section 33 3 form and function in chordates

section 33 3 form and function in chordates is a pivotal topic in the study of animal biology, focusing on the unique anatomical structures and physiological roles that define the phylum Chordata. This article explores the essential features that distinguish chordates from other animal groups, highlighting their evolutionary adaptations, major organ systems, and the significance of form and function in their survival. Readers will gain a comprehensive understanding of notochords, dorsal nerve cords, pharyngeal slits, and post-anal tails, as well as the variations observed across different chordate subgroups. By delving into both the structural and functional aspects, this guide provides a thorough overview suitable for students, educators, and enthusiasts alike. The article also examines evolutionary trends within chordates and the adaptive significance of their characteristic features. Continue reading to discover how the form and function of chordates contribute to their ecological success and evolutionary diversity.

Overview of Chordates

Chordates are a diverse and highly evolved group within the animal kingdom, encompassing all vertebrates and several closely related invertebrates. The phylum Chordata is characterized by a unique set of anatomical features present at some stage in their life cycle. These defining characteristics include the notochord, dorsal hollow nerve cord, pharyngeal slits, and a post-anal tail. Understanding section 33 3 form and function in chordates provides insight into the evolutionary innovations that have made this group so successful. Chordates inhabit a wide range of environments, from aquatic to terrestrial ecosystems, and display remarkable diversity in both form and function, reflecting their adaptive evolution over millions of years.

Key Structural Features in Chordates

The hallmark of chordates lies in their distinct anatomical structures. Each of the four key features plays a crucial role in the development and physiology of these animals. Recognizing these elements is fundamental to appreciating the significance of form and function in chordates.

Notochord

The notochord is a flexible, rod-shaped structure that provides skeletal support. In most vertebrates, it is replaced during development by a vertebral column, but its presence is a defining trait of the phylum. The notochord serves as an axis for muscle attachment and plays a critical role in the development of the nervous system.

Dorsal Hollow Nerve Cord

Unlike the ventral nerve cords found in many invertebrates, chordates possess a dorsal hollow nerve cord positioned above the notochord. This structure develops into the central nervous system, including the brain and spinal cord in vertebrates, enabling complex sensory processing and movement coordination.

Pharyngeal Slits

Pharyngeal slits are openings in the pharynx that serve various functions depending on the organism. In aquatic chordates, these slits facilitate filter feeding or act as gill openings for respiration. In terrestrial vertebrates, they contribute to the formation of structures such as the middle ear and tonsils.

Post-Anal Tail

The post-anal tail extends beyond the anus and is present at some stage in all chordates. This feature aids in locomotion for many species, particularly in aquatic environments, and may be reduced or modified in certain adult forms.

- Notochord: Skeletal support and axis for muscle attachment
- Dorsal hollow nerve cord: Central nervous system development
- Pharyngeal slits: Feeding and respiratory adaptations
- Post-anal tail: Locomotion and balance

Functional Significance of Chordate Features

The anatomical structures unique to chordates do not merely serve as identifying characteristics; they provide significant functional advantages that have contributed to the success and diversity of this group. Each feature supports specific biological processes essential for survival, growth, and reproduction.

Support and Movement

The notochord and post-anal tail are integral for support and locomotion. The notochord acts as a primary skeletal element in early development or in species without vertebrae, allowing for flexible yet controlled movement. The post-anal tail, composed of muscle and skeletal elements, improves swimming efficiency in aquatic chordates and aids in balance and movement among terrestrial species.

Respiration and Feeding

Pharyngeal slits are versatile structures that have evolved for a range of functions. In filter-feeding animals like lancelets, these slits trap food particles, while in fish, they facilitate gas exchange as part of the gill system. In tetrapods, remnants of pharyngeal slits are involved in ear and throat development, showcasing their evolutionary transformation.

Nervous System Integration

The dorsal hollow nerve cord is central to the integration of sensory information and coordinating complex behaviors. This structure enables advanced neurological functions, including perception, response to stimuli, and interaction with the environment, which are hallmarks of vertebrate evolution.

Chordate Subphyla: Variations in Form and Function

Section 33 3 form and function in chordates also examines the differences among the major chordate subphyla: Cephalochordata, Urochordata, and Vertebrata. Each subgroup adapts the core chordate features to suit its ecological niche and evolutionary history.

Cephalochordata (Lancelets)

Lancelets retain all four chordate features throughout their life. Their streamlined bodies and persistent notochord make them efficient filter feeders and swimmers in shallow marine environments. The simplicity of their structure provides insight into the ancestral condition of chordates.

Urochordata (Tunicates)

Tunicates exhibit chordate characteristics mainly in their larval stage. Larvae possess a notochord and dorsal nerve cord, which are lost or reduced in the sedentary adult form. Adult tunicates filter feed by pumping water through their pharyngeal slits, showcasing a dramatic shift in form and function during their life cycle.

Vertebrata (Vertebrates)

Vertebrates demonstrate the most advanced modifications of chordate features. The notochord is largely replaced by a vertebral column, supporting larger body sizes and more complex movements. The dorsal hollow nerve cord develops into sophisticated brains and spinal cords, enabling intricate sensory and motor abilities. Vertebrates occupy every major habitat on Earth, reflecting their adaptive versatility.

Evolutionary Trends and Adaptive Strategies

The evolution of chordates illustrates how modifications in form and function drive adaptive success. From simple filter feeders to complex vertebrates, the transition involves the specialization of basic structures for new purposes. Natural selection has favored innovations such as jaws, limbs, and highly developed sensory systems, which originate from the foundational chordate blueprint.

Adaptive Radiation

Chordates have undergone extensive adaptive radiation, resulting in a vast array of species adapted to diverse environments. This diversification is evident in the range of body plans, feeding strategies, and reproductive methods seen across the phylum.

Key Innovations

Major evolutionary innovations in chordates include the development of vertebrae, paired appendages, and lungs. These adaptations have enabled chordates to exploit new ecological niches, from the deep ocean to terrestrial landscapes, and to survive in changing environmental conditions.

1. Evolution of jaws: Enhanced feeding opportunities

2. Development of limbs: Transition to land
3. Complex sensory organs: Improved environmental awareness
4. Lungs and air-breathing: Colonization of terrestrial habitats

Conclusion

Section 33 3 form and function in chordates provides a framework for understanding the success and diversity of this remarkable phylum. By examining the structural features and their associated functions, as well as the evolutionary pathways that have shaped them, one gains a deeper appreciation of the complexity and adaptability of chordates. Their unique anatomical and physiological traits continue to be a focal point in evolutionary biology and comparative anatomy.

Q: What are the four key features of chordates?

A: The four key features of chordates are the notochord, dorsal hollow nerve cord, pharyngeal slits, and post-anal tail. These structures are present at some stage in their life cycle and distinguish them from other animal groups.

Q: How does the notochord contribute to chordate development?

A: The notochord provides skeletal support and serves as an axis for muscle attachment during development. In vertebrates, it is largely replaced by the vertebral column, but it is crucial for the early formation of the nervous system.

Q: What is the function of pharyngeal slits in chordates?

A: Pharyngeal slits serve various functions, such as filter feeding in lancelets, respiration in fish through gill openings, and forming structures like the middle ear and tonsils in terrestrial vertebrates.

Q: How do tunicates demonstrate changes in form and function during their life cycle?

A: Tunicates have a free-swimming larval stage with all chordate features, but as adults, they become sessile and lose the notochord and nerve cord, adapting to a filter-feeding lifestyle.

Q: What evolutionary innovations have allowed chordates to

diversify?

A: Key innovations include the development of vertebrae, paired appendages, jaws, complex sensory organs, and lungs, enabling chordates to occupy a wide range of ecological niches.

Q: Why is the dorsal hollow nerve cord important in chordates?

A: The dorsal hollow nerve cord develops into the central nervous system, including the brain and spinal cord, allowing for advanced sensory processing and motor coordination.

Q: Can all chordates be classified as vertebrates?

A: No, not all chordates are vertebrates. The phylum Chordata includes vertebrates, cephalochordates (lancelets), and urochordates (tunicates), with only vertebrates possessing a true backbone.

Q: How does the post-anal tail aid in chordate movement?

A: The post-anal tail provides propulsion and balance, especially in aquatic chordates, and may be reduced or modified in adult terrestrial species.

Q: What role do chordate features play in adaptive radiation?

A: The fundamental chordate features allow for diverse modifications and specializations, driving adaptive radiation and enabling chordates to thrive in various habitats.

Q: How does section 33 3 form and function in chordates contribute to evolutionary biology?

A: It highlights the structural and functional innovations that underpin the diversity and evolutionary success of chordates, offering key insights into animal evolution and adaptation.

Section 33 3 Form And Function In Chordates

Section 33.3: Form and Function in Chordates: A Deep Dive

Have you ever wondered about the incredible diversity of animals, from the graceful swan to the slithering snake? Underlying this breathtaking array of life forms is a shared evolutionary heritage: the chordate body plan. This post delves into the crucial aspects of Section 33.3 (a common section title in comparative anatomy textbooks), exploring the form and function of key chordate characteristics. We'll examine how these features—the notochord, dorsal hollow nerve cord, pharyngeal slits, post-anal tail, and endostyle/thyroid—contribute to the remarkable success and adaptability of chordates. Get ready for an insightful journey into the fascinating world of vertebrate and invertebrate chordate anatomy and physiology!

The Defining Characteristics of Chordates: A Recap

Before we dissect the intricacies of Section 33.3, let's refresh our understanding of the five key characteristics that define chordates:

1. Notochord: The Flexible Rod

The notochord is a flexible rod of mesodermal cells that provides support. In many chordates, it's replaced by the vertebral column during development, forming the backbone. Its function is crucial for early embryonic development and locomotion, providing a skeletal axis against which muscles can contract.

2. Dorsal Hollow Nerve Cord: The Information Highway

This unique feature, located dorsally (above) the notochord, develops into the central nervous system (brain and spinal cord) in vertebrates. It's a hollow tube, in contrast to the solid nerve cords found in invertebrates, and represents a significant evolutionary leap in neural complexity.

3. Pharyngeal Slits: Ancient Breathing Holes

Initially used for filter feeding in ancestral chordates, pharyngeal slits are openings in the pharynx (throat region). In aquatic chordates, they function in respiration and feeding. In terrestrial vertebrates, they are modified into structures like the Eustachian tubes (connecting the middle ear to the pharynx) and tonsils.

4. Post-Anal Tail: The Propulsion System

This muscular tail extends posterior to the anus. Its primary function is locomotion in many aquatic chordates. While greatly reduced or absent in some adult vertebrates, its presence in embryonic development underscores its evolutionary significance.

5. Endostyle/Thyroid Gland: Iodine Metabolism

The endostyle is found in invertebrate chordates and is involved in iodine metabolism. It's homologous to the thyroid gland in vertebrates, which produces hormones crucial for regulating metabolism and growth.

Section 33.3: Exploring Form and Function in Detail

Section 33.3 typically focuses on the specific adaptations and modifications of these five defining characteristics across various chordate groups. This includes examining how these features are expressed differently in different taxa, highlighting the evolutionary pressures that shaped their form and function.

Variations in Notochord Structure and Function

The notochord's structure and persistence vary significantly. While some retain it throughout life, others, like mammals, replace it with a vertebral column. The degree of ossification (bone formation) in the vertebral column also varies, reflecting different locomotor needs and environmental pressures.

The Evolution of the Nervous System

The dorsal hollow nerve cord's development into a complex brain and spinal cord is a hallmark of vertebrate evolution. The increasing complexity of the nervous system correlates with more sophisticated sensory perception, motor control, and behavioral responses.

Diversity of Pharyngeal Slits and Their Derivatives

The modifications of pharyngeal slits illustrate remarkable evolutionary adaptability. In fish, they serve as gills for respiration. In terrestrial vertebrates, they are modified into structures associated with hearing, swallowing, and the immune system.

Post-Anal Tail: From Propulsion to Balance

The post-anal tail's role in locomotion is paramount in many aquatic chordates, but it has been adapted for other functions in terrestrial animals. In some primates, it aids in balance and arboreal locomotion (movement through trees). In humans, it's a vestigial structure, reflecting our evolutionary history.

Endostyle to Thyroid: A Crucial Metabolic Shift

The evolutionary transition from the endostyle to the thyroid gland reflects a shift from filter feeding to more complex metabolic processes in vertebrates. The thyroid's role in regulating metabolism is essential for growth, development, and overall physiological homeostasis.

Conclusion

Understanding Section 33.3, encompassing the form and function of chordate characteristics, is pivotal for grasping the incredible diversity and evolutionary success of this major phylum. By examining the adaptations and modifications of these five defining features across different chordate groups, we gain invaluable insights into the evolutionary forces that have shaped the animal kingdom. This knowledge provides a foundational understanding of comparative anatomy and evolutionary biology.

FAQs

1. What is the significance of the notochord's replacement by the vertebral column? The vertebral column offers greater structural support and protection for the spinal cord, enabling greater

mobility and size in vertebrates.

2. How do pharyngeal slits contribute to the success of aquatic chordates? Pharyngeal slits facilitate efficient respiration and filter feeding, allowing aquatic chordates to thrive in diverse aquatic environments.

3. Are there any exceptions to the five key chordate characteristics? Some adult chordates may lack some characteristics, like a post-anal tail, but they are present during embryonic development.

4. What role does the thyroid gland play in vertebrate physiology? The thyroid gland regulates metabolism, growth, and development through the production of thyroid hormones.

5. How does studying Section 33.3 contribute to our understanding of evolution? It allows us to trace the evolutionary relationships between different chordate groups based on the modifications and adaptations of their defining characteristics.

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section 33 3 form and function in chordates: Vertebrate Palaeontology Michael J. Benton, 2024-10-07 All-new edition of the world’s leading vertebrate palaeontology textbook, now addressing key evolutionary transitions and ecological drivers for vertebrate evolution Richly illustrated with colour illustrations of the key species and cladograms of all major vertebrate taxa, Vertebrate Palaeontology provides a complete account of the evolution of vertebrates, including macroevolutionary trends and drivers that have shaped their organs and body plans, key transitions such as terrestrialization, endothermy, flight and impacts of mass extinctions on biodiversity and ecological drivers behind the origin of chordates and vertebrates, their limbs, jaws, feathers, and hairs. This revised and updated fifth edition features numerous recent examples of breakthrough discoveries in line with the current macroevolutionary approach in palaeontology research, such as the evolutionary drivers that have shaped vertebrate development. Didactical features have been enhanced and include new functional and developmental feature spreads, key questions, and extensive references to useful websites. Written by a leading academic in the field, Vertebrate Palaeontology discusses topics such as: Palaeozoic fishes, including Cambrian vertebrates, placoderms (‘armour-plated monsters’), Pan-Chondrichthyes such as sharks and rays, and Osteichthyes (‘bony fishes’) The first tetrapods, covering problems of life on land, diversity of Carboniferous tetrapods and temnospondyls and reptiliomorphs following the Carboniferous Mesozoic reptiles, such as Testudinata (turtles), Crocodylomorpha, Pterosauria, Dinosauria, great sea dragons and Lepidosauria (lizards and snakes) Mammals of the southern and northern hemispheres, covering Xenarthra (sloths, anteaters), Afrotheria (African mammals), Laurasiatheria (bats, ungulates, carnivores), and Euarchontoglires (rodents, primates) A highly comprehensive and completely up-to-date reference on vertebrate evolution, Vertebrate Palaeontology is an ideal learning aid for palaeontology courses in biology and geology departments. The text is also highly valuable to enthusiasts who want to experience the flavour of how modern research in the field is conducted.

section 33 3 form and function in chordates: Host and Microbe Adaptations in the Evolution of Immunity Larry J. Dishaw, Gary W. Litman, 2019-12-31 The evolution of metazoans has been accompanied by new interfaces with the microbial environment that include biological barriers and surveillance by specialized cell types. Increasingly complex organisms require increased capacities to confront pathogens, achieved by co-evolution of recognition mechanisms and regulatory pathways. Two distinct but interactive forms of immunity have evolved. Innate immunity, shared by all metazoans, is traditionally viewed as simple and non-specific. Adaptive immunity possesses the capacity to anticipate new infectious challenges and recall previous exposures; the most well-understood example of such a system, exhibited by lymphocytes of vertebrates, is based on somatic gene alterations that generate extraordinary specificity in discrimination of molecular structures. Our understanding of immune phylogeny over the past decades has tried to reconcile immunity from a vertebrate standpoint. While informative, such approaches cannot completely address the complex nature of selective pressures brought to bear by the complex microbiota (including pathogens) that co-exist with all metazoans. In recent years, comparative studies (and new technologies) have broadened our concepts of immunity from a systems-wide perspective. Unexpected findings, e.g., genetic expansions of innate receptors, high levels of polymorphism, RNA-based forms of generating diversity, adaptive evolution and functional divergence of gene families and the recognition of novel mediators of adaptive immunity, prompt us to reconsider the very nature of immunity. Even fundamental paradigms as to how the jawed vertebrate adaptive immune system should be structured for “optimal” recognition potential have been disrupted more than once (e.g., the discovery of the multicluster organization and germline joining of immunoglobulin genes in sharks, gene conversion as a mechanism of somatic diversification, absence of IgM or MHC II in certain teleost fishes). Mechanistically, concepts of innate immune memory, often referred to as “trained memory,” have been realized further, with the development of new discoveries in studies of epigenetic regulation of somatic lineages. Immune systems innovate and adapt in a taxon-specific manner, driven by the complexity of interactions with microbial symbionts (commensals, mutualists and pathogens). Immune systems are shaped by selective forces that reflect consequences of dynamic interactions with microbial environments as well as a capacity for rapid change that can be facilitated by genomic instabilities. We have learned that characterizing receptors and receptor interactions is not necessarily the most significant component in understanding the evolution of immunity. Rather, such a subject needs to be understood from a more global perspective and will necessitate re-consideration of the physical barriers that afford protection and the developmental processes that create them. By far, the most significant paradigm shifts in our understanding of immunity and the infection process has been that microbes no longer are considered to be an automatic cause or consequence of illness, but rather integral components of normal physiology and homeostasis. Immune phylogeny has been shaped not only by an arms race with pathogens but also perhaps by mutualistic interactions with resident microbes. This Research Topic updates and extends the previous eBook on Changing Views of the Evolution of Immunity and contains peer-reviewed submissions of original research, reviews and opinions.

section 33 3 form and function in chordates: *Reproductive Neuroendocrinology and Social Behavior* Ishwar S. Parhar, Tomoko Soga, Sonoko Ogawa, 2016-10-12 Anti-social behaviors and social deficits induced mental disorders are critical problems in our society today. Social behaviors and interactions are shaped by experience, hereditary components (genes, hormones and neuropeptides) and environmental factors (photoperiods and metabolic signals). In addition to the classical gonadotropin-releasing hormone, RFamide peptides, kisspeptin and gonadotropin-inhibiting hormone are emerging as important regulators of the reproductive axis. These neuropeptides are evolutionarily conserved and are regulated by environmental factors. In this Research Topic, we advocate more recent advances in reproductive neuropeptides and sex steroids in the domains of social behavior including sexual and parental behavior, aggression, stress and anxiety. Using multiple species model, we also review how genes and the neuroendocrine system interact at the cell and organismic levels to contribute to social behavior in particular the epigenetic genomic changes caused by early life environment. We provide comprehensive insights of distinct neural networks and how cellular and molecular events in the brain regulate social behavior from a comparative perspective.

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section 33 3 form and function in chordates: Animal Eyes Michael F. Land, Dan-Eric Nilsson, 2012-03 This book covers the way that all known types of eyes work, from their optics to the behaviour they guide. The ways that eyes sample the world in space and time are considered, and the evolutionary origins of eyes are discussed. This new edition incorporates discoveries made since the first edition published in 2001.

section 33 3 form and function in chordates: Peptide Hydrolases—Advances in Research and Application: 2013 Edition , 2013-06-21 Peptide Hydrolases—Advances in Research and Application: 2013 Edition is a ScholarlyEditions™ book that delivers timely, authoritative, and comprehensive information about Serine Proteases. The editors have built Peptide Hydrolases—Advances in Research and Application: 2013 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Serine Proteases in this book to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Peptide Hydrolases—Advances in Research and Application: 2013 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

section 33 3 form and function in chordates: The Heart and Circulation Branko Furst, 2013-08-13 This book traces the development of the basic concepts in cardiovascular physiology in the light of the accumulated experimental and clinical evidence and, rather than making the findings fit the standard pressure-propulsion mold, let the phenomena 'speak for themselves'. It starts by considering the early embryonic circulation, where blood passes through the valveless tube heart at a rate that surpasses the contractions of its walls, suggesting that the blood is not propelled by the heart, but possesses its own motive force, tightly coupled to the metabolic demands of the tissues. Rather than being an organ of propulsion, the heart, on the contrary, serves as a damming-up organ, generating pressure by rhythmically impeding the flow of blood. The validity of this model is then confirmed by comparing the key developmental stages of the cardiovascular system in the invertebrates, the insects and across the vertebrate taxa. The salient morphological and histological features of the myocardium are reviewed with particular reference to the vortex. The complex, energy-dissipating intracardiac flow-patterns likewise suggest that the heart functions as an organ of impedance, whose energy consumption closely matches the generated pressure, but not its throughput. Attention is then turned to the regulation of cardiac output and to the arguments advanced by proponents of the 'left ventricular' and of the 'venous return' models of circulation. Hyperdynamic states occurring in arteriovenous fistulas and congenital heart defects, where communication exists between the systemic and pulmonary circuits at the level of atria or the ventricles, demonstrate that, once the heart is unable to impede the flow of blood, reactive changes occur in the pulmonary and systemic circulations, leading to pulmonary hypertension and Eisenmenger syndrome. Finally, the key points of the nook are summarized in the context of blood as a 'liquid organ' with autonomous movement.

section 33 3 form and function in chordates: Adaptive Function and Brain Evolution Agustín González, Fernando Martinez-Garcia, Luis Puelles, Hans J Ten Donkelaar, 2014-10-27 The brain of each animal shows specific traits that reflect its phylogenetic history and its particular lifestyle. Therefore, comparing brains is not just a mere intellectual exercise, but it helps understanding how the brain allows adaptive behavioural strategies to face an ever-changing world and how this complex organ has evolved during phylogeny, giving rise to complex mental processes in humans and other animals. These questions attracted scientists since the times of Santiago Ramon y Cajal one of the founders of comparative neurobiology. In the last decade, this discipline has undergone a true revolution due to the analysis of expression patterns of morphogenetic genes in embryos of different animals. The papers of this e-book are good examples of modern comparative neurobiology, which mainly focuses on the following four Grand Questions: a) How are different brains built during ontogeny? b) What is the anatomical organization of mature brains and how can they be compared? c) How do brains work to accomplish their function of ensuring survival and, ultimately, reproductive success? d) How have brains evolved during phylogeny? The title of this e-book, Adaptive Function and Brain Evolution, stresses the importance of comparative studies to understand brain function and, the reverse, of considering brain function to properly understand brain evolution. These issues should be taken into account when using animals in the research of mental function and dysfunction, and are fundamental to understand the origins of the human mind.

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section 33 3 form and function in chordates: BIOLOGY OF NON-CHORDATES FATIK BARAN MANDAL, 2017-11-01 The second edition of the book is an elaborated and updated version of the title Invertebrate Zoology, which was published in the year 2012. In addition to the detailed description of representative genus of each of the major groups, the text provides latest developments in zoology and other related life science disciplines. This book, now with a different title in the second edition, gives an account of 36 phyla in comparison of 12 phyla explained in the first edition. NEW TO THE SECOND EDITION • Explains phyla such as Placozoa, Myxozoa, Nemertea, Gnathostomulida, Micrognathozoa, Cycliophora, Xenoturbellida, Acoelomorpha, Orthonectida, Rhombozoa, Gastrotricha, Kinorhyncha, Lorcifera, Priapulida, Nematoda, Nematomorpha, Acanthocephala, Entoprocta, Sipuncula, Echiura, Pentastomida, Onychophora, Tardigrada, Brachiopoda and Chaetognatha in the light of recent studies. • Discusses contemporary accounts on adaptive morphology, anatomy and physiology, including diversity in the mode of locomotion, nutrition, respiration and reproduction in major groups. • Emphasizes life cycle pattern of representative genus with well-illustrated diagrams. • Provides Short- and Long-answer questions at the end of each chapter along with references.

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section 33 3 form and function in chordates: Craniofacial Muscles Linda K. McLoon, Francisco Andrade, 2012-09-13 Of the approximately 640 muscles in the human body, over 10% of them are found in the craniofacial region. The craniofacial muscles are involved in a number of crucial non-locomotor activities, and are critical to the most basic functions of life, including vision, taste, chewing and food manipulation, swallowing, respiration, speech, as well as regulating facial expression and controlling facial aperture patency. Despite their importance, the biology of these small skeletal muscles is relatively unexplored. Only recently have we begun to understand their unique embryonic development and the genes that control it and characteristic features that separate them from the skeletal muscle stereotype. This book is the most comprehensive reference to date on craniofacial muscle development, structure, function, and disease. It details the state-of-the-art basic science of the craniofacial muscles, and describes their unique response to major neuromuscular conditions. Most importantly, the text highlights how the craniofacial muscles are different from most skeletal muscles, and why they have been viewed as a distinct allotype. In addition, the text points to major gaps in our knowledge about these very important skeletal muscles and identified key gaps in our knowledge and areas primed for further study and discovery.

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