DOWNLOAD PDF THE PHYSIOLOGY OF REPRODUCTION IN FUNGI

Chapter 1 : Fungi - Definition, Types, Examples, Characteristics & Reproduction | Biology Dictionary

Structure and Physiology of Fungi For example, fungi include the microscopic yeasts, the molds seen on contaminated bread, and the common mushrooms. Molds consist of long, branching filaments of cells called hyphae (singular, hypha).

In this article we will discuss about the asexual and sexual modes of reproduction in fungi with the help of diagrams. Asexual reproduction of fungi may take place by a variety of ways. The unicellular forms may multiply by cell division, fission or budding. Yeasts multiply either by fission as observed in the species of Schizosaccharomyces, or by budding in members of Saccharomyces. Some ascospores and basidiospores may also multiply by budding. The hyphal forms can multiply by fragmentation which may occur accidentally, or, in some fungi, it may occur through production of oidia or arthrospores. These thin-walled spores arise by cleavage of hyphae through splitting of the septa. In some fungi, the hyphal cells can produce thin-walled spores by budding. These spores are called blastospores. In many fungi, asexual reproduction occurs through production of more specialized spores. Such spores may be produced in special sacs, known as sporangia and the spores are known as sporangiospores. Spores may also be motile and, in that case they are called zoospores. Asexual spores in many fungi are produced from the tips of specialized hyphae in a highly characteristic manner depending on individual species. The specialized aerial hyphae are known as conidiophores and the spores as conidia. Sometimes, several conidiophores fuse with one another to form a columnar structure called a synnema or a coremium. In some fungi, conidiophores, instead of being evenly spread, may be restricted in specialized areas as compact beds, known as acereuli. Depending on the shape of the conidiophore-bearing areas, they are called sporodochia, pycnidia etc. Many fungi also produce thick-walled spores, known as chlamydospores which may be formed singly or in chains and may be intercalary or terminal. Different types of asexual reproductive units and associated structures are shown in Fig. Sexual reproduction takes place by fusion of two nuclei originating from two individuals of opposite mating types, generally designated as male and female. Fusion of the nuclei is preceded by fusion of two protoplasts; the process is called plasmogamy. Fusion of the nuclei is known as karyogamy. It leads to production of a diploid cell, called zygote. Eventually, meiosis takes place to restore the hyploid cells. In the higher fungi, i. Rather, the pair of nuclei divides synchronously to produce a dicaryophase. Ultimately, the two nuclei fuse to produce a diploid nucleus in a few cells before production of ascospores and basidiospores. The diploid nucleus undergoes meiosis immediately to produce haploid nuclei which pass into the ascospores and basidiospores. Plasmogamy and karyogamy may occur in a number of different ways in different taxonomic groups of fungi as described below: In lower fungi, such as chytrids, sexual reproduction takes place by fusion of male and female gametes. The male and female gametes may be morphologically similar isogamy or dissimilar anisogamy. One or both gametes may be motile or non-motile aplanogamy. In many phycomycetes, such as Saprolegnia, sexual reproduction is effected by gametangial contact. A gametangium is the structure in which gametes are formed. The male and female gametangia come in contact and a pore is produced at the point of contact. The male gametes nuclei pass through the pore into the female gametangium where they fertilize the eggs or oospheres to produce diploid oospores. In the zygomycetes, such as Mucor, the male and female gametangia come in contact and the entire gametangia fuse with other. Thereby, their separate identity is lost and the fusion produces a zygospore. In the zygospore, the male and female nuclei pair with each other. Eventually, some of these pairs of nuclei fuse and the diploid nuclei undergo meiosis to restore haploidy. In some basidiomycetes, such as the rust-fungus Puccinia, the male gametes are called spermatia which are produced in pycnidia or spermogonia. The uninucleate non-motile spermatia are passively transferred by insects to the receptive female hyphae leading to plasmogamy. The male nucleus passes into the female receptive hypha and fuse with a female nucleus. In higher basidiomycetes, like mushrooms, specialized sex organs are totally absent. In these fungi, male and female nuclei are brought together by fusion of vegetative hyphae originating from mycelia of opposite mating types. The different modes of plasmogamy are illustrated in Fig. Gametic union in Synchytrium endobioticum Morphologically similar male and female gametes unite to produce a diploid zygote. Gametangial contact in saprolignia sp. The male gametangium antheridium and

female gametangium oogonium come in contact and the male nuclei pass into the oogonium through a pore to fertilize the oospheres eggs resulting in the formation of diploid oospores. Gasmetangial copulation in mucor sp. The male and female gametangia fuse with each other to produce a zygospore. The different modes of plasmogamy illustrated in Fig. Karyogamy leads to formation of a diploid nucleus which undergoes meiosis to produce the different types of sexual spores. The formation of sexual spores is variable in different taxonomic groups of fungi. In the chytrids, such as Synchytrium endobioticum which causes wart disease of potato, the fusion of isogametes results in the formation of a diploid zoospore. The zoospores infect the host plant and form a resting sporangium. Eventually, the diploid nucleus divides meiotically to produce many haploid zoospores which, on liberation, infect new host plants Fig. In the lower phycomycetes, like oomycetes e. Saprolegnia, the fusion product is an oospore which, after a resting period, divides meiotically to produce haploid somatic mycelium Fig. In the higher phycomycetes, like Mucor, Rhizopus etc. It contains many pairs of nuclei. Some of these pairs of nuclei fuse to produce diploid nuclei, while others degenerate. The diploid nuclei undergo reduction division before the zygospore germinates into stalked sporangium containing numerous haploid sporangiospores. These spores are liberated by bursting open. The sporangiospores germinate to produce haploid mycelia of opposite sexuality Fig. In the ascomycetes, sexual union takes place between a female ascogonium and male antheridium. The male nuclei pass into the ascogonium, where the male and female nuclei form pairs, but do not fuse. The fertilized ascogonium increases in size and produces numerous outgrowths which develop into ascogenous hyphae. The ascogenous hyphae are septate and each cell contains a pair of nucleiâ€" one male and one female. The pairs of nuclei divide mitotically as the ascogenous hyphae continue to grow. Eventually, the tip of an ascogenous hypha bends to form a hook-like structure, called a crozier. The pair of nuclei present in the penultimate cell of the crozier fuse to form a diploid nucleus. This fusion nucleus 2n divides meioticaly to produce haploid ascospores. The penultimate cell elongates and develops into an ascus containing ascospores Fig. These spores are liberated by different means and produce haploid mycelia. Thus, in ascomycetes, a single sexual act produces a large number of ascospores by postponing karyogamy and interposing a dikaryotic phase in between plasmogamy and karyogamy. In the basidiomycetes, specially in the fruit-body forming types, like mushrooms, bracket fungi etc. Holobasidiomycetes , typically plasmogamy occurs by fusion of somatic hyphae which results in the formation of a dikaryotic cell containing a pair of nuclei of opposite mating types. This dikaryotic cell develops into a dikaryotic mycelium, each cell containing a pair of nuclei dikaryon. A characteristic feature of many basidiomycetes is the presence of a clamp-connection in the dikaryotic mycelium. This structure possibly ensures that each cell of the hyphae gets one copy of the daughter nuclei of each dikaryon Fig. The dikaryotic mycelium grows indefinitely and may, under appropriate conditions, lead to formation of a fruit-body basidiocarp. In some of the ultimate cells of the dikaryotic hyphae constituting the basidiocarp, the pairs of nuclei fuse to produce diploid nuclei which undergo meiotic division and produce haploid basidiospores Fig. The basidiospores on liberation germinate to produce haploid mycelia of different mating types tetra polar sexuality. In other basidiomycetes, like rust-fungi, plasmogamy occurs by spermatization in the alternate host which is berberry. Karyogamy takes place when the teleutospores germinate. The diploid nuclei in the two-called teleutospores undergo meiosis to form haploid basidiospores. These spores infect berberry plants. In rust fungi, the basidia are septate Fig. Formation of sexual spores in different taxonomic groups of fungi is diagrammatically represented in Fig.

Chapter 2 : Difference between Mold and Fungus | Difference Between

Originally published in , as part six of the Cambridge Monographs in Experimental Biology series, this book provides a concise discussion regarding the reproductive processes of fungi.

Hyphae grow at their tips apices ; new hyphae are typically formed by emergence of new tips along existing hyphae by a process called branching, or occasionally growing hyphal tips fork, giving rise to two parallel-growing hyphae. These growth processes lead to the development of a mycelium , an interconnected network of hyphae. Septate hyphae are divided into compartments separated by cross walls internal cell walls, called septa, that are formed at right angles to the cell wall giving the hypha its shape , with each compartment containing one or more nuclei; coenocytic hyphae are not compartmentalized. Mycelia grown on solid agar media in laboratory petri dishes are usually referred to as colonies. These colonies can exhibit growth shapes and colors due to spores or pigmentation that can be used as diagnostic features in the identification of species or groups. Growth and physiology Mold growth covering a decaying peach. The frames were taken approximately 12 hours apart over a period of six days. The growth of fungi as hyphae on or in solid substrates or as single cells in aquatic environments is adapted for the efficient extraction of nutrients, because these growth forms have high surface area to volume ratios. Fungi have evolved a high degree of metabolic versatility that allows them to use a diverse range of organic substrates for growth, including simple compounds such as nitrate , ammonia , acetate , or ethanol. This form of "radiotrophic" growth has been described for only a few species, the effects on growth rates are small, and the underlying biophysical and biochemical processes are not well known. These structures aid reproduction by efficiently dispersing spores or spore-containing propagules. Asexual reproduction Asexual reproduction occurs via vegetative spores conidia or through mycelial fragmentation. Mycelial fragmentation occurs when a fungal mycelium separates into pieces, and each component grows into a separate mycelium. Mycelial fragmentation and vegetative spores maintain clonal populations adapted to a specific niche , and allow more rapid dispersal than sexual reproduction. Sexual reproduction See also: Mating in fungi and Sexual selection in fungi Sexual reproduction with meiosis has been directly observed in all fungal phyla except Glomeromycota [78] genetic analysis suggests meiosis in Glomeromycota as well. It differs in many aspects from sexual reproduction in animals or plants. Differences also exist between fungal groups and can be used to discriminate species by morphological differences in sexual structures and reproductive strategies. Fungi employ two mating systems: In sexually reproducing fungi, compatible individuals may combine by fusing their hyphae together into an interconnected network; this process, anastomosis , is required for the initiation of the sexual cycle. Many ascomycetes and basidiomycetes go through a dikaryotic stage, in which the nuclei inherited from the two parents do not combine immediately after cell fusion, but remain separate in the hyphal cells see heterokaryosis. During cell division , formation of the hook ensures proper distribution of the newly divided nuclei into the apical and basal hyphal compartments. An ascus plural asci is then formed, in which karyogamy nuclear fusion occurs. Asci are embedded in an ascocarp , or fruiting body. Karyogamy in the asci is followed immediately by meiosis and the production of ascospores. After dispersal, the ascospores may germinate and form a new haploid mycelium. Compatible haploid hyphae fuse to produce a dikaryotic mycelium. However, the dikaryotic phase is more extensive in the basidiomycetes, often also present in the vegetatively growing mycelium. A specialized anatomical structure, called a clamp connection , is formed at each hyphal septum. As with the structurally similar hook in the ascomycetes, the clamp connection in the basidiomycetes is required for controlled transfer of nuclei during cell division, to maintain the dikaryotic stage with two genetically different nuclei in each hyphal compartment. In glomeromycetes formerly zygomycetes , haploid hyphae of two individuals fuse, forming a gametangium , a specialized cell structure that becomes a fertile gamete -producing cell. The gametangium develops into a zygospore , a thick-walled spore formed by the union of gametes. When the zygospore germinates, it undergoes meiosis , generating new haploid hyphae, which may then form asexual sporangiospores. These sporangiospores allow the fungus to rapidly disperse and germinate into new genetically identical haploid fungal mycelia. This ejection ensures exit of the spores

from the reproductive structures as well as traveling through the air over long distances. It is known to play a role in intraspecific hybridization [94] and is likely required for hybridization between species, which has been associated with major events in fungal evolution. Evolution of fungi In contrast to plants and animals , the early fossil record of the fungi is meager. Factors that likely contribute to the under-representation of fungal species among fossils include the nature of fungal fruiting bodies , which are soft, fleshy, and easily degradable tissues and the microscopic dimensions of most fungal structures, which therefore are not readily evident. Fungal fossils are difficult to distinguish from those of other microbes, and are most easily identified when they resemble extant fungi. Fungal fossils do not become common and uncontroversial until the early Devonian â€” These current phylogenetic analyses often overturn classifications based on older and sometimes less discriminative methods based on morphological features and biological species concepts obtained from experimental matings. Efforts among researchers are now underway to establish and encourage usage of a unified and more consistent nomenclature. Web sites such as Index Fungorum and ITIS list current names of fungal species with cross-references to older synonyms. The classification of Kingdom Fungi is the result of a large-scale collaborative research effort involving dozens of mycologists and other scientists working on fungal taxonomy. The accompanying cladogram depicts the major fungal taxa and their relationship to opisthokont and unikont organisms, based on the work of Philippe Silar, [] "The Mycota:

Chapter 3 : Fungi: characteristics and classification -

Fungi reproduce sexually or asexually, or both, depending upon the species and the environmental conditions. As the name implies, sexual reproduction is the result of the union of two spores. Most fungi reproduce both sexually and asexually.

Symbionts[edit] Schematic cross section of lichen, a symbiosis between green algae and a fungus. Thick layers of hyphae , called the cortex 2. Loosely packed hyphae 4. Anchoring hyphae called rhizines. The fungal partner may be an Ascomycete or Basidiomycete. Common cyanobacterium partners include are Nostoc [1] or Scytonema. Other lichen fungi occur in only five orders in which all members are engaged in this habit Orders Graphidales , Gyalectales , Peltigerales , Pertusariales , and Teloschistales. Lichenized and nonlichenized fungi can even be found in the same genus or species. Next to the Ascomycota, the largest number of lichenized fungi occur in the unassigned fungi imperfecti. Comparatively few Basidiomycetes are lichenized, but these include agarics , such as species of Lichenomphalia , clavarioid fungi , such as species of Multiclavula , and corticioid fungi , such as species of Dictyonema. The autotrophic symbionts occurring in lichens are a wide variety of simple, photosynthetic organisms commonly and traditionally known as algae. These symbionts include both prokaryotic and eukaryotic organisms. Approximately species of photosynthetic partners from 40 genera and five distinct classes prokaryotic: Trebouxiophyceae , Phaeophyceae , Chlorophyceae have been found to associate with the lichen-forming fungi. The most commonly occurring genus is Nostoc. The second most commonly represented green alga genus is Trentepohlia. Overall, about species are known to occur as autotrophs in lichens. All the algae are probably able to exist independently in nature as well as in the lichen. One fungus, for example, can form lichens with a variety of different algae. The thalli produced by a given fungal symbiont with its differing partners will be similar, and the secondary metabolites identical, indicating that the fungus has the dominant role in determining the morphology of the lichen. Further, the same algal species can occur in association with different fungal partners. Lichens are known in which there is one fungus associated with two or even three algal species. Rarely, the reverse can occur, and two or more fungal species can interact to form the same lichen. The alga bears its own scientific name, which bears no relationship to that of the lichen or fungi. Both the lichen and the fungus that is a part of the lichen are currently given the same species name, which creates an ambiguity. An example of when "lichenized fungus" refers to just the fungus is when the fungus is grown in culture without a phycobiont. An example where "lichenized fungus" refers to the entire lichen is in a list of classified lichens. Some fungi can only be found living on lichens obligate parasites , but are not considered part of the lichen. These are referred to as lichenolous fungi. Photosynthetic component[edit] The photosynthetic component of a lichen is called the photobiont or phycobiont. The layer of tissue containing the cells of the photobiont is called the "photobiontic layer". Chlorococcales is now a relatively small order and may no longer include any lichen photobionts. Trebuxia , once included here, is now considered to be in a separate class, Trebouxiophyceae. Another cyanolichen group, the jelly lichens e. These lichen species are grey-blue, especially when dampend or wet. Many of these characterize the Lobarion communities of higher rainfall areas in western Britain, e. Dobson Lichens, an illustrated guide to the British and Irish species. Chapter 3 in T. Bergman; Ulla Rasmussen 31 July Retrieved 2 June Retrieved 27 April Archived from the original PDF on 8 June

Chapter 4 : Physiology of the fungi.

The available literature on the physiology of reproduction in fungi [36, p.] is surveyed from the standpoints of the growth of spores and spore-bearing structures, the physiology of vegetative reproduction, the effect of environment and nutrition on sporulation, the physiology of sex, and reproduction in the natural habitat.

By Editors Fungi Definition Fungi singular: Fungi reproduce both sexually and asexually, and they also have symbiotic associations with plants and bacteria. However, they are also responsible for some diseases in plants and animals. The study of fungi is known as mycology. Fungi Characteristics Some fungi are single-celled, while others are multicellular. Single-celled fungi are called yeast. Some fungi alternate between single-celled yeast and multicellular forms depending on what stage of the life cycle they are in. Fungi cells have a nucleus and organelles, like plant and animal cells do. The cell walls of fungi contain chitin, which is a hard substance also found in the exoskeletons of insects and arthropods such as crustaceans. They do not contain cellulose, which commonly makes up plant cell walls. Multicellular fungi have many hyphae singular: Hyphae have a tubular shape and are split into cell-like compartments by walls that are known as septa. These cells can have more than one nucleus, and nuclei and other organelles can move in between them. There is some debate over whether multicellular fungi are truly multicellular, because organelles and cytoplasm can move from one cell to the other in a process called cytoplasmic streaming. They are commonly known as multicellular, but they are not multicellular in the same way as plants and animals, which have enclosed cells. These are hyphae of a Penicillium fungus. Fungi are heterotrophs; they cannot make their own food and must obtain nutrients from organic material. To do so, they use their hyphae, which elongate and branch off rapidly, allowing the mycelium of the fungus to quickly increase in size. Some fungi hyphae even form root-like threads called rhizomorphs, which help tether the fungus to the substrate that it grows on while allowing it to quickly obtain more nutrients from other sources. Fungi are opportunists, which means that they can obtain nutrients from a wide variety of sources and thrive in a wide range of environmental conditions. Some fungi obtain nutrients from dead organic matter; these fungi are called saprobes and are decomposers, which break down and get rid of dead organisms. Other fungi parasitize plants and are responsible for plant diseases like Dutch elm disease. However, fungi can also have symbiotic mutually beneficial relationships with photosynthetic algae or bacteria, and with plant roots. A symbiotic association of a fungus and an animal that photosynthesizes is called a lichen, while a plant root-and-fungus association is called a mycorrhiza. Fungi Reproduction Most fungi can reproduce through both sexual and asexual reproduction. Asexual reproduction occurs through the release of spores or through mycelial fragmentation, which is when the mycelium separates into multiple pieces that grow separately. In sexual reproduction , separate individuals fuse their hyphae together. The exact life cycle depends on the species, but generally multicellular fungi have a haploid stage where they have one set of chromosomes , a diploid stage, and a dikaryotic stage where they have two sets of chromosomes but the sets remain separate. All fungi reproduce using spores. Spores are microscopic cells or groups of cells that disperse from their parent fungus, usually through wind or water. Spores can become dormant for a long time until conditions are favorable for growth. This is an adaptation for opportunism; with a sometimes unpredictable food source availability, spores can be dormant until they are able to colonize a new food source. Fungi produce spores through sexual and asexual reproduction. Types of Fungi There are five phyla of fungi: Chytridiomycota, Zygomycota, Glomeromycota, Ascomycota, and Basidiomycota. The following is a brief description of each phylum. Chytridiomycota Chytrids, the organisms found in Chytridiomycota, are usually aquatic and microscopic. They are usually asexual, and produce spores that move around using flagella, small tail-like appendages. The chytrid Batrachochytrium dendrobatidis can cause a fungal infection in frogs by burrowing under their skin, and it has recently devastated populations of harlequin frogs, killing off two-thirds of them in Central and South America. Zygomycota Zygomycetes are mainly terrestrial and feed off of plant detritus or decaying animal material. They also cause problems by growing on human food sources. One example of a zygomycte is Rhizopus stolonifer, a bread mold. The hyphae of zygomycetes are not separated by septa, making their mycelia essentially one large cell with many nuclei. They usually

reproduce asexually, through spores. Glomeromycota Glomeromycetes make up half of all fungi found in soil, and they often form mycorrhizae with plants; in fact, percent of all land plants develop mycorrhizae with glomeromycetes. The fungi obtain sugars from the plant, and in return, dissolve minerals in the soil to provide the plant with nutrients. These fungi also reproduce asexually. However, some ascomycetes normally are found inside humans, such as Candida albicans, a yeast which lives in the respiratory, gastrointestinal, and female reproductive tracts. Ascomycetes have reproductive sacs known as asci, which produce sexual spores, but they also reproduce asexually. Basidiomycota Like ascomycetes, basidiomycetes also produce sexual spores called basidiospores in cells called basidia. Basidia are usually club-shaped, and basidiomycetes are also known as club fungi. Most basidiocytes reproduce sexually. Mushrooms are a common example of basidiomycetes. Examples of Fungi Fungi are sometimes overlooked in biology, especially compared to bacteria, plants and animals. This is partially because many fungi are microscopic, and the field of mycology did not really develop until after the invention of the microscope. However, there are many common examples of fungi. Yeasts are one example. As mentioned before, Candida albicans grows naturally inside the human body, but sometimes it can grow excessively and cause a yeast infection. Yeast infections are extremely common; 75 percent of women will have at least one yeast infection during their lifetime. Fungi are also often associated with food. Mushrooms and truffles are examples of fungi that are sometimes edible, the latter being highly prized in haute cuisine internationally. Molds are fungi that grow on foods over time, causing them to spoil. However, some molds are used in the process of cheese-making. Molds are added to soft ripened cheeses like brie, washed rind cheeses like Limburger, and blue cheeses. Related Biology Terms Heterotroph â€” An organism that cannot make its own food and must obtain nutrients from other organic sources. Hyphae â€” Branching filaments of a fungus. Mycelium â€” A network of hyphae. Yeast â€” Single-celled fungi. Which of these is NOT a fungus?

Chapter 5 : The physiology of reproduction in fungi (edition) | Open Library

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The kingdom Fungi, the plural of fungus, are eukaryotic and heterotrophic organisms, capable of absorbing organic carbon. They are essentially aerobic and include yeasts, molds, and mushrooms. Yeasts are unicellular microscopic organisms which reproduce vegetatively by budding. Molds are microscopic as well and are characterized by the presence of multicellular hyphae forming a mycelium. Mushrooms, on the other side, present a macroscopic sexual organ, the fruiting body where the sexual spores are produced. A number of fungi species are dimorphic and are capable of growing as yeasts or molds according to the temperature or CO2 concentration. An example is Blastomyces dermatitidis which can exist as both mold and yeast. Fungi absorb their nutrients through their cell wall following the release of specific enzymes which digest organic macromolecules in the extracellular environment. The digested molecules then cross by diffusion through the fungal cellular envelope. Fungi are saprophytes when the carbon originates from nonliving substrates and parasites or commensal when the source of carbon is a living organism. Reproduction in fungi occurs by the production of spores which can be sexual or asexual. Sexual reproduction involves the fusion of two haploid nuclei. This is followed by a meiotic division of the nucleus. During asexual reproduction, asexual spores called sporangiospores are formed and divide subsequently by mitosis. Fungi are classified based on their reproductive system: Anamorphs constitute asexual reproductive structures, and teleomorphs constitute the sexual reproductive structures. The term holomorph is used to refer to the complete fungus with its anamorph and its teleomorph structures. What is Mold Molds are a microscopic type of fungi, which unlike the unicellular microscopic yeasts or the macroscopic multicellular mushrooms, are characterized by the presence of multicellular filaments called hyphae. The network formed by the hyphae constitute the mycelium which is visible to the naked eye. Hyphae grow by apical elongation, a process involving the fusion of vesicles with the plasma membrane at the apex, the consecutive digestion of the membrane, and the formation of a new cell wall. Molds can reproduce sexually by forming zygospores which result from the fusion of two haploid cells. When the environmental conditions are favorable, a zygospore undergoes meiosis, the cellular division which results in two new haploid cells different than the parent cell. Molds can also reproduce asexually. In this case, sporangiospores are released from special hyphae called sporangiophores. Sporangiospores are diploid cells that undergo mitosis producing new cells that are identical to the parent cell. Difference between Mold and Fungus Definition of Mold and Fungus Fungi is a kingdom comprising a large number of species which are eukaryotic and heterotrophic organisms. It includes yeasts, molds, and mushrooms. Molds are a group of fungi, which are specifically multicellular microscopic organisms characterized by the presence of multicellular filaments, the hyphae. Morphology of Mold and Fungus Fungi can exist as unicellular microscopic organisms called yeasts, as multicellular microscopic molds with hyphae, or as macroscopic mushrooms with a visible sexual organ, the fruiting body. Some specific fungi can also be dimorphic, present as both molds and yeasts, switching between the two forms according to the environmental conditions such as temperature or CO2 concentration. Molds, on the other hand, are multicellular microscopic fungi, typically characterized by the presence of hyphae filaments. The aggregation of the hyphae as a network constitute the mycelium, visible to the eye. Physiology of Mold and Fungus All fungi including molds are essentially heterotrophic and aerobic organisms, with only some yeast species being anaerobic. They are both able to absorb organic carbon from the environment through external digestion. Catalytic enzymes are secreted and released into the extracellular environment where macromolecules such as sugar, lipids, and proteins are therefore digested. The resulting small molecules are then absorbed by diffusion into the fungi cells. Fungi and molds are called saprophytes when the carbon originates from nonliving substrates and parasites or commensal when the source of carbon is a living organism. Reproduction of Mold and Fungus Fungi such as yeasts and molds alike reproduce by the production of spores which can be sexual or asexual. Sexual

reproduction involves the fusion of two haploid nuclei followed by the meiotic division of nucleus and resulting in two cells which are different from the parent cell. Asexual reproduction occurs when diploid spores are formed and divide subsequently by mitosis, producing two diploid cells identical to the parent cell. Classification of Mold and Fungus All fungi including molds are classified based on their reproductive structures. They are called anamorphs when they reproduce asexually, teleomorphs when they present sexual reproductive structures. The fungus and mold is a holomorph referring to both its asexual and sexual structures. Comparion Chart Summary of Mold and Fungus Molds are a group of microorganisms belonging to the kingdom of Fungi, which comprises as well yeasts and mushrooms. The main difference between molds and other fungal species resides in their morphology. Molds are multicellular microscopic organisms characterized by the presence of filaments called hyphae, while yeasts are unicellular microorganisms, and mushrooms present a macroscopic fruiting body producing spores. If you like this article or our site. Please spread the word.

Chapter 6 : Introduction to Fungi

PHYSIOLOGY OF FUNGI OR MYCETES OR MYCOPHYTES - MYCOLOGY (see also human diseases caused by fungi) ; taxonomy & features; true Fungi (Kingdom Mycota or Eumycota) with many characteristic biochemical features, showing that they are a monophyletic group of organisms.

References Abstract Fungal physiology is concerned with activities related to growth, development and reproduction of fungi. These activities can only be understood with reference to the structure of these organisms. The fungal hypha as an efficient tunnelling machine. At the extreme apex, plastic wall components are synthesized at the plasma membrane and pushed into the extensible apical wall. These wall components are gradually crosslinked increased yellow colour as the apex pushes forward and the wall matures. The force for penetration is the hydrostatic pressure caused by the turgor osmotic uptake of water , while proteins delivered in vesicles red are extruded in the apical wall by fusion of vesicles with the plasma membrane red and transported over the wall by the flow of plastic wall components blue arrows. Among these proteins are degradative enzymes that dissolve solid polymers and thus ease the way for hyphal penetration and hydrophobins that attach the hyphal wall to hydrophobic solids. Models showing the role of hydrophobins in the emergence of aerial hyphae a and b and the role of hydrophobins in adherence of fungal structures to hydrophobic surfaces such as plant leaves. In a hydrophobin molecules are secreted at the tips of hyphae into the medium and assemble at the waterâ€"air interface into a membrane that lowers the water surface tension so that hyphae can grow through the surface into the air. Once in the air b the hydrophobins assemble at the surface of the hyphae providing them with a hydrophobic coating. In c a hypha growing in the air adheres to a hydrophobic surface. In d it grows in an aqueous environment over a hydrophobic surface. Secreted hydrophobins assemble at the hydrophobicâ€"hydrophilic interface making the surface hydrophilic wettable so that proteins or polysaccharides in wall or secreted capsular material dark blue can now glue the hypha to the surface. Chains of hydrophobin monomers are folded in such a way that hydrophobic amino acids red are located at the inside, hydrophilic amino acids blue at the outside of the molecule where they can interact with water. When assembling at a hydrophobicâ€"hydrophilic interface the hydrophobins undergo a conformational change exposing hydrophobic amino acids to one side and amino acids to the other, forming an amphipathic membrane from Wessels,. Molecular Biology of Fungal Development, pp. Biochemistry and Molecular Biology, pp. Harold FM Ionic and electrical dimensions of hyphal growth. I, Growth, Differentiation and Sexuality, pp. Hawksworth DL The fungal dimension of biodiversity: Honegger R Metabolic interactions at the mycobiontâ€"photobiont interface in lichens. V, Plant Relationships, Part A, pp. Lewis DH Concepts in fungal nutrition and the origin of biotrophy. Biological Reviews, Cambridge Moore D Fungal Morphogenesis. Perkins DD Neurospora: Rayner AD The challenge of the individualistic mycelium. Frontiers in Mycology, pp. Schuren FHJ Heterologous protein production in mycelial fungi. Talbot NJ Fungal hydrophobins. Biology of the Fungal Cell, pp. Trinci APJ The duplication cycle and vegetative development in moulds. III, Developmental Mycology, pp. Wessels JGH a Wall growth, protein excretion and morphogenesis in fungi. Wessels JGH b Fruiting in the higher fungi. Advances in Microbial Physiology Wessels JGH Hydrophobins, unique fungal proteins. Deacon JW Modern Mycology, 3rd edn. Elliott CG Reproduction in Fungi. Griffin DH Fungal Physiology, 2nd edn.

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Chapter 7 : Lichen anatomy and physiology - Wikipedia

Fungi exists in two fundamental forms, filamentous or hyphal form (MOLD) and singe celled or budding form (YEAST). But for the classification of fungi, they are studied as mold, yeast, yeast like fungi and dimorphic fungi.

Autumn semester Course description 1. The chemistry of the mycelium. Regulation of the replication and transcription. Primary metabolism and special aspects aerobe and anaerobe respiration, cyanide resistant respiration, primary biosynthesis. C, N and P metabolism in fungi. The polysaccharides of fungi. The biosynthesis of trehalose, plant and fungal trehalases, TPS transformation. The specific secondary metabolites of fungi. Synthesis of micotoxins, pigments, antibiotics and other medicinal substances. Regulation of metabolism and division. Internal and external regulatory factors. Signals and signal transduction pathways. Structure, growth and differentiation of the mycelium. Trophic growth, nutrient uptake, transport, translocation. Digestion processes of fungi. Induction and classification of extramycelial enzymes. Effect of the environment temperature, pH, humidity, light, nutrients on growth and differentiation. Termophil and psichrophil fungi. Physiology of the sexual and asexula reproduction. Genetic and hormonal regulation of the vegetative â€" reproductive transition. Induction of primordium and fruit body formation hormons and Process of spore formation. Induction and environmental conditions of spore germination. The most important biodegradation processes of fungi. Enzymes of the cellulase complex, induction, intermediers, process and regulation of the cellulose decomposition. The brown rot fungi. Industrial production of cellulases. Lignin decomposition, enzymes lignin peroxidase,, laccase, tyrosinases, phenoloxidase , relationships between structure and function. Enzymes of the white rot fungi. Delignification with industrial and biological methods. Stress physiology of fungi and the role of phytopathogen fungi in plant diseases. Physiological bases of culturing fungi. Two-step fermentation, solid and liquid phase cultures, composting. Readings Text and figures on CD and homepage: Physiology of fungi recommended:

Chapter 8 : Physiology of Fungi - Mycology

Covers cultivation and growth, composition of fungus cells, carbon nutrition and metabolism, respiration, nitrogen nutrition and metabolism, inorganic nutritIon and metabolism, vitamin requirements of fungi, reproduction, spore germination, and the action of physical and chemical agents.

Chapter 9 : Physiology of fungi

Asexual reproduction of fungi may take place by a variety of ways. The unicellular forms may multiply by cell division, fission or budding. Yeasts multiply either by fission as observed in the species of Schizosaccharomyces, or by budding in members of Saccharomyces.