

male chicken reproductive system

male chicken reproductive system is a fascinating and intricate part of avian biology that plays a crucial role in the reproduction and fertilization processes of chickens. Understanding the structure and function of the male chicken's reproductive organs provides valuable insights into poultry breeding, genetics, and overall avian physiology. Unlike mammals, male chickens, or roosters, have unique reproductive features adapted to their avian nature, which influences their breeding behaviors, reproductive success, and the management practices used in poultry farming.

Overview of the Male Chicken Reproductive System

The male chicken reproductive system is primarily designed for the production of sperm and the fertilization of eggs. It is composed of several specialized organs that work together to produce, store, and deliver sperm during copulation with hens. Although comparatively simpler than mammalian systems, it exhibits unique characteristics suited to avian reproduction.

Key Components of the Male Chicken Reproductive System

The main organs and structures involved in the male chicken reproductive system include:

Testes

- Located internally near the backbone, within the abdominal cavity.
- Usually, only one testis is active at a time, with the left testis being larger and more functional.
- Responsible for producing sperm and testosterone, the male sex hormone.

Vas Deferens

- A tube that transports sperm from the testes to the cloaca.
- Runs along the backbone and is involved in storing and conveying sperm during copulation.

Cloaca

- A common opening for the digestive, urinary, and reproductive tracts.
- The site where sperm is transferred to the hen during mating.
- Contains the cloacal bursae, which are involved in reproductive functions.

Seminal Vesicles and Accessory Glands

- Unlike mammals, male chickens have minimal accessory glands.
- Some species may possess small seminal vesicles contributing to seminal fluid.

Testicular Anatomy and Function

The testes are the primary reproductive organs in male chickens, and their anatomy is adapted for efficient sperm production.

Location and Structure

- Situated internally near the kidneys and along the dorsal body wall.
- Composed of seminiferous tubules where spermatogenesis occurs.
- The testes increase in size during the breeding season and regress afterward.

Spermatogenesis Process

- Germ cells in the seminiferous tubules divide and mature into spermatozoa.
- Spermatogenesis is influenced by hormonal signals, primarily testosterone.
- Mature sperm are stored briefly in the epididymis (though in chickens, the epididymis is not well-developed; sperm are stored in the vas deferens).

Sperm Production and Storage

The efficiency of sperm production and storage directly impacts breeding success in poultry.

Sperm Production

- Occurs continuously during the breeding season.
- The testes produce millions of sperm daily.

Sperm Storage

- Sperm are stored temporarily in the vas deferens.
- The vas deferens acts as a reservoir, releasing sperm during copulation.

Copulation and Fertilization Process

Understanding how sperm are transferred and fertilization occurs is essential in poultry breeding.

The Copulatory Process

- Roosters mount hens and align their cloacae.
- During copulation, the rooster everts his cloaca (called the cloacal kiss) to transfer sperm.
- This process is quick, often lasting only a few seconds.

Fertilization

- Sperm travel through the hen's reproductive tract to fertilize the ovum in the oviduct.
- Fertilization typically occurs in the infundibulum, the first part of the oviduct.
- Once fertilized, the egg proceeds through the oviduct, developing a shell before being laid.

Reproductive Hormones and Regulation

Hormonal control is vital for regulating reproductive functions.

Testosterone

- The primary male sex hormone.
- Regulates spermatogenesis, secondary sexual characteristics, and mating behaviors.

Gonadotropins

- Luteinizing hormone (LH) stimulates testosterone production.
- Follicle-stimulating hormone (FSH) supports spermatogenesis.

Seasonal Variations

- Reproductive activity varies with seasons, influenced by daylight length.
- Testicular size and sperm production peak during the breeding season.

Factors Affecting Male Reproductive Efficiency

Several factors can influence the reproductive capacity of roosters, including:

- **Age:** Optimal fertility occurs at certain ages; too young or old roosters may have reduced fertility.
- **Health and Nutrition:** Proper diet and health are vital for hormone production and sperm quality.
- **Environmental Conditions:** Light exposure, temperature, and stress levels affect reproductive activity.
- **Genetics:** Breed differences influence reproductive traits and fertility rates.

Reproductive Challenges in Male Chickens

Despite their robust reproductive system, male chickens may face issues that impair fertility:

Sperm Abnormalities

- Poor motility, abnormal morphology, or low sperm count can reduce fertilization success.

Testicular Degeneration

- Can occur due to age, disease, or environmental stress, leading to decreased sperm production.

Infections and Diseases

- Bacterial or viral infections can damage reproductive organs and impair function.

Behavioral Factors

- Mating behaviors influenced by social hierarchy or environment may affect fertilization rates.

Modern Perspectives and Breeding Practices

Advances in poultry breeding focus on enhancing reproductive efficiency and genetic quality.

Selective Breeding

- Selecting roosters with desirable reproductive traits improves flock fertility.

Artificial Insemination

- Used in commercial settings to increase fertilization rates, especially when natural mating is less effective.

Reproductive Monitoring

- Regular assessment of sperm quality, testicular size, and behavior helps manage reproductive health.

Conclusion

The male chicken reproductive system is a highly specialized and efficient biological structure essential for poultry reproduction. Its components—from the testes to the vas deferens—work harmoniously to produce, store, and deliver sperm, ensuring successful fertilization of eggs. Understanding this system not only deepens our appreciation of avian biology but also informs better management and breeding strategies in poultry farming. As research advances, further insights into the reproductive physiology of chickens will continue to enhance productivity and genetic improvement in the poultry industry.

Keywords: male chicken reproductive system, rooster anatomy, spermatogenesis in chickens, avian reproduction, poultry breeding, fertilization in chickens, rooster fertility, reproductive organs of male birds

Frequently Asked Questions

What are the main components of the male chicken reproductive system?

The main components include the testes, epididymis, vas deferens, cloaca, and the phallus (also called the copulatory organ).

How do the testes function in male chickens?

The testes produce sperm and testosterone; they are located internally near the kidneys and are essential for reproduction and secondary sexual characteristics.

What is the role of the cloaca in the male chicken's reproductive system?

The cloaca serves as the common passage for eggs, feces, and reproductive fluids; during copulation, sperm is transferred through the cloaca to the hen.

Do male chickens have a penis or phallus for mating?

Unlike many animals, male chickens do not have a penis; they use their cloaca to transfer sperm during cloacal contact in a process called 'cloacal kissing'.

How is sperm stored in male chickens?

Sperm produced in the testes is stored temporarily in the epididymis and vas deferens before being transferred during mating.

At what age do male chickens typically become reproductively active?

Male chickens usually reach sexual maturity around 16 to 20 weeks of age, depending on the breed and environmental factors.

What factors can affect the reproductive health of male chickens?

Factors include nutrition, environmental conditions, stress levels, disease, and genetics, all of which can impact sperm production and fertility.

How can breeders assess the fertility of a male chicken?

Fertility can be assessed through semen analysis, observing mating behavior, and conducting fertility tests by incubating eggs fertilized by the rooster.

Additional Resources

Male Chicken Reproductive System: An In-Depth Expert Overview

Understanding the intricacies of the male chicken reproductive system is essential for poultry breeders, veterinarians, and avian biologists aiming to optimize breeding programs and ensure the health and productivity of their flocks. This comprehensive review explores the anatomy, physiology, and functions of the male chicken's reproductive organs, providing valuable insights into how these systems operate and contribute to successful reproduction.

Introduction to the Male Chicken Reproductive System

The male chicken, commonly known as the rooster, possesses a specialized reproductive system tailored to facilitate efficient sperm production and successful fertilization of eggs. Unlike mammals, roosters do not have external genitalia; instead, their reproductive organs are internally located, with unique structures adapted for their avian reproductive strategies.

The primary components of the male chicken reproductive system include the testes, epididymides, vasa deferentia, cloaca, and associated accessory glands. These organs work in concert to produce, mature, and deliver sperm during copulation.

Testes: The Sperm Production Powerhouses

Location and Structure of the Testes

In roosters, the testes are paired, oval-shaped organs situated internally

within the abdominal cavity, adjacent to the kidneys. Unlike mammals with external testes housed in the scrotum, avian testes are retained internally, a feature that influences their temperature regulation and spermatogenesis.

Each testis is composed of numerous seminiferous tubules, which are tightly coiled and serve as the sites of sperm production. The testes are suspended by the mesorchium, a supportive tissue that contains blood vessels, lymphatics, and nerves.

Spermatogenesis: The Process of Sperm Development

Testicular tissue in roosters is highly active, producing millions of sperm daily. The process involves several stages:

- Spermatogonia Formation: Germ cells divide mitotically to produce primary spermatocytes.
- Meiosis: Primary spermatocytes undergo meiosis to form secondary spermatocytes, which further divide into spermatids.
- Spermiogenesis: Spermatids mature into spermatozoa, acquiring motility and the ability to fertilize an ovum.

The entire process is influenced by hormonal regulation, primarily testosterone, which is produced by the interstitial cells (Leydig cells) located between the seminiferous tubules.

Accessory Organs and Duct Systems

Epididymides

While in many animals, epididymides are prominent structures, in male chickens, they are relatively rudimentary or absent, with sperm maturation and storage primarily occurring within the vasa deferentia.

Vasa Deferentia

The vasa deferentia are long, convoluted ducts that transport sperm from the testes to the cloaca. They are the main sperm-conducting channels in roosters.

- Structure: These ducts are muscular and lined with ciliated epithelium, aiding in the propulsion of sperm.

- Function: They not only transport sperm but also serve as sites for sperm storage and maturation.

Accessory Glands

Unlike mammals, chickens lack prominent accessory glands such as seminal vesicles or prostate. However, they possess the cloacal gland and other specialized tissues that contribute seminal fluids, which help in sperm viability and motility.

The Cloaca: The Common Reproductive and Excretory Passage

The cloaca is a multipurpose cavity serving as the exit point for the digestive, urinary, and reproductive systems.

- Anatomy: It has three main compartments: the vent (external opening), the coprodeum (digestive), and the urodeum (urinary and reproductive).
- Function in Reproduction: During copulation, the cloacal contact allows the transfer of sperm from the male to the female. The male everts the cloaca, aligning it with the female's cloaca to facilitate insemination.

Sperm Storage and Fertilization

One of the remarkable features of the male chicken reproductive system is the ability to produce sperm capable of fertilizing eggs over an extended period.

- Sperm Storage Tubules (SSTs): Located in the female's oviduct, but the male's sperm can survive in the female reproductive tract for up to two weeks, thanks to the sperm's resilience and the female's SSTs.
- Fertilization Process: During mating, sperm are deposited into the female's cloaca and migrate to the SSTs for storage. When ovulation occurs, sperm travel up the oviduct to fertilize the ovum.

Hormonal Regulation of Reproductive Function

The male chicken reproductive system is under tight hormonal control, primarily mediated by the hypothalamic-pituitary-gonadal axis.

- Testosterone: The key hormone promoting spermatogenesis, secondary sexual characteristics, and behavioral traits such as crowing and territoriality.
- Gonadotropins (LH and FSH): Secreted by the pituitary gland, stimulating the testes to produce sperm and testosterone.
- Environmental Factors: Light exposure, temperature, and nutrition influence hormonal levels, affecting reproductive activity.

Reproductive Cycle and Seasonality

Roosters are generally seasonal breeders, with reproductive activity peaking during specific times of the year.

- Breeding Season: Usually correlates with longer daylight hours, which stimulate hormonal activity.
- Testicular Size and Activity: Increase during the breeding season, leading to higher sperm output.
- Regulation: Once environmental cues diminish, testicular activity declines, reducing sperm production.

Implications for Poultry Breeding and Management

Understanding the male chicken reproductive system is critical for effective breeding programs:

- Sperm Collection: Knowledge of the testes and vasa deferentia helps optimize artificial insemination techniques.
- Health Monitoring: Recognizing signs of reproductive health issues, such as testes degeneration or infections, ensures flock fertility.
- Environmental Management: Controlling light and temperature can enhance reproductive performance.
- Genetic Selection: Breeding roosters with high sperm quality and quantity ensures better fertility rates.

Common Reproductive Disorders in Roosters

Awareness of potential issues affecting the male reproductive system is vital for maintaining flock productivity:

- Testicular Atrophy: Often caused by infections, age, or nutritional deficiencies.
- Infections: Bacterial or fungal infections can impair sperm production.
- Injuries: Trauma to the cloaca or testes can cause fertility problems.
- Hormonal Imbalances: Disrupt the spermatogenic cycle and behavioral traits.

Conclusion

The male chicken reproductive system is a sophisticated and efficient biological apparatus finely tuned to the needs of avian reproduction. From the internal testes producing millions of sperm daily to the specialized ducts and cloaca facilitating fertilization, each component plays a pivotal role. An in-depth understanding of these structures and their functions enables poultry professionals to enhance breeding success, improve flock health, and advance avian reproductive science. As research progresses, further insights into the molecular and cellular mechanisms governing these systems will undoubtedly lead to innovations in poultry breeding and management strategies.

In summary, the male chicken's reproductive system exemplifies evolutionary adaptation, balancing internal anatomy with reproductive efficiency. Whether for scientific study or practical application, appreciating the complexities of this system is essential for anyone involved in poultry science.

Male Chicken Reproductive System

male chicken reproductive system: *Poultry Care and Practice* Amaranaath Mehra, 2025-01-03 *Poultry Care and Practice* covers the comprehensive aspects of poultry farming, including the anatomy of birds, commercial management, and the successful global poultry industry. This book focuses on domestication processes of birds like ducks, chickens, geese, and turkeys for eggs and meat production. We delve into the taxonomy of different poultry birds, examining growth models, egg-laying patterns, and reproductive systems. The book also highlights poultry breeding and genetic improvements, providing a solid foundation for students to understand physical characteristics and management principles. Popular poultry such as ducks, geese, and ostriches are discussed, highlighting their cultural significance and usage. Through practical examples, we offer insights into poultry farming techniques and innovations, making it an invaluable resource for

students and professionals.

male chicken reproductive system: The Chicken Joseph Barber, 2018-07-24 A comprehensive, richly illustrated celebration of the natural history of the chicken. Inherently social creatures, chickens are enjoying a renaissance as prized members of many households and small farms. From feathers and flock formation to imprinting and incubating, *The Chicken* provides a comprehensive, richly illustrated guide to understanding how chickens live, think, and act both alongside people and independently. Starting with the evolution of chickens nearly 10,000 years ago and their adaptations to life with humans, *The Chicken* also analyzes the anatomy and behavior of modern domesticated chickens and provides practical tips for helping these amazing birds thrive. Featuring a stunning gallery of breeds with detailed profiles, the book also includes a directory of the most striking examples of chickens that have elevated this species from backyard egg producers to prize-winning poultry. Provides an accessible, comprehensive, and richly illustrated look at the chicken. Features a finely illustrated directory of forty popular breeds and their characteristics and care requirements. Covers the anatomy, physiology, and behavior of chickens. Offers insights into the intelligence and distinctive thought processes of chickens. Includes "theory into practice" panels to help chicken keepers better understand their birds.

male chicken reproductive system: Anatomy and Physiology of Domestic Animals R. Michael Akers, D. Michael Denbow, 2013-07-03 Anatomy and physiology are key foundational areas of study for animal science students and professionals. Understanding these guiding principles will provide students with a better understanding of complex make-up of domestic animals and continued success in further study in this field. *Anatomy and Physiology of Domestic Animals* provides a thorough, systems-based introduction to anatomy and physiology of a wide range of domestic animal species. Each chapter is highly illustrated to provide useful examples of concepts discussed.

male chicken reproductive system: Backyard Poultry Medicine and Surgery Cheryl B. Greenacre, Teresa Y. Morishita, 2021-05-04 Die 2. Auflage von *Backyard Poultry Medicine and Surgery* ist eine sorgfältige Überarbeitung und Erweiterung der 1. Auflage und bietet praktische Informationen für Veterinärmediziner, die Geflügeltiere und kleinere Geflügelbestände behandeln. Das Buch ist ein umfassender Leitfaden zu sämtlichen Aspekten der Haltung, medizinischen und chirurgischen Betreuung von Geflügel in Hinterhofhaltung. Sieben neue Kapitel befassen sich mit den Bereichen Toxikologie, Euthanasie, Pathologie, Verhalten, medizinische Versorgung von Jagdvögeln, Impfung und Medikation. Das Referenzwerk ist zum schnellen Nachschlagen nach Organsystem strukturiert und unterstützt Veterinärmediziner, die regelmäßig oder gelegentlich Geflügeltiere behandeln, bei Diagnose und Management von Hühnern in Hinterhofhaltung. Mehr als 400 Farbfotos helfen bei der Identifizierung von Rassen und Diagnostik. Der klinische Fokus unterstützt Veterinärmediziner in jeder Hinsicht beim Erstellen von Diagnose- und Behandlungsplänen. Die Kapitel stammen von führenden Experten für Vogelmedizin und Vogelchirurgie. *Backyard Poultry Medicine and Surgery* ist ein Muss für jeden Veterinärmediziner, der gelegentlich oder regelmäßig Geflügeltiere in Hinterhofhaltung betreut. - Umfassender Leitfaden für die Diagnose und Behandlung von Geflügeltieren in Hinterhofhaltung. - Bietet praktische Informationen zu Haltung, medizinischer und chirurgischer Behandlung. - Folgt einem individualmedizinischen Ansatz und unterstützt Praktiker beim Erstellen von Diagnose- und Behandlungsplänen für einzelne Tiere oder kleine Tierbestände. - Die neue Auflage wurde erheblich erweitert, viele Kapitel um neue Inhalte sowie sieben neue Kapitel. - Neue Kapitel behandeln die Themenkomplexe Toxikologie, Euthanasie, Pathologie, Verhalten, medizinische Versorgung von Jagdvögeln, Impfung und Medikation. - Enthält noch mehr Farbfotos, um Rasse und Erkrankung noch besser identifizieren zu können. - Begleitende Website.

male chicken reproductive system: Livestock Products Technology Mr. Rohit Manglik, 2024-07-17 EduGorilla Publication is a trusted name in the education sector, committed to empowering learners with high-quality study materials and resources. Specializing in competitive exams and academic support, EduGorilla provides comprehensive and well-structured content

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male chicken reproductive system: Storey's Guide to Raising Poultry, 4th Edition Glenn Drowns, 2012-05-22 Whether you're running a farm or interested in keeping a few backyard birds, Storey's Guide to Raising Poultry covers everything you need to know to successfully raise your own chickens, turkeys, waterfowl, and more. Stressing humane practices throughout, Glenn Drowns provides expert advice on breed selection, housing, feeding, behavior, breeding, health care, and processing your own meat and eggs. With tips on raising specialty species like doves, ostriches, and peafowl, you'll be inspired to experiment with new breeds and add diversity to your poultry operation.

male chicken reproductive system: Reproduction in Domestic Animals Perry T. Cupps, 1991-02-20 A unique feature of this book is the focus on large, domestic animals. Previous editions were considered the Bible of reproductive physiology. It covers basic, large animal reproductive physiology, provides species-specific information and is suitable as a textbook for upper-division courses.

male chicken reproductive system: Dukes' Physiology of Domestic Animals William O. Reece, Howard H. Erickson, Jesse P. Goff, Etsuro E. Uemura, 2015-03-25 Diese vollständig überarbeitete 13. Auflage dieses klassischen Nachschlagewerks zur Physiologie von Haustieren bietet ausführliche Beschreibungen zu normalen physiologischen Prozessen und Dysfunktionen. Der Schwerpunkt liegt dabei auf für die klinische Praxis relevanten Themen. Das didaktische Konzept sorgt für einen nachhaltigen Lernerfolg. - Bietet ausführliche Beschreibungen zu normalen physiologischen Prozessen und Dysfunktionen bei Haustieren. - Betont die klinische Relevanz durch die Darstellung klinischer Zusammenhänge, Merksätze und Fragen zur Überprüfung des Lernstoffes und präsentiert Fälle, die in der Praxis mit hoher Wahrscheinlichkeit auftreten. - Didaktisch hervorragend aufbereitet: Kapitelzusammenfassungen und -einführungen, Schlüsselbegriffe, zusätzliche Abbildungen, Fragen zum besseren Verständnis der Lernstoffes sowie Übungen zur Selbstüberprüfung. - Vermittelt die Inhalte auf verständliche Weise, ohne dabei übermäßig redundant zu sein. - Begleitende Website mit Fragen und Antworten sowie Abbildungen der Printausgabe im PowerPoint-Format.

male chicken reproductive system: Reproduction in Farm Animals E. S. E. Hafez, B. Hafez, 2013-07-03 When you're looking for a comprehensive and reliable text on large animal reproduction, look no further! the seventh edition of this classic text is geared for the undergraduate student in Agricultural Sciences and Veterinary Medicine. In response to reader feedback, Dr. Hafez has streamlined and edited the entire text to remove all repetitious and nonessential material. That means you'll learn more in fewer pages. Plus the seventh editing is filled with features that help you grasp the concepts of reproduction in farm animals so you'll perform better on exams and in practice: condensed and simplified tables, so they're easier to consult an easy-to-scan glossary at the end of the book an expanded appendix, which includes graphic illustrations of assisted reproduction technology Plus, you'll find valuable NEW COVERAGE on all these topics: Equine Reproduction: expanded information reflecting today's knowledge Llamas (NEW CHAPTER) Micromanipulation of Gametes and In Vitro Fertilization (NEW CHAPTER!) Reach for the text that's revised with the undergraduate in mind: the seventh edition of Hafez's Reproduction in Farm Animals.

male chicken reproductive system: Sturkie's Avian Physiology G. Causey Whittow, 1999-10-14 Sturkie's Avian Physiology is the classic comprehensive single volume on the physiology of domestic as well as wild birds. The Fifth Edition is thoroughly revised and updated, and includes new chapters on the physiology of incubation and growth. Chapters on the nervous system and sensory organs have been greatly expanded due to the many recent advances in the field. The text also covers the physiology of flight, reproduction in both male and female birds, and the immunophysiology of birds. The Fifth Edition, like the earlier editions, is a must for anyone interested in comparative physiology, poultry science, veterinary medicine, and related fields. This volume establishes the standard for those who need the latest and best information on the physiology of birds. - Thoroughly updated and revised - Coverage of both domestic and wild birds -

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male chicken reproductive system: Hormones and Reproduction of Vertebrates, Volume 4 David O. Norris, Kristin H. Lopez, 2011-05-04 This series of volumes represents a comprehensive and integrated treatment of reproduction in vertebrates from fishes of all sorts through mammals. It is designed to provide a readable, coordinated description of reproductive basics in each group of vertebrates as well as an introduction to the latest trends in reproductive research and our understanding of reproductive events. Whereas each chapter and each volume is intended to stand alone as a review of that topic or vertebrate group, respectively, the volumes are prepared so as to provide a thorough topical treatment across the vertebrates. Terminology has been standardized across the volumes to reduce confusion where multiple names exist in the literature, and a comprehensive glossary of these terms and their alternative names is provided. A complete, essential and up to date reference for research scientists working on vertebrate hormones and reproduction - and on animals as models in human reproductive research Covers the endocrinology, neuroendocrinology, physiology, behaviour and anatomy of vertebrate reproduction Structured coverage of the major themes for all five vertebrate groups allows a consistent treatment for all Special chapters elaborate on features specific to individual vertebrate groups and to comparative aspects, similarities and differences between them

male chicken reproductive system: Livestock and Poultry Breeding William Cackler, 1989

male chicken reproductive system: Journal of the National Cancer Institute National Cancer Institute (U.S.), 1968

male chicken reproductive system: The Chicken Health Handbook, 2nd Edition Gail Damerow, 2016-01-08 Healthy chickens are happy chickens. This one-of-a-kind reference book covers the health problems that plague chickens of all breeds and ages. Practical charts identify common symptoms and causes of infection, while an alphabetic listing of diseases provides advice on treatment. You'll find helpful descriptions of troublesome ailments of all types, from poor egg production to crooked toe syndrome. Practical remedies and gentle preventative care measures will help your beloved flock stay happy, healthy, and safe.

male chicken reproductive system: Research Awards Index , 1979

male chicken reproductive system: Research Grants Index National Institutes of Health (U.S.). Division of Research Grants, 1970

male chicken reproductive system: Photoperiodism Randy J. Nelson, David L. Denlinger, David E. Somers, 2010-01-27 Life evolves in a cyclic environment, and to be successful, organisms must adapt not only to their spatial habitat, but also to their temporal habitat. How do plants and animals determine the time of year so they can anticipate seasonal changes in their habitats? In most cases, day length, or photoperiod, acts as the principal external cue for determining seasonal activity. For organisms not living at the bottom of the ocean or deep in a cave, day follows night, and the length of the day changes predictably throughout the year. These changes in photoperiod provide the most accurate signal for predicting upcoming seasonal conditions. Measuring day length allows plants and animals to anticipate and adapt to seasonal changes in their environments in order to optimally time key developmental events including seasonal growth and flowering of plants, annual bouts of reproduction, dormancy and migration in insects, and the collapse and regrowth of the reproductive system that drives breeding seasons in mammals and birds. Although research on photoperiodic time measurement originally integrated work on plants and animals, recent work has focused more narrowly and separately on plants, invertebrates, or vertebrates. As the fields have become more specialized there has been less interaction across the broader field of photoperiodism. As a result, researchers in each area often needlessly repeat both theoretical and experimental work. For example, understanding that there are genetically distinct morphs among species that, depending on latitude, respond to different critical photoperiods was discovered separately in plants, invertebrates, and vertebrates over the course of 20 years. However, over the past decade, intense work on daily and seasonal rhythms in fruit flies, mustard plants, and hamsters and mice, has led to remarkable progress in understanding the phenomenology, as well as the molecular and genetic

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