

Contents

Words to Watch	iv	Chapter 5 Elements and Compounds	129
Chapter 1 Living Cells	1	5.1 Particles in elements and compounds	131
1.1 Plant, animal and fungal cells	3	5.2 Symbols and formulas	147
1.2 Structures within cells	7	5.3 The periodic table of elements	155
1.3 Examining cells	9	Chapter 5 Test	157
1.4 Single-celled organisms	15	Chapter 6 Physical and Chemical Changes	161
1.5 Cell division	17	6.1 Physical and chemical changes	163
Chapter 1 Test	21	6.2 Evidence for chemical changes	167
Chapter 2 Organ Systems	25	6.3 Investigating simple reactions	173
2.1 Organs and systems	27	6.4 Chemical properties affect use	185
2.2 More organs and systems	31	Chapter 6 Test	189
2.3 Specialised cells and tissues	39	Chapter 7 Rocks and Minerals	193
2.4 Comparative anatomy	43	7.1 Formation of rocks	195
2.5 Asexual and sexual reproduction	47	7.2 Identifying rocks	207
2.6 Comparing reproductive systems	55	Chapter 7 Test	225
Chapter 2 Test	59	Chapter 8 More Rocks and Minerals	229
Chapter 3 Some Body Systems in Detail	63	8.1 Minerals in rocks	231
3.1 The circulatory system	65	8.2 Forces making rocks and minerals	239
3.2 The respiratory system	77	8.3 Rocks and minerals as resources	255
3.3 The digestive system	83	Chapter 8 Test	265
3.4 The excretory system	87	Chapter 9 Forms of Energy	271
3.5 The skeletal system	91	9.1 Different forms of energy	273
3.6 Technology and organs	95	9.2 Kinetic energy	281
3.7 Comparing systems in different organisms	97	9.3 Potential energy	283
Chapter 3 Test	99	9.4 Energy changes	287
Chapter 4 Particles in Matter	105	9.5 Energy flow diagrams	303
4.1 Particles in solids, liquids and gases	107	9.6 Energy efficiency and consumption	307
4.2 Temperature and particle motion	121	Chapter 9 Test	309
Chapter 4 Test	125	Answers	313
		Periodic Table	387
		Index	388

Words to Watch

account, account for State reasons for, report on, give an account of, narrate a series of events or transactions.

analyse Interpret data to reach conclusions.

annotate Add brief notes to a diagram or graph.

apply Use an idea, equation, principle, theory or law in a new situation.

assess Make a judgement of value, quality, outcomes, results or size.

calculate Find a numerical answer showing the relevant stages in the working (unless instructed not to do so).

clarify Make clear or plain.

classify Arrange into classes, groups or categories.

comment Give a judgement based on a given statement or result of a calculation.

compare Give an account of similarities and differences between two (or more) items, referring to both (all) of them throughout.

construct Represent or develop in graphical form.

contrast Show how things are different or opposite.

deduce Reach a conclusion from the information given.

define Give the precise meaning of a word, phrase or physical quantity.

demonstrate Show by example.

derive Manipulate a mathematical relationship(s) to give a new equation or relationship.

describe Give a detailed account.

design Produce a plan, simulation or model.

determine Find the only possible answer.

discuss Give an account including, where possible, a range of arguments for and against the relative importance of various factors, or comparisons of alternative hypotheses.

distinguish Give differences between two or more different items.

draw Represent by means of pencil lines.

estimate Find an approximate value for an unknown quantity.

evaluate Assess the implications and limitations.

examine Inquire into.

explain Give a detailed account of causes, reasons or mechanisms.

extract Choose relevant and/or appropriate details.

extrapolate Infer from what is known.

identify Find an answer from a given number of possibilities.

justify Support an argument or conclusion.

label Add labels to a diagram.

list Give a sequence of names or other brief answers with no explanation.

measure Find a value for a quantity.

outline Give a brief account or summary.

predict Give an expected result.

propose Put forward a point of view, idea, argument or suggestion for consideration or action.

recall Present remembered ideas, facts or experiences.

show Give the steps in a calculation or derivation.

sketch Represent by means of a graph showing a line and labelled but unscaled axes but with important features (for example, intercept) clearly indicated.

solve Obtain an answer using algebraic and/or numerical methods.

state Give a specific name, value or other brief answer without explanation or calculation.

suggest Propose a hypothesis or other possible answer.

summarise Express concisely the relevant details.

synthesise Put together various elements to make a whole.

1

Living Cells

Do you know what a cell is? Do you know about all the different types of cells in plants and animals? What does a cell look like? You will find the answers to these questions in this chapter as you explore the unseen wonders of the microscopic world.

You will examine how cells grow differently and make different tissues and that tissues make organs which work together in systems to run our bodies.

You will practise skills in classifying things, researching information, using dichotomous keys and using the microscope.

1.1 Plant, animal and fungal cells

1.2 Structures within cells

1.3 Examining cells

1.4 Single-celled organisms

1.5 Cell division

1.1.1 A timeline for cells

1.1.2 Plant and animal cells

1.1.3 Fungal cells

1.2.1 Functions of cell parts

1.3.1 Different animal cells

1.3.2 Different plant cells

1.3.3 Classifying cells

1.4.1 Unicellular and multicellular organisms

1.5.1 The phases of mitosis

1.5.2 The importance of mitosis

Chapter 1 Test



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How much do you remember or already know?

1. What are cells?
2. What technology was needed before we could see cells?
3. What cells have a cell wall?
4. What cells have a cell membrane?
5. What cells contain chlorophyll?
6. Why is chlorophyll important?
7. What is photosynthesis?
8. What gas is produced during photosynthesis?
9. What is the chemical formula for this gas?
10. What pollutant gas is used during photosynthesis?
11. What is the chemical formula for this gas?
12. What is the main product of photosynthesis?
13. What structure inside plant cells contains chlorophyll?
14. What is a unicellular organism?
15. What is a multicellular organism?
16. Are you unicellular or multicellular?
17. What type of cells tend to be cylindrical in shape?
18. What type of light is essential for photosynthesis?
19. What were the first cells observed by scientists?
20. What was the name of the scientist who observed them?
21. When was the microscope invented?
22. What part of a cell controls all its activities?
23. What is a plant cell wall composed of?
24. What is one thing all plant cells have that animal cells don't have?
25. What is another thing?
26. What is the name for animal male sex cells?
27. What is the name for plant male sex cells?
28. What is the name for animal female sex cells?
29. What is the name for female plant sex cells?
30. What is the process when male and female sex cells combine?

1.1 Plant, animal and fungal cells

1.1.1 A timeline for cells

Read the information then answer the questions which follow it.

Cells are the basic units of all living things. There are many different types of cells because each type has a very specific function that only cells of that type can carry out. In addition, the types of cells found in plants are very different from the types of cells found in animals.



Because they are microscopic, the first cells were not discovered until after the microscope had been invented separately by Hans Janssen around 1590 and Hans Lippershey about 1609. Around 1663 Robert Hooke designed a prototype of the simple light microscope which developed into the microscopes you use in the laboratory and used it to observe the structure of cork. He described 'tiny box-like structures' and called these 'cells'.

In 1675, Anton van Leeuwenhoek discovered single-celled organisms in stagnant pond water. He named these 'animalcules'. In 1683, Leeuwenhoek discovered bacteria in saliva. Rene Dutochet made a bold statement in 1824, proposing that all plants and animals were made up of these cells that scientists had been studying for nearly 200 years.

As technology improved and microscope lenses became capable of better magnification, structures within cells were discovered. In 1831 Robert Brown reported the existence of a small structure in all plant and animals cells he observed. We know this as the nucleus of the cell, the part that governs and regulates all processes that occur within the cell.

In 1839, two German biologists, Theodor Schwann and Matthias Schleiden proposed the theory we know as the **cell theory**. This theory states the following.

Cell theory

All living organisms are made up of cells.

New cells are produced when old cells divide into two.

All cells are similar, but not identical to each other.

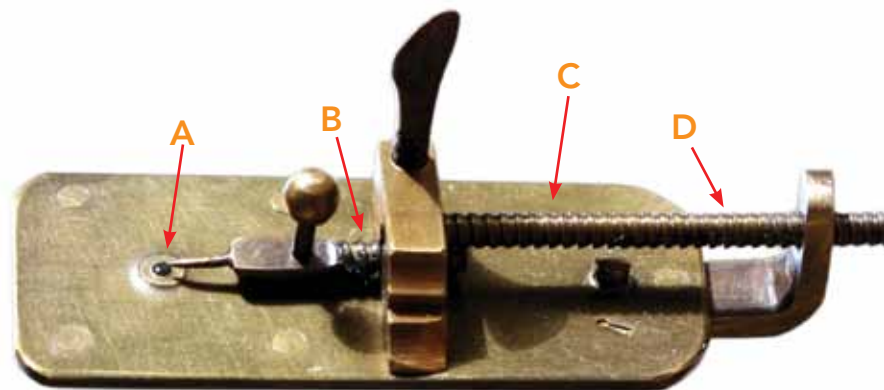
Anton van Leeuwenhoek's microscope

A = spherical lens

B = skewer to impale object and rotate it

C = metal plate

D = screw to adjust height of object



1.1 Plant, animal and fungal cells

1.1.1.1 Comment on the importance of the invention of the microscope to our knowledge of cells.

1.1.1.2 Construct a timeline of the events in cell history as outlined above.

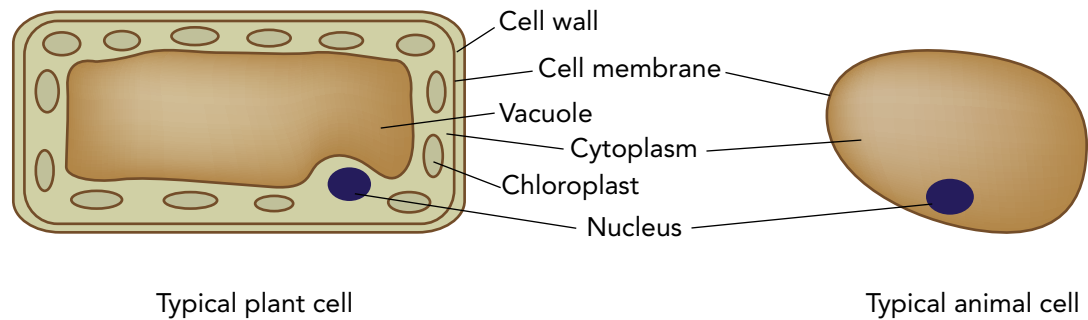
Construct your timeline here

1.1.1.3 Explain why the discovery of cells was so important to human health and medical treatment of diseases.

1.1 Plant, animal and fungal cells

1.1.2 Plant and animal cells

1.1.2.1 The diagrams show the basic structure of typical animal and plant cells. Use them to complete the table which will summarise the similarities and differences between these cells.



Similarities	Differences	
Both plant and animal cells ...	Plant cells ...	Animal cells ...

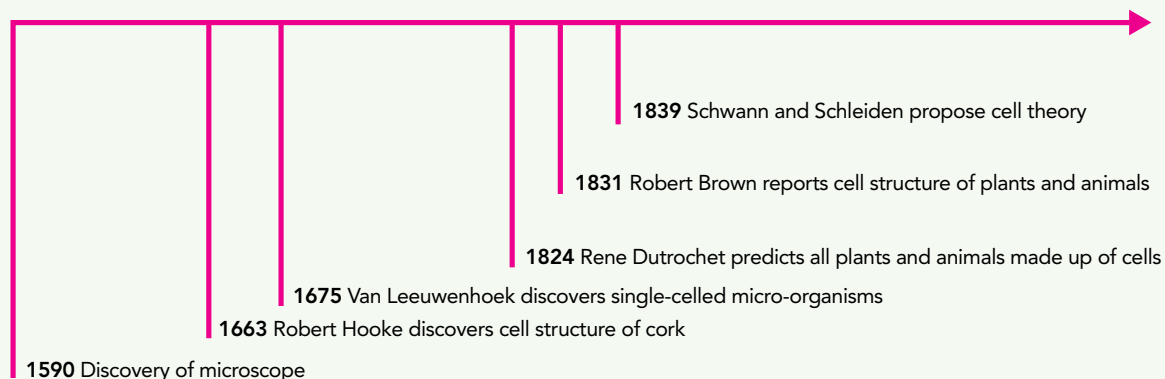
Chapter 1 Living Cells

How much do you remember or already know?

1. Cells are the building blocks of living organisms.
2. Microscopes.
3. Plant and fungal cells.
4. All cells.
5. Plant cells.
6. It is needed for photosynthesis.
7. The process by which plants manufacture their own food from carbon dioxide and water.
8. Oxygen.
9. O_2
10. Carbon dioxide.
11. CO_2
12. Sugar (glucose).
13. Chloroplasts.
14. A single-celled organism.
15. An organism made up of many cells.
16. Multicellular.
17. Bacterial cells.
18. Red light and blue light.
19. Cork cells.
20. Robert Hooke.
21. 1590 (about 1600).
22. The nucleus.
23. Cellulose.
24. Chloroplasts or a cell wall.
25. A cell wall or chloroplasts.
26. Sperm.
27. Pollen.
28. Ova.
29. Ova.
30. Fertilisation.

1.1.1.1 Most cells are too small to be visible to the naked eye (remarkable exceptions are birds' eggs which are single ova) so the invention of the microscope was essential for us to discover cells and their structures.

1.1.1.2



1.1.1.3 The discovery of cells has enabled the cause and treatment of many diseases and illnesses to be discovered. It enabled us to see the organisms causing disease. Knowledge of cell structures and how they behave enables researchers to develop chemicals which can inhibit their growth (cancer cells), kill them, or moderate their behaviour so that they perform normally.