distributed along the southern coast of Australia or New Zealand, inhabiting seaweed beds on temperate shallow rocky reefs. Labridae is also a family in Labriformes, in which some 71 genera with more than 500 species are recorded from tropical to temperate regions of the Atlantic, Indian and Pacific Oceans [1]. Recent molecular phylogenetic studies have reported that odacids are deeply nested within the labrid tribe Hypsigerynini [3,4]. Studying the reproductive behavior and sexual patterns of odacids that have evolved in isolated areas is crucial not only for understanding the diversity and uniqueness observed in those regions, but also for elucidating the evolution of reproductive behavior and sexual patterns of labrids that have diversified in the oceans around the world.

Ecological studies on odacids have included butterflyfish *Calix pulfus* inhabiting rocky reefs in New Zealand, with reports on the influence of season, ontogeny, and tide on diet [5], otolith-based age estimation, sex-specific growth, longevity, and age-based reproductive events [6], and temperature-related variations in growth rate, size, maturation, and life span [7]. Furthermore, a histological study revealed that the sexual ontogeny of *O. pulfus*

# Patterns Of Reproductive Behavior

**Douglas Braun-Harvey, Michael A.  
Vigorito**



## **Patterns Of Reproductive Behavior:**

**Patterns of Reproductive Behavior** Desmond Morris,1970      [Patterns of Reproductive Behavior](#) Desmond Morris,1970      **Animal Models of Reproductive Behavior** Raúl G. Paredes,Wendy Portillo,Marie Bedos,2023-05-16 This volume presents the latest techniques to study several aspects of reproductive behavior in different species The chapters in this book cover topics such as methods to investigate social behavior sexual motivation and reward both of which are fundamental for the initiation of sexual behavior olfactory signaling different characteristics and models of reproductive function and parental behavior in both rats and rabbits In the Neuromethods series style chapters include the kind of detail and key advice from the specialists needed to get successful results in your laboratory Cutting edge and practical **Animal Models of Reproductive Behavior** is a valuable resource for both experienced researchers and students who want to incorporate new techniques into their studies of reproductive behavior      **Reproductive Behavior** William Montagna,1974-09-01 Sexual compatibility between male and female partners is in dispensable to normal and successful fertilization in mammals Thus the genes from males and females whose sexual behavior is characterized by awkwardness ineptness and miscues are elimi nated from the gene pool of the species In human societies this compatibility is not always evident and the behavior that precedes and accompanies copulation and fertilization is exceed ingly complex and affected by many variables As in most other species of animals the entire repertoire of reproductive behavior of man is not well understood by man When viewed discussed or reported the topic is too often and most unfortunately regarded as an amalgam of emotion mysticism and biology In the past such emotion charged approaches to the biologi cal fact of reproduction did much to obfuscate the subject and as a result much of the array of hormonal neural psychological and social variables that control and insure the successful repro duction of the human species remains even now in Victorian ignor ance But with the recent rash of books and scientific treatises on the subject some progress has been made in elucidating human reproduction and associated sexual behavior However so entrench ed are some of our social taboos that the danger still lurks of equating social acceptance of the words with an understandin all too lacking of the process to which they refer

**Patterns of Reproductive Behaviour** ,1972      **The Ontogenesis of the Reproductive Behavior Pattern** Chauncey MacKinley Louttit,1929      **Experiential Background for the Induction of Reproductive Behavior Patterns by Hormones** Daniel S. Lehrman,1971      **Reproductive Behavior and Evolution** J. Rosenblatt,2013-06-29 The Daniel S Lehrman Memorial Symposia Series will publish the proceedings of symposia devoted to the evolution development and organization of behavior These various symposia will bring together at intervals scientists studying problems from each of these view points The aim is to attempt to integrate our knowledge derived from these different sources and to familiarize scientists working on similar behavior patterns with the work of their colleagues in related fields of study Each volume therefore will be devoted to a specific topic in the field of animal behavior which will be explored with respect to its

evolutionary aspects including the adaptive nature of the behavior with respect to its developmental aspects including neural hormonal and experiential influences and with respect to the analysis of features of organization including motivational perceptual and motor aspects and their physiological bases It is our feeling that the most appropriate memorial to our colleague and close friend Daniel S Lehrman is the continuation of his valuable contributions toward integrating these approaches to the study of animal behavior which he pursued so effectively during his own life Daniel S Lehrman's lifelong love and study of animal behavior gave us a wealth of new insights into reproductive behavior and evolution It is therefore appropriate that the first symposium of this series is devoted to recent advances in this field

*Vision in Cephalopods, Volume II* Daniel Osorio, Chuan-Chin Chiao, Frederike Diana Hanke, 2021-09-29

**Patterns of Sexual Behavior** Clellan Stearns Ford, Frank A. Beach, 1972

*Treating Out of Control Sexual Behavior* Douglas Braun-Harvey, Michael A. Vigorito, 2015-11-05

Out of control sexual behavior referred to variously as sex addiction sexual compulsivity and hypersexuality among other terms has been a controversial and attention getting issue since it first captured both public and professional attention over 30 years ago Previous discussions of this behavior have been grounded in conceptualizing it as a pathologized medical issue on par with substance abuse addictions or in backlash as simply irresponsible behavior indicating weakness in the individual In keeping with the call from many leaders in the mental health and sexual health areas to move beyond these two polarized conceptualizations of these sexual behavior problems the authors present a model for working with clients in both group and individual treatment settings Based on their experience with hundreds of clients this book provides a comprehensive and practical conceptualization of out of control sexual behavior framed as a sexual health problem within a larger model of human behavior not a psychiatric or addictive disorder The book includes step by step tools for assessment treatment planning as well as treatment implementation It describes a process for professionals to guide clients to define and be accountable for their own personal vision of sexual health as the foundation on which they regain sexual behavior control The authors provide rich and varied composite case examples based on 20 years of clinical experience that demonstrate clinician sexual health treatment conversations and tools as well as stories of hope and guidance so essential to individuals wanting to understand how sexual health can be the essential ally in changing their sexual behavior

**Biology of Animal Behavior** James W. Grier, 1984

[Encyclopedia of Fish Physiology](#), 2011-06-01

Fish form an extremely diverse group of vertebrates At a conservative estimate at least 40% of the world's vertebrates are fish On the one hand they are united by their adaptations to an aquatic environment and on the other they show a variety of adaptations to differing environmental conditions often to extremes of temperature salinity oxygen level and water chemistry They exhibit an array of behavioural and reproductive systems Interesting in their own right this suite of adaptive physiologies provides many model systems for both comparative vertebrate and human physiologists This four volume encyclopedia covers the diversity of fish physiology in over 300 articles and provides entry level information for students and

summary overviews for researchers alike Broadly organised into four themes articles cover Functional Thematic and Phylogenetic Physiology and Fish Genomics Functional articles address the traditional aspects of fish physiology that are common to all areas of vertebrate physiology including Reproduction Respiration Neural Sensory Central Effector Endocrinology Renal Cardiovascular Acid base Balance Osmoregulation Ionoregulation Digestion Metabolism Locomotion and so on Thematic Physiology articles are carefully selected and fewer in number They provide a level of integration that goes beyond the coverage in the Functional Physiology topics and include discussions of Toxicology Air breathing Migrations Temperature Endothermy etc Phylogenetic Physiology articles bring together information that bridges the physiology of certain groupings of fishes where the knowledge base has a sufficient depth and breadth and include articles on Ancient Fishes Tunas Sharks etc Genomics articles describe the underlying genetic component of fish physiology and high light their suitability and use as model organisms for the study of disease stress and physiological adaptations and reactions to external conditions Winner of a 2011 PROSE Award Honorable Mention for Multivolume Science Reference from the Association of American Publishers The definitive encyclopedia for the field of fish physiology Three volumes which comprehensively cover the entire field in over 300 entries written by experts Detailed coverage of basic functional physiology of fishes physiological themes in fish biology and comparative physiology amongst taxonomic Groups Describes the genomic bases of fish physiology and biology and the use of fish as model organisms in human physiological research Includes a glossary of terms

**The Journal of Comparative Psychology** ,1923 **Third International Symposium on Reproductive Physiology of Fish** Memorial University of Newfoundland. Marine Sciences Research Laboratory,1987 **Space Partition within Aquatic Ecosystems** Gérard Balvay,2012-12-06 Proceedings of the Second International Congress of Limnology and Oceanography held in Evian May 25 28 1993 Human Reproduction and Sexual Behavior Richard Evan Jones,1984 Introduction to human reproduction and sexual behavior The female and male reproductive systems The Brain and Pituitary Gland The adult female reproductive system The adult male reproductive system Sexual differentiation and development Puberty Procreation The menstrual cycle Gamete transport and fertilization Pregnancy Labor and Birth The neonate and the new parents Human genetics Medical aspects of human reproduction Contraception Induced abortion Infertility Sexually transmitted diseases Human sexual behavior The human sexual response Patterns of human sexual behavior The psychology and sociology of sexual behavior Human population growth and family planning **The Reproductive Physiology of Mammals** Keith K. Schillo,2009 Reproductive Physiology of Mammals From Farm to Field and Beyond explores the fundamental principles of mammalian reproductive biology in the context of a society that values the management of the reproductive activity of human and nonhuman animals The format of the book is compatible with traditional approaches to teaching courses in reproductive physiology but emphasizes basic biological principles and comparative analyses of reproductive physiology This departure from tradition is intended to accommodate studentsa growing interests in companion

and wild animals and provide expertise that allows students to pursue careers that require literacy in basic science

Addressing Problematic Sexual Behaviors in Children Genevieve Naquin, 2024-11-19 A much needed manual for clinicians and those in the helping professions who work with children and graduate students training to work with children

**Health Promotion Throughout the Life Span - E-Book** Carole Lium Edelman, Elizabeth Connelly Kudzma, 2021-10-20 Selected for Doody's Core Titles 2024 with Essential Purchase designation in Patient Education Master health promotion for all ages and population groups Health Promotion Throughout the Life Span 10th Edition provides comprehensive coverage of leading health promotion concepts from assessment to interventions to application Its lifespan approach addresses patients unique needs with case studies and care plans presented within an assessment framework based on Gordon's Functional Health Patterns Addressing each age and stage of development this market leading text covers the latest research and trends in health promotion and disease prevention for diverse population groups Coverage of growth and development addresses health promotion concepts for each age and each stage of development through the lifespan Case studies present realistic situations with questions that challenge you to apply key concepts to further develop clinical judgment Think About It clinical scenarios at the beginning of each chapter include questions to encourage clinical judgment Research for Evidence Based Practice boxes summarize current health promotion studies showing the links between research theory and practice Hot Topics boxes introduce significant issues trends and controversies in health promotion Separate chapters on population groups the individual family and community highlight the unique aspects of assessment and health promotion for each group Quality and Safety Scenario boxes focus on QSEN related competencies with examples of health promotion Innovative Practice boxes outline unique and creative health promotion programs and projects currently being implemented Health and Social Determinants Health Equity boxes address cultural perspectives relating to planning care NEW Greater emphasis on health equity highlights the need to make health promotion accessible to all NEW Increased focus on diversity and inclusion better reflects the communities being served NEW Veteran's health content is incorporated throughout as appropriate NEW Discussions of Healthy People 2030 initiatives and objectives address national health issues and priorities NEW Updated diagnosis terminology includes ICD-10 diagnoses or patient problems NEW Affordable Care Act references are more general to reflect changing politics

## Decoding **Patterns Of Reproductive Behavior**: Revealing the Captivating Potential of Verbal Expression

In a period characterized by interconnectedness and an insatiable thirst for knowledge, the captivating potential of verbal expression has emerged as a formidable force. Its power to evoke sentiments, stimulate introspection, and incite profound transformations is genuinely awe-inspiring. Within the pages of "**Patterns Of Reproductive Behavior**," a mesmerizing literary creation penned by way of a celebrated wordsmith, readers set about an enlightening odyssey, unraveling the intricate significance of language and its enduring affect our lives. In this appraisal, we shall explore the book is central themes, evaluate its distinctive writing style, and gauge its pervasive influence on the hearts and minds of its readership.

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