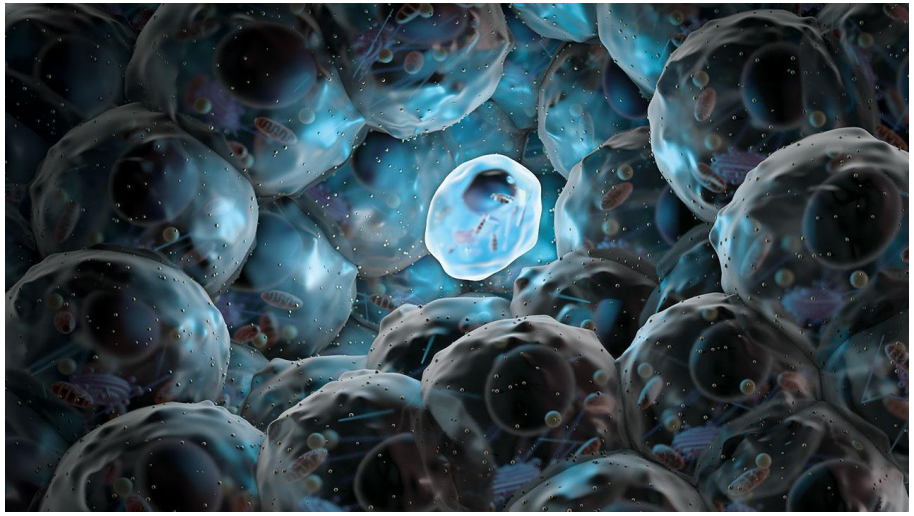
Cells & Living Things

Lesson 4

What are living things made of?

- Early idea…
  - All living things are made of earth, air, fire, and water
- Now…
  - All living things are made of cells (cell theory)



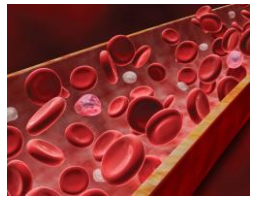
What is the basic unit of life?

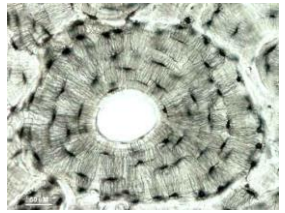
Cells & Living Things:

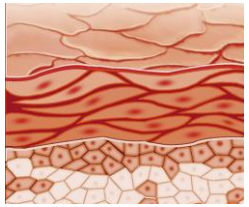
- A cell is the basic unit of life
  - The smallest thing that can be called “alive”
- All living things are made of cells
- Most living things that we have seen are made of many cells
- Depending on their size, plants and animals are made of thousands, millions, billions, or even trillions of cells.

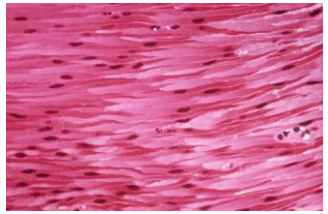
Cells & Living Things

Cells are found in all parts of animals and plants:





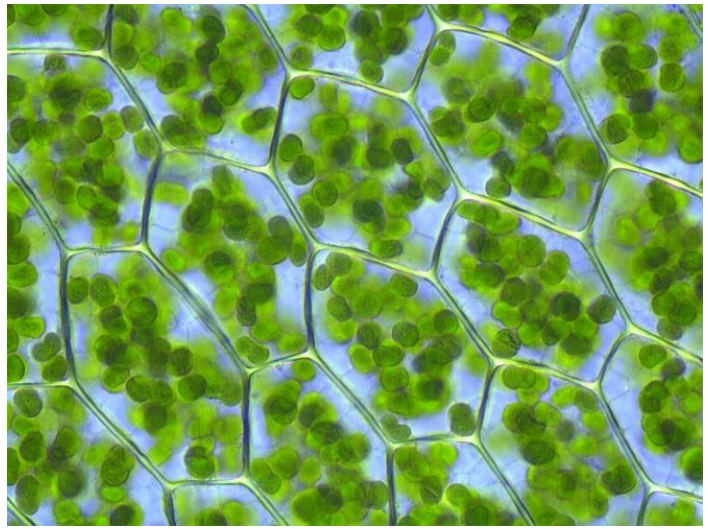




Animals

- Blood
- Bone
- Skin
- Nerves
- Muscles etc.

Plants



- Roots
- Stems
- Leaves
- Flowers etc.

Cells & Living Things

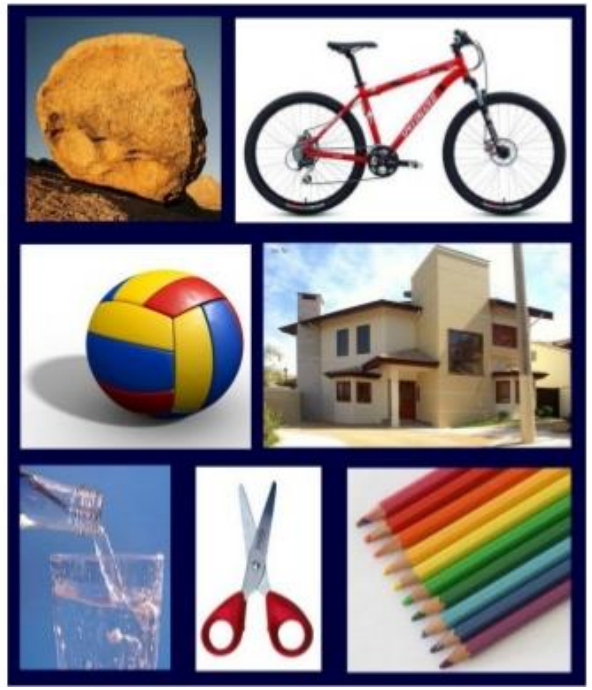
- Cells carry out many functions, or jobs
- Some cells are specialized to do specific functions
- In our body, we have cells that are specialized to do specific functions
  - Skin cells – cover and protect
  - Muscle cells – allow for movement
  - Bone cells – support and protect
  - Nerve cells – send and receive messages
  - Blood cells – transport materials and fight diseases

Cells & Living Things

- Some living things, such as bacteria, are made of only one cell
  - That one cell performs all of the necessary life functions

Living or nonliving

- Looking at all the things around you, everything in the world can be grouped as **living** or **nonliving**
  - Examples of living things:
    - Trees, grass, bighorn sheep
  - Examples of nonliving things:
    - Clouds, rocks, air



Characteristics of Living Things

- How do you tell the difference between living and nonliving things?
  - By observing their **properties**
    - A **property** is a quality that describes an object
    - Examples:
      - A property of a rock is its hardness
      - A property of a person is eye colour
    - Properties can also describe how an object behaves
    - All things have different properties

Characteristics/Properties of Living Things

- Living things have properties you can see and feel
- Living things carry out basic life activities
- **All living things…**

Basic life activities

1. Grow and develop
2. Move
3. Need energy (food)
4. Remove waste
5. Respond to stimuli (sense and react to their internal/external environment)
6. Reproduce

- Another word for a living thing is an **organism**

What is an organism?

An organism is…

- A complete, individual living thing
- Carries out all the basic life activities

- Large living things such as an elephant or a pine tree are organisms
- Tiny single cell bacteria that cause sore throats are organisms
  - Bacteria are the simplest single cells that carry out all basic life activities

Characteristics of Living Things

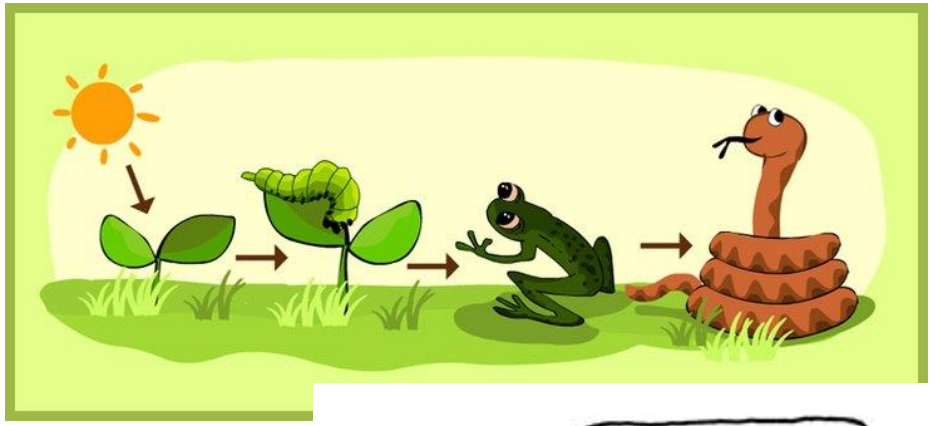
Growth and development

- To grow means to get bigger and to get bigger means more cells need to be added
  - A result of the cells in your body increasing in number
  - New cells will grow to replace old cells that die
- To develop means to change into an adult form (mature)

Movement

- A change in position, shape, or location (locomotion)
- May occur internally

Characteristics of Living Things



Need energy (food)

- To consume, intake, and use nutrients as energy to perform life activities

Remove waste

- Get rid of waste/unwanted material that builds up inside
- Excretion

Characteristics of Living Things

Respond to stimuli

- **Stimulus:** anything that causes and organism to react
  - Maybe internal or external
- The ability to detect changes in the environment

Reproduce

- Producing more of the same kind (offspring)
- The ability to reproduce and pass genetic information onto their offspring

Observing Cells

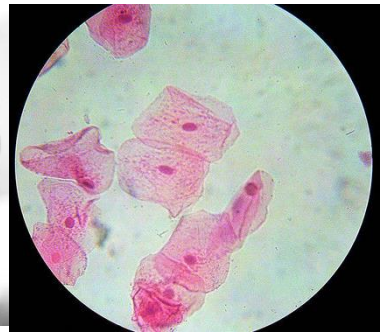
Compound Microscope

How can you see cells?

- Cells come in different sizes
- Most cells are so small that they are invisible to the naked eye
  - They can only be seen with a microscope

What is a microscope

- A microscope is an instrument used to magnify small things, or make them appear larger
  - Tiny structures that were not visible before can be seen through the microscope

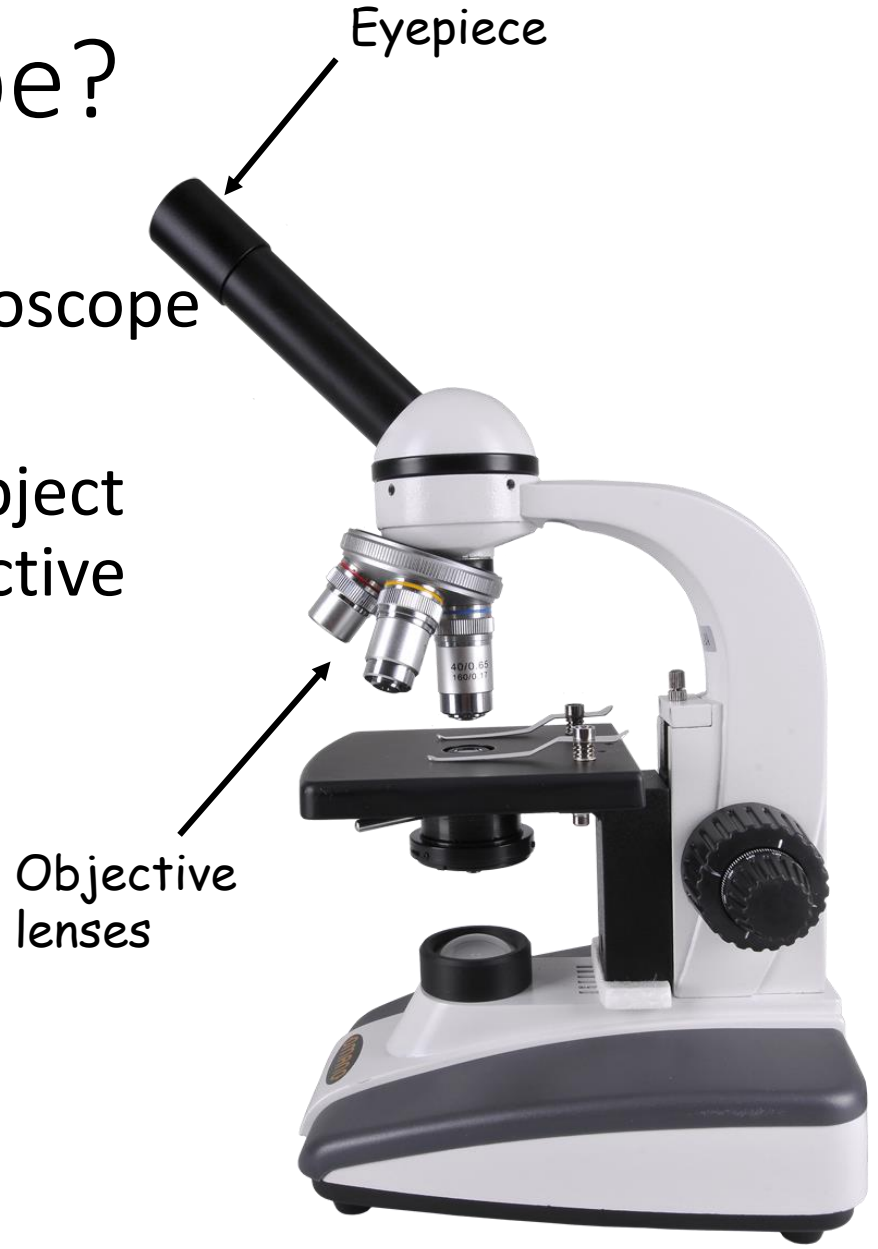


Our microscope

- At school, we will be using a **compound light microscope**
  - It is a compound microscope because it combines two lenses
  - It is a light microscope because it uses light to view and object
- Used to help us see tiny organisms/specimens/things by making them seem larger that they really are
  - This is called **magnification power**

How powerful is our microscope?

- The **eyepiece** (where we look into) of the microscope usually has a magnification of 10x
- Typically, 3 other lenses further magnify the object we are trying to see. These are called the objective lenses.
  - Each objective lens has its own magnification



How powerful is our microscope? Cont'd

- To find the total magnification of the lens combination (eyepiece + objective lens) we multiply

Power of objective lens	**Power of eyepiece lens**	**Calculation (power of objective lens multiplied by power of eyepiece lens)**	**Total magnification of the lens combination**
Low power 4x	10x	4 x 10 = 40	40x
Medium power 10x	10x	10 x 10 = 100	100x
High power 40x	10x	40 x 10 = 400	400x

- Therefore, our compound light microscopes can magnify an object up to 400x its original size!

Are there stronger types of microscopes?

- An electron microscope is even stronger
  - A scanning electron microscope can magnify up to 200 000x