



Medical Academy named after S.I. Georgievsky of Vernadsky CFU Department of Biology


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Convergence and concurrency


The relationship of ontogenesis and phylogenesis, the rules of phylogenesis. Forms of phylogenesis. Divergence. Convergence and concurrency. Phylogenesis of the phylum Chordata skin coverings. Developmental disorders of the skin coverings in human




The relationship of ontogenesis and phylogenesis

- Ontogeny and phylogeny.
 - By studying ontogeny (the development of embryos), scientists can learn about the evolutionary history of organisms.
 - This phrase suggests that an organism's development will take it through each of the adult stages of its evolutionary history, or its phylogeny.
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How are ontogeny and phylogeny related?

- Ontogeny is the growth (size change) and development (structure change) of an individual organism; phylogeny is the evolutionary history of a species.
 - Otherwise put, each successive stage in the development of an individual represents one of the adult forms that appeared in its evolutionary history.
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What did Haeckel mean when he said ontogeny recapitulates phylogeny?

- The phrase “ontogeny recapitulates phylogeny” was coined by Ernst Haeckel in 1866 and for many decades was accepted as natural law. Haeckel meant it in the strict sense: that an organism, in the course of its development, goes through all the stages of those forms of life from which it has evolved.
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The rules of phylogenesis

- In evolutionary biology, there is a wonderfully elegant idea that "ontogeny recapitulates phylogeny." Also known as the biogenetic law, this was developed by Ernst Haeckel in the 19th century, and states that the development of an organism (ontogeny) follows its evolutionary history, or phylogeny.
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What is ontogenesis and Phylogenesis?

- In phylogenesis, the biological genotype develops by natural selection. In ethnogenesis, institutionalised forms of activity and material culture develop.
 - In sociogenesis, social positions and social situations develop. In ontogenesis, individual human organisms and minds develop.
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What is the difference between ontogenesis and Phylogenesis?

- The main difference between ontogeny and phylogeny is that ontogeny is the study of the development of organisms, whereas phylogeny is the study of evolution. Furthermore, ontogeny gives the development history of an organism within its own lifetime while phylogeny gives the evolutionary history of a species.
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Does ontogeny recapitulate phylogeny?

- Although there are often developmental similarities that do reflect shared evolutionary history, development (ontogeny) does not necessarily reflect (recapitulate) shared evolutionary history (phylogeny).


What is Phylogenesis in microbiology?

- Phylogenesis (from Greek φῦλον phylon "tribe" + γένεσις genesis "origin") is the biological process by which a taxon (of any rank) appears.
 - The science that studies these processes is called phylogenetics.
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What are the applications of phylogenetic tree in microbiology?


- Phylogeny combined with taxonomy creates a universal language for understanding what an organism is and where it fits in the broad tree of life.

What are the 3 types of phylogenetic tree?


- The lowest point of the tree is the root, which symbolizes the universal common ancestor to all living beings. The tree branches out into three main groups: Bacteria (left branch, letters a to i), Archea (middle branch, letters j to p) and Eukaryota (right branch, letters q to z).
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Divergence.


- the inner product of the operator del and a given vector, which gives a measure of the quantity of flux emanating from any point of the vector field or the rate of loss of mass, heat, etc., from it.

- Convergence is often the key liveness property for distributed systems that interact with physical processes. Techniques for proving convergence (asymptotic stability) have been extensively studied by control theorists. In particular, for the asynchronous model of computation Tsitsiklis [8] provides a set of necessary and sufficient conditions for proving stability and convergence under the assumption that each asynchronous operator (state transition function) is applied infinitely often.
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Phylogenesis of the phylum Chordata skin coverings.

- The chordates are named for the notochord, which is a flexible, rod-shaped mesodermal structure that is found in the embryonic stage of all chordates and in the adult stage of some chordate species. It is strengthened with glycoproteins similar to cartilage and covered with a collagenous sheath.
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What are the 5 characteristics of chordates?

- Animals in the phylum Chordata share five key characteristics that appear at some stage during their development: a notochord, a dorsal hollow (tubular) nerve cord, pharyngeal gill arches or slits, a post-anal tail, and an endostyle/thyroid gland (Figure 2).
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Developmental disorders of the skin coverings in human

- More than 100 human genetic skin diseases, impacting over 20% of the population, are characterized by disrupted epidermal differentiation. A significant proportion of the 90 genes identified in these disorders to date are concentrated within several functional pathways, suggesting the emergence of organizing themes in epidermal differentiation.
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Epidermal diseases arise from aberrant epidermal differentiation

- The epidermis is a self-renewing stratified epithelial tissue that forms the outer barrier of the skin. As such, its function is to protect the organism from outside insults, such as bacterial pathogens, and to prevent water-loss.

Epidermal differentiation and overview of disorders affecting differentiation

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- Keratinocytes undergo a process of terminal differentiation involving stratification, which consists of the upward migration of keratinocytes from the basal layer containing progenitor cells into the spinous and granular layers; here, lamellar bodies provide the materials for formation of the impermeable epidermal barrier.

Thank you

