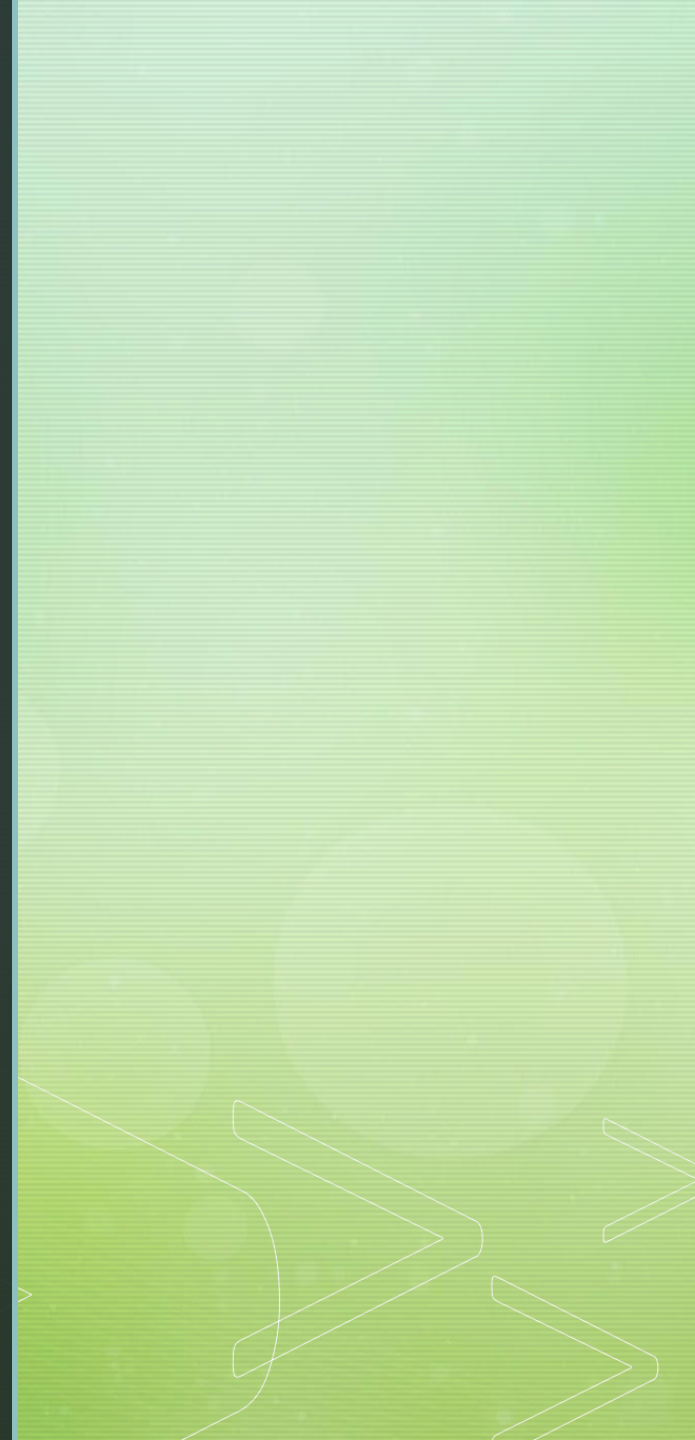


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# Theory of phylembryogenesis



# Abstract

- Traditional metazoan phylogeny classifies the Vertebrata as a subphylum of the phylum Chordata, together with two other subphyla, the Urochordata (Tunicata) and the Cephalochordata. The Chordata, together with the phyla Echinodermata and Hemichordata, comprise a major group, the Deuterostomia

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- Chordates invariably possess a notochord and a dorsal neural tube. and that within the Chordata, cephalochordates diverged first, with tunicates and vertebrates forming a sister group.



# Introduction

- Since Charles Darwin proposed the evolution of animals by means of natural selection, the origin and evolution of chordates from common ancestor(s) of deuterostomes have been investigated and discussed for more than 150 years

# Brief History

- Lankester gave subphylum status to the Urochordata, the Cephalochordata and the Craniata, altogether comprising the phylum Vertebrata. This constituted the first conception of the modern phylum Chordata.


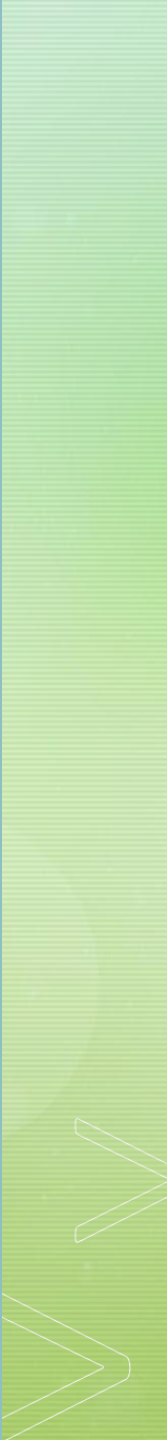
## Traditional view

- Chordates are thought to have originated from a common ancestor of the deuterostomes. majority of previous researchers of this field have favoured an evolutionary scenario in which urochordates evolved first.

## Recent view

- Molecular phylogeny, first based on comparison of 18S rDNA sequences and later protein-coding gene sequences. however, did not support this classification of protostomes, but instead suggested their division into two major groups, the Ecdysozoa and Lophotrochozoa.



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- On the other hand, recent studies of deuterostome molecular phylogeny, nuclear and mitochondrial genomics, and evolutionary developmental biology, have unambiguously demonstrated that echinoderms and hemichordates form a clade, and that urochordates, cephalochordates and vertebrates form another distinct clade
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# Evolutionary scenarios of chordates

- the paedomorphosis hypothesis, the auricularia hypothesis, the inversion hypothesis and the aboral-dorsalization hypothesis. The first of these debated whether adults of ancestral chordates were sessile or free-living. The next three discussed, in terms of embryology or evolutionary developmental biology, how the chordate body plan, especially its adult form, originated from the common ancestor

# The paedomorphosis scenario

- Extant hemichordates consist of two groups with different lifestyles: the sessile, colonial pterobranchs and free-living enteropneusts. The motile, free-living lifestyle of cephalochordates and vertebrates was believed to have evolved from a motile larval stage of the sedentary, tentaculate ancestor



# The auricularia hypothesis

- attempted to explain how the chordate body plan originated from a deuterostome common ancestor, by emphasizing the significance of changes in larval forms



# The inversion hypothesis

in vertebrates, the CNS runs dorsal to the digestive system; hence they are sometimes called Notoneuralia. That is, the D-V axis appears to be inverted between annelids and vertebrates.

# The aboral-dorsalization hypothesis

- The A-D hypothesis stands on recent deuterostome phylogeny and emphasizes the occurrence of fish-like or tadpole-like (FT) larvae as a critical developmental event that led to the evolution of chordates.

# Vascular system

- **Chordate animals have a closed circulatory system, in which blood is transported around the body inside veins and arteries of various sizes. The blood is circulated by the pumping action of the heart; the respiratory gases in the blood diffuse across the thin walls of the smallest vessels in the tissues.**

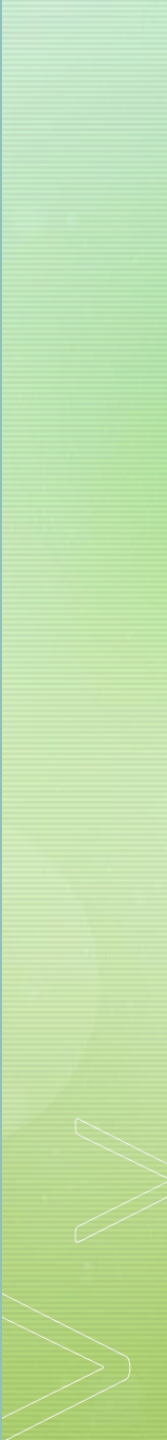


# Vascular system

- **The most recently evolved vertebrates have a four-chambered heart, and a double circulation of the blood, which involves a separate circulation for the heart and the lungs, and for the heart and the rest of the body (systemic circulation).**



# Humans vascular system

- In addition to circulating blood and lymph throughout the body, the vascular system functions as an important component of other body systems
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# What is vascular disease?

- A vascular disease is a condition that affects the arteries and veins. Most often, vascular disease affects blood flow, either by blocking or weakening blood vessels, or by damaging the valves that are found in veins

# What causes vascular disease?

- Atherosclerosis a buildup of plaque, which is a deposit of fatty substances, cholesterol, cellular waste products, calcium, and fibrin in the inner lining of an artery
- Blood clots. A blood vessel may be blocked by an embolus
- Inflammation.
- Trauma or injury involving the blood vessels may lead to inflammation or infection
- Genetic. Certain conditions of the vascular system are inherited.

# What are the effects of vascular disease?

- Because the functions of the blood vessels include supplying all organs and tissues of the body with oxygen and nutrients, removal of waste products, fluid balance, and other functions, conditions that affect the vascular system may affect the part(s) of the body supplied by a particular vascular network

# Conclusion

- **Chordates utilize a wide range of habitats. The earliest evolved chordates and some of the more recent groups are aquatic, while others are primarily terrestrial.**