

Summary

1 Cell structure

- 1 The basic unit of life, the cell, can be seen clearly only with the aid of microscopes.
- 2 The light microscope uses light as a source of radiation, whereas the electron microscope uses electrons.
- 3 The electron microscope has greater resolution (allows more detail to be seen) than the light microscope, because electrons have a shorter wavelength than light.
- 4 With a light microscope, cells may be measured using an eyepiece graticule and a stage micrometer.
- 5 Using the formula $A = \frac{I}{M}$, the actual size of an object (A) or its magnification (M) can be found if its observed (image) size (I) is measured and A or M , as appropriate, is known.
- 6 All cells are surrounded by a partially permeable cell surface membrane that controls exchange between the cell and its environment.
- 7 All cells contain genetic material in the form of DNA, and ribosomes for protein synthesis.
- 8 The simplest cells are prokaryotic cells, which are thought to have evolved before, and given rise to, the much more complex and much larger eukaryotic cells.
- 9 Prokaryotic cells lack a true nucleus and have smaller ribosomes than eukaryotic cells. They also lack membrane-bound organelles. Their DNA is circular and lies naked in the cytoplasm.
- 10 All eukaryotic cells possess a nucleus containing one or more nucleoli and DNA. The DNA is linear and bound to proteins to form chromatin. The cytoplasm contains many membrane-bound organelles providing separate compartments for specialised activities (division of labour). Organelles include endoplasmic reticulum (ER), 80S ribosomes, mitochondria, Golgi apparatus and lysosomes. Animal cells also contain centrioles. Plant cells also contain chloroplasts, often have a large, permanent, central vacuole and have a cell wall containing cellulose.
- 11 In eukaryotes, cells may be further organised into tissues, organs and systems.