

SLE204 – Animal Diversity

S1 2020 Deakin University

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Kingdom Protozoa

Main characteristics

- Are complete organisms
- All activities are carried out within a cell membrane
- Animal-like features such as no cell wall, at least one motile stage in their life cycle and most ingest food – various types of nutrition
 - Autotrophic – Synthesise their own food
 - Heterotrophic – Obtain organic molecules synthesised by other organisms – phagotrophs (ingest visible particles)
 - Saprozoic – Ingesting food in a soluble form
- Are unicellular
- Mostly microscopic
- Have variable shape – high diversity
- No organs or tissues – organelles with complex structure
- Free living, mutualism, commensalism, parasitism

How protozoans move – particularly the ciliate *Paramecium*

- Pseudopodia (false foot)
 - Blunt extensions of cell body forms
 - Hyaline cap forms (extension of the ectoplasm)
 - Endoplasm then flows into the hyaline cap
 - Hydrostatic pressure forces endoplasm towards hyaline cap
- Cilia (*Paramecium*)
 - Little hairs around cell body
 - Have a power stroke and then a return stroke (like swimming)
 - *Paramecium* knows when to change direction because the electrical potential changes across its membrane (spiral path of swimming)
 - Attraction – increases the rate of the forward ciliary beat
 - Avoiding reaction – results in ciliary reversal and backward swimming
- Flagella (whip like)
 - Simple undulations (move up and down)
 - No morphological difference with cilia
- Sessile (don't move)

Structures involved in obtaining food and osmoregulation

Osmoregulation

- Vacuoles observed in cytoplasm
- Contractile vacuoles function in osmoregulation (water balance) – mainly in freshwater protozoans
 1. Water diffuses in passively to maintain an osmotic pressure = to that in the cytoplasm
 2. Vacuole fills & its membrane fuses with the surface membrane
 3. Water & ions are expelled
- Remove excess water that's entered the cytoplasm by osmosis
- Vacuoles are made of a system of cisternae and tubules
- Proton pumps in their membranes transport hydrogen and co-transport bicarbonate into the vacuoles

What happens to their food?

- Engulfed in a food vacuole – intracellular membrane bound vesicle
- Lysosomes – small vesicles containing digestive enzymes, fuse with food vacuole
- Undigested material released to outside – exocytosis
- Most ciliates/flagellates have a definite mouth structure (cytostome)
- Amoeba – release can occur across almost any point along membrane

Excretion

- Metabolic wastes – entirely by diffusion
- Main end product of nitrogen metabolism is ammonia – readily diffuses across cell membranes

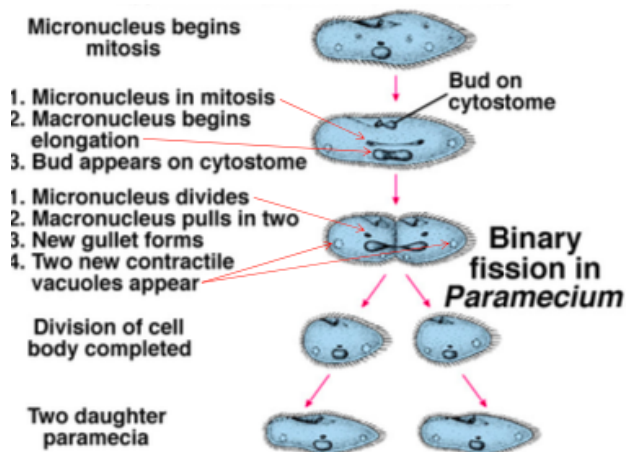
Endoparasites – *Plasmodium*, *Trypanosoma* – know the diseases they cause and their vectors

- Group of organelles, the apical complex
- Locomotor organs less obvious
- At some point in life cycle spore develops
- Often life cycle with sexual and asexual stages
- Invertebrate intermediate host included in cycle e.g.
 - *Plasmodium* sporozoan parasite which causes malaria, transmitted by (vector) is the mosquito
 - *Trypanosoma* parasite causes African sleeping sickness and is transmitted by the Tsetse fly

Modes of reproduction

No embryo is developed

- Binary fission
 - Multiplication of cells that produces more individuals
 - Produces 2 identical individuals
 - Forms protective tests
 - Nuclei divides



- Conjugation – sexual reproduction
 - The exchange of genetic material
 - Reduction of chromosome numbers to half
 - Development of sex cells (gametes)
 - Fusion of gamete nuclei
 - Increases genetic variation
- Self-fertilisation (autogamy) – similar to conjugation but no exchange of nuclei

Phylum Cnidaria

Nematocytes with nematocysts

There are 4 classes of *Cnidarians*

1. Hydrozoa
 - Hydra, Obelia, Physalia (Portuguese Man-O-War, Bluebottles)
2. Scyphozoa
 - Jellyfish – single animal with 2 life history stages: medusa and bottom dwelling polyp
3. Cubozoa
 - Cube jellyfish
4. Anthozoa
 - Sea anemones, corals

Key characteristic

- Name comes from cnidocyte/nematocytes – cells containing the nematocysts
- Nematocytes only formed by cnidarians
- Mostly sessile – at best slow moving (swimming)
- Abundant in shallow marine habitats

Simple animals but very effective predators – kill and eat prey far more sophisticated than themselves