Lecture 11

The Pathway to Fungi, Plants and Animals

- Evolution of multicelularity has occurred over multiple times (25 to be exact)
- Unikonta (group of protists):
    - Amoebozoans
    - Opisthokonts = protists, fungi and animals

Amoebozoans:

- Unicellular
- Multi-nuclei
- Have no fixed form (lobes instead)
- Pseudopod – projection of cytoplasm
- Ubiquitous (break down stuff) in soil and water
- Seek and consume bacteria
- Some are parasitic and infect vertebrates
- Amoebic dysentery (common type)

➢ Slime moulds: (two groups)
- Plasmodial slime moulds
    - Acellular organism
    - Large vegetative mass
    - 'Super cell' = sac of cytoplasm containing thousands of nuclei
- Cellular slime moulds
    - Unicellular organism when resources are present
    - Work collectively when resources are sparse

Opisthokonts:

➢ Fungi:
- Originated from a single-celled ancestor with a flagellum
- Early lineages all had a single flagellum – common ancestor to fungi, certain protists and animals
- Two groups of fungi:
  flagellated (chytrid, require a kind of moisture to move around) and non-flagellated
- Zoospores in chytrid require moisture to move from sporangium using a single flagella
- Fungi thought to have colonised land well before plants though fossil records are sparse
- Five fungal phyla:
    1. Chytridomycota = chytrid
        - Only living fungi=flagellated cells=zoospores
        - Many parasitic – mostly algae and microbes
        - Not all live as parasites
        - Decomposers in soil and freshwater lakes
        - Some exist as anaerobes, living symbiotically inside herbiovores such as cows, assisting in the decomposition of plant compounds
    2. Zygomycota
        - Common bread and fruit mould

3. Glomeromycota
    - Form mutualistic relationships with plant roots (extend root system)

4. Ascomycota
    - Form saclike spores
    - Many fruit underground = truffles
    - Most form specific fruiting body called an ascocarp containing structures to form spores
    - Severe disease-causing plant pathogens
    - Some assist plants in water absorption and may inject and insect-repelling toxin into plant tissue as defence

5. Basidiomycota
    - aka club fungi
    - Can grow basidiocarp over a span of hours

Key Traits:

- Chitin: cell walls made from nitrogen containing polysaccharide (therefore not plants)
- Heterotrophic (do not photoythesis – some exceptions however)
- Do not ingest food (therefore not animals)
- Absorb nutrients from outside their body
- Enzymes break down complex molecules into smaller organic compound which they absorb
- Fungi comes in two forms:
    - Single celled = yeast (that have a multicellular ancestor)
    - Multicellular filaments = hyphae
    - Some fungi produce both forms

Yeast (single celled):

- Reproduce **asexually** by copying DNA and pinching off a new cell in a process known as 'budding'
- DNA replication and cytokenesis
- yeast do not form a clade of their own, species within yeast are found in Ascomycota and Basidiomycota
- Many species associated with sugar-rich materials = fruit skins, plant saps, mutualists with soil and insects and can be parasitic
- Hyphae:
    - Have tubular cells with cell wall
    - Some segregated
    - May be multinucleated
    - Not made out of cellulose but chitin
    - Chitin is used in exoskeleton of invertebrates

Fungal reproduction (multicellular):

- Reproduce asexually and sexually
- Fungal cells are haploid – only 1 set of chromosomes