

Module 7

Chapter 12 – The Eukaryotes

Fungi

- _____: the study of fungi
- Fungi important in food chain
 - _____ dead matter
 - Recycle _____
- Used for _____, produce food, _____
- _____
 - Most are _____ or _____ anaerobes
 - Few anaerobes known

Characteristics of fungi

- Multicellular fungi identified based on _____
 - Colony characteristics, reproductive spores
- Classified into 3 groups:
 -
 -
 -

Molds and fleshy fungi

- _____: body of fungus
 - Consist of _____ of cells joined together called _____ or _____ (singular)
- _____: filamentous mass of fungi
- Hyphae grow by elongating at the _____
 - Each _____ is capable of _____
 - Fragments that _____ can form new hypha
- _____ hypha: portion of thallus that obtains _____ → actively _____ portion
_____ *Hypha*
- Most hyphae have _____
- _____ into cell-like units
_____ *Hypha*
- Few have _____
- Appear as long continuous cells with _____

Reproductive Hyphae

- Concerned with _____
 - Aka _____ hyphae
 - Project _____ the surface

Yeasts

- _____, unicellular fungi
 - Typically _____ or _____
- Yeasts divide _____
 - Daughter cell (_____) is _____ than parent cell
- Yeasts capable of _____ growth
- Can use _____ as final electron acceptor
 - Produce _____ and water
- Can use _____ as final electron acceptor
 - Forms _____ and _____
 - Important in food industry

Dimorphic fungi

- Can grow as _____ or _____
- In pathogens, _____ is temp-dependent
 - _____ °C – yeastlike
 - _____ °C – moldlike

Characteristics of Fungi

- Fungi are _____
 - Compete with _____ for food
- Nutritional characteristics provide some advantages
 - Fungi can grow _____
 - Resistant to _____
 - _____
 - Can grow in low _____, low _____ environment
 - Capable of degrading _____; lignin in wood

Life Cycle of Fungi

- Reproduction accomplished by forming _____
 - Spores _____ from parent
 - _____ into new mold
- _____ fungi
 - Produce both _____ and _____ spores
- _____ fungi
 - Produce only _____ spores
- Spores can survive for extended periods in _____, _____
 - _____ to the extreme like bacterial _____
- Filamentous fungi reproduce _____ by fragmenting _____
- Asexual spores formed by _____ hyphae
- Spores are _____

Conidiospores

- Spore _____ enclosed in _____
- Conidia (pl) or _____ produced in chain at end of _____

Arthrospores

- A type of _____
- Septate hyphae fragment into a _____, _____ spore, an _____

Sporangiospores

- Formed within _____ or _____ at end of _____
- Can contain hundreds of _____

Sexual Reproduction

- *Sexual* spores result from _____ of _____
- Requires opposite _____
- Spores have characteristics of _____
- _____: fusion of haploid cells produces one _____
- _____: formed in a sac (_____)
- _____: formed externally on a _____ (_____)

Fungal Diseases

- _____: a fungal infection
- Generally _____ (long-lasting) because fungi _____
- Classified into 5 groups according to
 - Degree of tissue involvement
 - Mode of entry into host
- _____ *mycoses*
 - Infections _____ the body
 - Route of entry is _____
 - Begin in _____, spread to other tissues
- _____ *mycoses*
 - Fungal infections _____
 - Infection occurs by _____ of spores _____
 - Sporotrichosis is subcutaneous infection acquired by gardeners, farmers
- _____ *mycoses*, _____ *mycoses*
 - Infect epidermis, hair, and nails
 - Secrete _____, _____ keratin in hair, skin
 - Transmitted by _____
- _____ *mycoses*
 - Localized along _____, _____ skin cells
 - _____ is invaded, often unaware of infection
- _____ *pathogen*
 - Generally _____ in normal habitat
 - Becomes pathogenic in _____ host
 - Under treatments with antibiotics, suppressed immune system

Chemotherapy

- Difficult to target fungi – cells are _____
 - Structures, metabolism is _____
- **Sterols** in _____ differ in fungi

- **Ergosterol vs cholesterol**
- Fungal _____ are also a target
- In general, anti-fungal treatments require _____
 - Fungi grow _____ than bacteria

Ergosterol Synthesis Inhibitors

- Causes excessive _____ of membranes
- Polyenes:
 - Amphotericin B most common, but _____ to kidneys
- Azoles
 - Most widely used anti-fungal
 - Imidazoles used as _____ for athlete's foot and yeast infections
 - Triazoles (fluconazole, itraconazole) have _____, very commonly used

Cell Wall Synthesis Inhibitors

- Primary target is _____, found in chitin cell wall
- Incomplete cell walls lead to _____
- Echinocandins useful for _____ mycoses

Lichens

- Mutualistic combination of an _____ (or a cyanobacterium) and _____
- Alga produces and secretes _____; fungus provides _____
- Colonize habitats that are _____ for either the alga or the fungus alone
- _____ growing
- Three morphologic categories
 - _____ lichen: grow _____ or encrusting on surface
 - _____ lichen : _____
 - _____ lichen – _____ projections

Protozoa

Characteristics of protozoa

- Unicellular _____
- Inhabit water and soil
- _____: feeding and growing stage
- Relatively few cause disease
 - But diseases are significant
- Involve complex _____
 - Often with multiple _____
- Reproduce asexually and _____
- _____: formation of a _____ called a _____
 - Occurs as part of _____
 - Parasites can survive _____
- Mostly _____
 - Some capable of anaerobic growth
- All live in areas with _____

Malaria

- _____: causative agent of malaria
- *Anopheles* mosquito is _____ host - _____
- Human is _____ host – _____ reproduction

Toxoplasmosis

- _____ - causative agent of toxoplasmosis
- Felines are _____
- Mammals are _____
- Cysts are excreted in feces of cats
- Humans _____ or _____ cysts
- Especially harmful to _____ → can cause _____

Helminths

Characteristics of helminthes

- _____ eukaryotic animals
- Parasitic helminths have characteristics that differ from free-living helminths
 - Lack _____ system
 - Reduced _____ system
 - Reduced or absent _____
 - Complex _____ system
- _____ (hermaphroditic)
 - Male and female reproductive systems in _____
- _____
 - Separate male and female
- _____ → _____ → _____
- Two groups of helminths
 - _____ and _____
- Platyhelminths
 - The _____ → flukes and tapeworms
- Nematodes
 - The _____
- Two modes of transmission
 - Eating of _____, _____
 - Excreted in _____
 - Eating of _____
 - From _____

Lung Fluke: _____

- _____ are definitive hosts
- Lives in _____, excreted in _____
- _____ are intermediate hosts
- Humans infected by _____ from mollusks

Trichinosis: _____

- Nematode grows inside _____ intestines
- Humans get infected by eating _____

Rat Lungworm: _____

- _____ are definitive hosts
 - Lives in _____, excreted in _____
- _____ are intermediate hosts
- Humans get infected by eating _____
- Humans are “_____” or “_____” hosts
 - Can be _____, but not _____

Chapter 13 – Viruses, Viroids, and Prions

General characteristics of viruses

- _____
- Especially _____
 - Can't be _____ from solution
- Obligate _____ parasites
 - No _____ when isolated
- Multiply _____ living cells
- Cause synthesis of special structures
- Contain _____ type of nucleic acid (_____ or _____)
- Protein coat (_____) surrounding the nucleic acid
 - Some are enclosed by an _____
- Viruses have _____ enzymes of their own
 - Completely _____ on host cell
- Antiviral treatments _____
 - Drugs that target replication machinery also target host cell
- _____ range: the _____ of host cells that virus can _____
- Most viruses are limited to _____ cell type of _____ host species
- Host range determined by:
 - Virus' requirements for _____
 - Availability of _____ for multiplying
- Viral host range gives potential in _____
 - Use of bacteriophage to treat _____ infections
 - _____ viruses infect only tumor cells

Virions

- _____, fully _____ infectious viral particle
- Composed of _____, surrounded by a _____
- Capsid protects virus, determines _____
- Nucleic acid can be either _____ or _____ genome, never _____
- Can be _____ stranded (ds) or _____ stranded (ss)

- Viruses classified by _____
- Some viruses have capsid covered by an _____ made of _____, _____, carbohydrates

Helical Viruses

- Resemble _____
- Can be _____ or _____

Polyhedral viruses

- Many _____
- Most are _____: 20 triangular faces, 12 corners

Enveloped viruses

- Covered by _____
 - From plasma membrane from _____
- Can be enveloped _____, enveloped _____
- _____ used for _____

Complex viruses

- _____ structures in addition to capsid
- Additional structures can include _____, tail pin, _____, baseplate

Taxonomy of viruses

- Classification of viruses is based on type of _____, replication, _____
- Family names end in – _____
- Genus names end in – _____
- Viral species: group of viruses that share same _____ and _____
 - _____ names are used for species
 - Subspecies are designated by a _____

Growing Viruses

- Viruses cannot replicate _____ of host
- In laboratory, viruses must be cultures in _____

Growing animal viruses in the laboratory

1. In _____
 - Include mice, rabbits, and guinea pigs
 - Most studies of _____ involve live animals
 - Some viruses cannot be grown in animals, or do not cause disease
 - _____, HIV has no live animal model
 - Difficult to study
2. In embryonated _____
 - Convenient and _____
 - _____ is drilled in _____ of embryonated egg
 - Viral suspension, virus containing tissue injected
 - Many membranes in egg can support growth of virus
 - Many viral _____ prepared in eggs

3. In _____

- Preferred growth medium of viruses
 - _____ population of cells, handle much like _____, _____ to work with than live animals, eggs
- Cell cultures (not _____) grown in liquid culture media in lab
 - Viruses grow in _____

Viral multiplication

Multiplication of animal viruses

- All animal viruses have similar life cycles
 -
 -
 -
 -
 -
 -
- Major difference between viruses is in _____, _____

Attachment

- Attach to _____ (_____) on host _____
- _____ distributed all over viruses
 - _____ or _____

Entry

- Nonenveloped viruses enter by _____
 - Transport of molecules into a cell via vesicles
- Enveloped viruses enter through _____ of _____ to host membrane

Uncoating

- Separation of _____ from _____
 - Many ways this happens

Biosynthesis and Maturation

- Biosynthesis
 - _____ of viral DNA → viral _____
 - _____ of viral mRNA → viral _____
 - Uses mostly _____ enzymes
- Maturation
 - _____ of _____

Release

- Nonenveloped viruses released by _____ plasma membrane
- Enveloped viruses obtain envelope by _____
- Assembled _____ pushed through _____

Live Cycle of Enveloped Virus → HIV

- _____ genome
- Must convert _____ into _____

- Uses _____ enzyme
 - _____
- HIV infects _____ cells (_____ cells)
 - A white blood cell
- _____ binds to protein on T cell
 - Protein receptor _____ Helper T cells
- HIV enters cell
 - _____ fuses with membrane
- Uncoating
- _____ converts viral RNA into DNA
- Retroviral DNA enters _____
- Inserts into _____
 - Integrated viral DNA is known as _____
- Can exist in _____ or _____ state
- Productive state – HIV matures
 - Maturation
 - Released by _____

Viruses and cancer

- _____: genes associated with cancer
- Many oncogenes control when a cell _____
 - Activated oncogenes transform normal cells into _____ cells
- _____ cells grow uncontrolled, leading to _____
- The genetic material of _____ viruses becomes integrated into the host cell's _____ → forms _____
 - Insertion can activate _____

Latent viral infections

- Viruses remains _____ host cell for long periods

Persistent viral infections

- Disease process occurs _____ over a long _____; generally _____