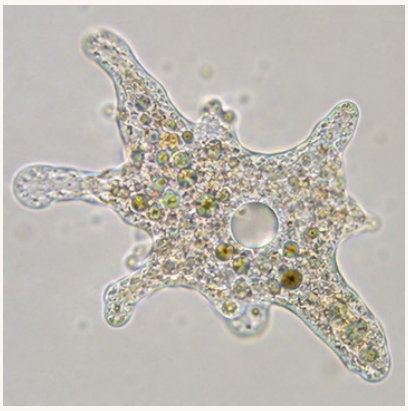
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Cells and microorganisms


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Cells and microorganisms

A world on a slide



THE IDEA

A lens can reveal structures too small to see unaided. A microscope magnifies a thin sample.

Light must reach the eye through the specimen. Start with a wide field of view to find a feature before increasing magnification.

CHECK YOUR THINKING

Why might a thick leaf look like a dark patch?

A. A dark patch proves the leaf has no cells.

B. Light has trouble passing through many overlapping layers.

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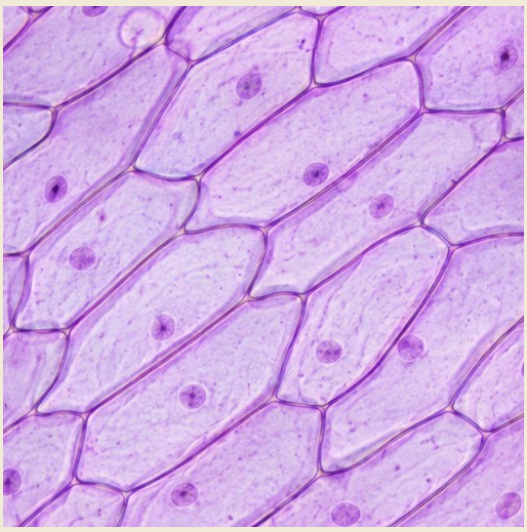
A RELATED EXAMPLE

Where is the DNA?

Plant cells, animal cells and bacteria all have a membrane, cytoplasm and genetic material. In typical plant and animal cells, DNA sits inside a membrane-bound nucleus. Bacteria have DNA in a region called the nucleoid. A bacterial wall is common, but a chloroplast belongs to a photosynthetic plant cell, not a bacterium.

Cells and microorganisms

The walls in an onion



THE IDEA

What looks like brickwork is a layer of plant cells. Each living cell has a membrane and cytoplasm.

In an onion cell a wall lies outside the membrane. A stained nucleus can become visible. Similar cells form tissues; tissues work together in organs.

CHECK YOUR THINKING

Does every onion bulb cell look green?

A Yes. Every plant cell makes food in green chloroplasts.

B No. Bulb tissue can lack visible chloroplasts.

B. No. Bulb tissue can lack visible chloroplasts.

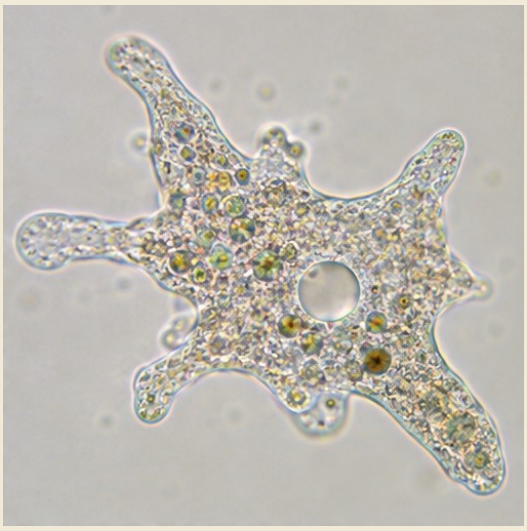
A RELATED EXAMPLE

Why dough rises

A dough ball puffs up even though no one blows air into it. Yeast uses sugar and releases carbon dioxide during fermentation. The dough traps gas bubbles. In curd making, bacteria turn milk sugar into acid. Different microbes can change food in different ways.

Cells and microorganisms

One cell can be an organism



THE IDEA

A pond amoeba surrounds a food particle with temporary extensions. One cell can take in food, grow, respond and divide.

In a multicellular animal different cells specialise. A muscle cell does one part of the body's work.

CHECK YOUR THINKING

Could an amoeba be both a cell and an organism?

A No. Every organism must contain many tissues.

B Yes. Its one cell carries out the functions of life.

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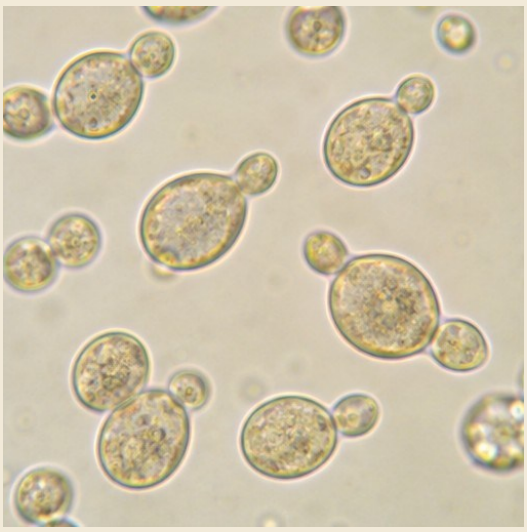
LOOK AGAIN

How could one cell surround a food particle?

An amoeba extends parts of its cell around a food particle. The particle becomes enclosed in a food vacuole.

Cells and microorganisms

Find a bud



THE IDEA

A smaller swelling on a yeast cell grows and can separate. Yeast is a single-celled fungus.

Microorganisms also include bacteria, many algae and protozoa. Viruses multiply only inside host cells. Size alone cannot tell us which group we see.

CHECK YOUR THINKING

Does a bud mean that two species are present?

A Yes. Different sizes always mean different species.

B No. A new yeast cell is growing from its parent.

B. No. A new yeast cell is growing from its parent.

LOOK AGAIN

Which small outgrowths could become separate cells?

A small outgrowth attached to a yeast cell can develop into a daughter cell. Its position helps distinguish budding from two similar cells lying side by side.

Cells and microorganisms

Who recycles the leaf?



THE IDEA

A fallen leaf gradually loses its shape on a damp forest floor. Many fungi and bacteria break dead matter down.

Nutrients return to the soil and support new growth. Other bacteria associated with legume roots make nitrogen from air available in useful compounds.

CHECK YOUR THINKING

Why can a leaf vanish while its matter remains?

A Its material becomes part of microbes, soil, water and gases.

B Decomposition destroys all the leaf's matter.

A. Its material becomes part of microbes, soil, water and gases.

LOOK AGAIN

Where might some of the leaf's material go next?

Decomposers use some leaf material for growth. Other material returns to the environment, including mineral nutrients and carbon dioxide.

ONE LAST CHALLENGE

Why can the products of decomposition differ?

In a compost heap air reaches much of the waste. In a biogas system the community of decomposers lives under different conditions.



THE REVEAL

Different conditions favour different microbes and processes.

Oxygen availability helps explain why the two systems can produce different gases.

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