

Plant cells and cell walls

What is the middle lamella?

Plant cells and cell walls

Describe the structure of a chloroplast.

Plant cells and cell walls

What are pits in a plant cell wall?

Plant cells and cell walls

Three features of plant cells that animal cells lack.

Plant cells and cell walls

How can an amyloplast be told from a chloroplast in an electron micrograph?

Plant cells and cell walls

Which glucose isomer makes up starch and which makes up cellulose?

Plant cells and cell walls

Why is amylopectin broken down quickly?

Plant cells and cell walls

How are cellulose microfibrils held together?

Double membrane envelope; thylakoids stacked into grana in the fluid stroma; stroma holds enzymes, starch grains, 70S ribosomes and circular DNA.

A layer rich in pectins (calcium pectate) between the walls of neighbouring plant cells that cements the cells together.

Cellulose cell wall, chloroplasts, large permanent vacuole with tonoplast (also starch store and fixed shape).

Regions where the wall is thin because no secondary thickening was deposited, allowing water and solutes to pass between cells.

Starch: α -glucose. Cellulose: β -glucose.

Amyloplast has starch grains and no internal thylakoid stacks (grana); a chloroplast has grana.

Many hydrogen bonds between -OH groups of adjacent parallel β -glucose chains.

It is branched, so has many ends where enzymes hydrolyse the glycosidic bonds at the same time.

Plant cells and cell walls

What is secondary thickening?

Plant cells and cell walls

Name three plant fibres used by humans.

Plant tissues, fibres and mineral nutrition

Function of sclerenchyma fibres?

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Function of xylem vessels?

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Function of phloem?

Plant tissues, fibres and mineral nutrition

How is a companion cell different from a sieve tube element?

Plant tissues, fibres and mineral nutrition

Order of tissues in a dicot stem vascular bundle, from the centre outwards.

Plant tissues, fibres and mineral nutrition

What must a plan diagram not include?

Flax, hemp, jute (also sisal): used for rope, textiles, paper and composites.

Extra layers of cellulose and lignin laid down inside the primary wall, making cells like xylem vessels and sclerenchyma fibres rigid and waterproof.

Support, and transport of water and mineral ions up the plant.

Support. Dead cells with thick lignified walls giving high tensile strength.

It has a nucleus, dense cytoplasm and many mitochondria; the sieve tube element has little cytoplasm and no nucleus.

Translocation of organic solutes, such as sucrose, from sources to sinks in both directions.

Individual cells. It shows only the outline and tissue boundaries.

Xylem, phloem, sclerenchyma (cap).

Plant tissues, fibres and mineral nutrition

How do you avoid air bubbles when mounting a section?

Plant tissues, fibres and mineral nutrition

Formula for magnification.

Plant tissues, fibres and mineral nutrition

Define sustainability.

Plant tissues, fibres and mineral nutrition

Name two plant-based replacements for oil-based plastics.

Plant tissues, fibres and mineral nutrition

Why do plants need nitrate ions?

Plant tissues, fibres and mineral nutrition

Why do plants need calcium ions?

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Why do plants need magnesium ions?

Plant tissues, fibres and mineral nutrition

Two functions of water in plants.

Magnification = size of image $\div$ size of real object.

Lower the coverslip at an angle with a mounted needle.

Starch-based plastics and plant fibre materials (for example hemp or flax).

Meeting the needs of the present without harming the ability of future generations to meet their own needs.

To form calcium pectate in the middle lamella and cell walls; also for membrane structure.

Nitrogen for amino acids, proteins, nucleotides and chlorophyll.

Turgor and support; solvent and transport medium; reactant in photosynthesis; cooling by transpiration.

Magnesium is the central atom in chlorophyll.

Plant tissues, fibres and mineral nutrition

Formula for tensile strength.

Plant tissues, fibres and mineral nutrition

How do you convert a mass to a force?

Bacterial growth, plant medicines and drug testing

Name the conditions required for bacterial growth.

Bacterial growth, plant medicines and drug testing

How do bacteria reproduce?

Bacterial growth, plant medicines and drug testing

Which plant provides allicin and what is it used for?

Bacterial growth, plant medicines and drug testing

Which plant substance led to aspirin?

Bacterial growth, plant medicines and drug testing

What does digitalis come from and what is it used for?

Bacterial growth, plant medicines and drug testing

Why is the dish incubated upside down?

Force (N) = mass (kg) × 9.81 N kg⁻¹.

Breaking force (N) ÷ cross-sectional area (mm²).

Asexually by binary fission.

Nutrients (carbon and nitrogen sources, ions), suitable temperature, oxygen (aerobes), suitable pH and water.

Salicin from willow bark.

Garlic. Allicin has antimicrobial properties.

So condensation does not drip onto the agar.

Foxglove (*Digitalis purpurea*); treating some heart conditions.

Bacterial growth, plant medicines and drug testing

Why is the lid not sealed completely?

Bacterial growth, plant medicines and drug testing

What is a zone of inhibition?

Bacterial growth, plant medicines and drug testing

Why is a solvent-only disc included?

Bacterial growth, plant medicines and drug testing

What was digitalis soup?

Bacterial growth, plant medicines and drug testing

What is a double-blind trial?

Bacterial growth, plant medicines and drug testing

Phases of clinical trials.

Classification and biodiversity

Define classification.

Classification and biodiversity

Define species.

A clear area around a disc where bacterial growth has been prevented.

To let oxygen in and so avoid growing anaerobic pathogens.

A traditional herbal mixture for dropsy that William Withering investigated, identifying foxglove as the active ingredient.

As a negative control to show that the solvent is not causing the zone of inhibition.

Phase 1: safety in healthy volunteers. Phase 2: effectiveness and dose in patients. Phase 3: large trial against placebo or existing treatment.

Neither patients nor researchers know who receives the drug or the placebo.

A group of similar organisms that can interbreed to produce fertile offspring.

Organising the variety of life into groups based on relationships, using differences and similarities in phenotypes and genotypes.

Classification and biodiversity

Taxonomic hierarchy in order.

Classification and biodiversity

Name the three domains.

Classification and biodiversity

What evidence led to the three-domain system?

Classification and biodiversity

Name three human threats to biodiversity.

Classification and biodiversity

Define biodiversity.

Classification and biodiversity

Define endemism.

Classification and biodiversity

What is species richness?

Classification and biodiversity

Formula for heterozygosity index.

Archaea, Bacteria and Eukarya.

Domain, kingdom, phylum, class, order,
family, genus, species.

Habitat destruction, climate change,
pollution, overexploitation, introduced
species.

Molecular evidence (such as rRNA
sequences) showing Archaea differ from
Bacteria, evaluated and accepted by the
scientific community.

A species found in only one geographical
region and nowhere else.

The variety of living organisms in an area
(species, genetic and habitat diversity).

Number of heterozygotes ÷ number of
individuals in the population.

The number of different species in a
habitat.

Classification and biodiversity

Formula for index of diversity.

Classification and biodiversity

What do N and n mean in the formula for D?

Niche, allele frequency and conservation

Define niche.

Niche, allele frequency and conservation

Give an example of an anatomical adaptation.

Niche, allele frequency and conservation

Give an example of a physiological adaptation.

Niche, allele frequency and conservation

Give an example of a behavioural adaptation.

Niche, allele frequency and conservation

Hardy-Weinberg equations.

Niche, allele frequency and conservation

What do p, q and 2pq represent?

N = total number of organisms of all species; n = number of organisms of each species.

$$D = N(N - 1) \div \sum n(n - 1).$$

Rolled leaves with sunken stomata and hairs in marram grass reduce water loss.

The role of a species in its habitat, including how it obtains resources and its interactions with other species.

Hibernation or nocturnal activity in a desert animal.

Kangaroo rats produce very concentrated urine to conserve water.

p = dominant allele frequency; q = recessive allele frequency; $2pq$ = heterozygote frequency.

$$p + q = 1 \text{ and } p^2 + 2pq + q^2 = 1.$$

Niche, allele frequency and conservation

Conditions for Hardy-Weinberg to hold.

Niche, allele frequency and conservation

Two causes of change in allele frequency.

Niche, allele frequency and conservation

What is reproductive isolation?

Niche, allele frequency and conservation

Steps from isolation to speciation.

Niche, allele frequency and conservation

What is a captive breeding programme?

Niche, allele frequency and conservation

Give a limitation of zoos for conservation.

Niche, allele frequency and conservation

How are seeds stored in a seed bank?

Niche, allele frequency and conservation

Give a limitation of seed banks.

Mutation and natural selection.

Large population, random mating, no mutation, no selection, no migration.

Isolation, no gene flow, different mutations and selection, different allele frequencies, cannot interbreed to produce fertile offspring.

Populations can no longer exchange genes, so their gene pools become separate.

Few individuals of few species, expensive, small gene pool, animals may fail to adapt to the wild.

Breeding endangered animals in zoos, managing pairings to maintain genetic diversity.

Some seeds cannot be dried or frozen; seeds lose viability; stored plants cannot adapt to changing conditions.

Dried to a low water content and kept at low temperature (for example -20°C).