

Comparative Reproduction Content and Volume Overview

Michael K Skinner, Center for Reproductive Biology, School of Biological Sciences, Washington State University, Pullman, WA, United States

Ina Dobrinski, Department of Biochemistry & Molecular Biology, Cumming School of Medicine, University of Calgary, Calgary, AB, Canada

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This is an update of Penny Swanson, Michael K. Skinner, Content and Volume Overview, Editor(s): Michael K. Skinner, Encyclopedia of Reproduction (Second Edition), Academic Press, 2018, Pages 1–2, ISBN 9780128151457, <https://doi.org/10.1016/B978-0-12-811899-3.20528-4>.

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Abstract

The Comparative Reproduction Volume 6 of the Encyclopedia of Reproduction third edition has multiple sections to separate the various chapters and focus on the various topics involved. Although a number of reviews of the topic have been published for the experts and research scientists in the area, the current Encyclopedia and Volumes are summaries of the key topics for students and non-experts as an educational resource in the biology of reproduction. A brief summary of each section and the chapters involved is provided. The objective is to provide an overview and clarify the relationships of the different topics.

Key Points

- Overview Volume 6.
- Summary Integration Chapters.

Overview

Volume 6 is focused on Comparative Reproduction in all species and phylogeny where reproduction has been investigated. The focus is mainly on non-mammalian species due to Volume 1–5 being focused on mammalian reproduction. The first section of Volume 6 is Modes of Reproduction which involves chapters on sexual reproduction, asexual / unisexual reproduction in plants and animals. Hermaphroditism, viviparity and oviparity in vertebrates and invertebrates are presented. Reproductive strategies and tactics are reviewed (Swanson and Skinner, 2018) with new literature and information presented.

An initial section involves Reproductive Behavior in a variety of species including birds, invertebrates, insects, fish, turtles, and mammals. The sexual behavior reviewed includes mate choice and sexual selection, courtship and mating, communication (e.g. song), migration and navigation, nesting, brooding and parental behavior.

The Development and Anatomy of Reproduction section presents a focus on comparative analysis between species such as plants and insects. The mammary glands, placenta and accessory sex glands are tissues compared between species. The Primordial Germ Cells, Sex Determination and Differentiation section involves a variety of species including fish, drosophila, vertebrates, amphibians, reptiles, birds and insects. Primordial germ cell development, sex determination, environmentally induced sex determination and sex reversal are reviewed in the different species. The Gamete Structure section reviews egg and sperm in vertebrates and invertebrates. The Oogenesis and Ovulation section reviews these processes in fish, reptiles, birds, insects and echinoderms. Oocyte maturation is compared and impacts on reproduction reviewed. The Maternal Reserves section reviews maternal RNA, vitellogenesis and yolk proteins in fish, drosophila, birds, insects, crustaceans and molluscs. The comparative reproduction of maternal reserves is reviewed.

The Spermatogenesis and Spermiogenesis section reviews the topic in fish, elasmobranchs, birds, insects, crustaceans and molluscs. A detailed comparison is made for each to identify similarities and differences in male germ cell development. The Fertilization section compares the fertilization, sperm storage and delayed fertilization in numerous species. The Endocrine Control of Reproduction reviews the comparative pituitary gland cellular organization in vertebrates. In addition, the endocrine control of reproduction in fish, birds, amphibians, reptiles, insects, crustaceans and molluscs is reviewed.

A number of reproductive physiology topics are reviewed in the Seasonal Reproduction section for photoperiodism, in the Puberty and Metamorphosis to Reproduction section and in the Pregnancy and Parturition section in fish, birds, mammals,

insects, reptiles, and amphibians. The Olfaction and Reproduction section reviews pheromones and olfactory imprinting and homing in fish, insects and mammals.

The Overview of Reproduction by Phylogeny section reviews the topic in sponges, corals, jellyfish, flatworms, round worms, *C. elegans*, rotifer, molluscs, insects, crustaceans, centipedes, sea stars, sea urchins, tunicates, fish, sharks, rays, sturgeons, bony fish, frogs, alligators, turtles, birds, monotremes, marsupials, mammals and plants. This section provides an extensive comparative reproduction overview for each.

The Reproduction, Exotics / Zoo Animals / Wildlife section reviews reproduction in a variety of species. The reproduction in penguins, hyena, alligators, crocodiles, elephants, snakes, primates and deer are presented. In addition, the General Reproduction in Lab Animals section presents common lab models and associated reproduction. This includes *C. elegans*, *drosophila*, cockroaches, tobacco horn worm, sea urchin, zebrafish and rodents.

The Genetics and Epigenetics in Life History and Reproduction section reviews several very interesting models. This includes honey bees, fish, oysters, and the genetic selection of reproductive traits in animals. The Energetics / Nutrition in Reproduction section covers various species like fish and birds. Hibernation and lactation are other physiological processes reviewed.

The final section on Reproductive Technologies in non-human / non-primate species examines a variety of technologies. Germ cell transplantation in fish is reviewed. Gamete preservation in a variety of species is reviewed. Reproductive cloning in a number of different species is also presented. Captive breeding in wildlife, mammals, birds, fish, amphibians and reptiles is reviewed. Sex control and sterilization in species such as fish is presented. In addition, methods for sterilization and contraception in mammals and wildlife are reviewed.

The breadth, quality and educational impact of this Volume 6 of the Encyclopedia of Reproduction is solely due to the chapter authors who are internationally recognized authorities on the topics and contributed significantly to the scientific advances in the field. All are active researchers that have made major contributions in the area of Comparative Reproduction. The authors and contributions to this volume are very much appreciated.

Summary

Overview of the Volume 6 Comparative Reproduction involves the topics and sections of modes of reproduction in a wide variety of organisms from plants to mammals. Comparative aspects are presented in reproductive behavior, development and anatomy of reproductive organs, sex determination and differentiation, gamete structure, oogenesis and ovulation, maternal reserves, spermatogenesis, fertilization, endocrinology, seasonal reproduction, puberty and metamorphosis, pregnancy and parturition, phylogeny of reproduction, wildlife and lab animals reproduction, and reproductive technology.

References

Swanson, P., Skinner, M.K., 2018. Content and volume overview. In: Skinner, M.K. (Ed.), *Encyclopedia of Reproduction*, second ed. Elsevier.