NOTES 1.1

Chapter 1 - Classifying and Exploring Life
Lesson 1 - Characteristics of Life

Q: What is life?
A: anything living; an organism

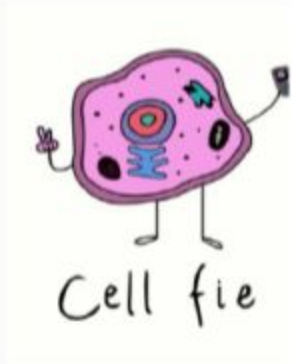
Q: What is an organism?
A: a living thing that has all of the characteristics of life

Hmmm…sounds like the same thing? But how can I tell the difference?

6 Characteristics of All Living Things –

1. Cellular Organization

➔ All organisms are made of small building blocks called cells.



Q: What is a cell?
A: the basic unit of structure and function in an organism; the smallest unit of life

Cells are…

- so small a million of them could fit on the tip of a needle!
- ONLY seen under a microscope

Cells can be…

- Unicellular - living things that are made of only one cell;
  single-celled organisms (MOST numerous on Earth)

  Ex. bacteria

- Multicellular - living things that are made of 2 or more cells;
  many-celled organisms (have specialized cells)

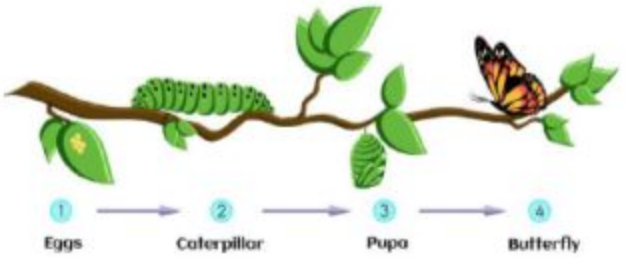
  Ex. humans, animals, plants, etc.

2. Growth & Development

➔ Living things grow by increasing cell size or increasing cell #.

Cells…

- grow and develop (use energy to create new cells)
- become more complex over time



Q: What is development?
A: the process of change that occurs during an organism's life to produce a more complex organism

➔ Growth is the process of becoming larger and development is the process of becoming more complex.

Q: How do growth and development differ?

3. Reproduce

➔ All living things have the ability to reproduce.

Q: What does it mean to reproduce?
A: the process by which one organism makes one or more new organisms; to produce offspring that are similar to the parents

4. Respond to Stimuli

➔ All organisms react to changes in their environment called a stimulus

Q: What is a stimulus?
A: a change in an organism's surroundings that causes the organism to react

2 types -
Internal - hunger and thirst External - temperature, light, sound, etc.

➔ An organism reacts to a stimulus with a response.

Q: What is a response?
A: an action or change in behavior or the environment

Ex. "jumping" out of your seat during a scary movie

5. Maintains Homeostasis

➔ Because conditions in their surroundings can change significantly, organisms must be able to keep the conditions inside their bodies constant also known as homeostasis.

Q: What is homeostasis?
A: maintaining stable internal conditions despite changes in surroundings

Ex. maintaining a body temp° of 98.4°F (37°C) even though its hot or cold outside by sweating or shivering

6. Use Energy

Cells use energy to...

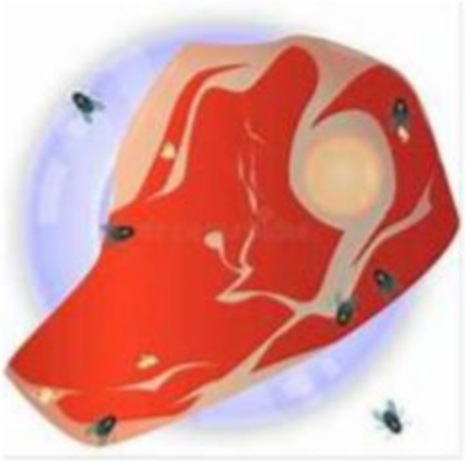
- grow
- transport substances
- make new cells
- repair parts/damage
- work (function)
- perform chemical reactions

Life Comes From Life

Most people know that when we see a garden full of veggies or a litter of puppies that these new organisms are the result of reproduction.

However, this wasn't the case 400 years ago... People once thought that life could appear suddenly from nonliving materials.

For instance -



People thought that because flies were always found around meat that they must come from meat.

People also thought that because frogs were always found around ponds and mud that they must come from it as well.

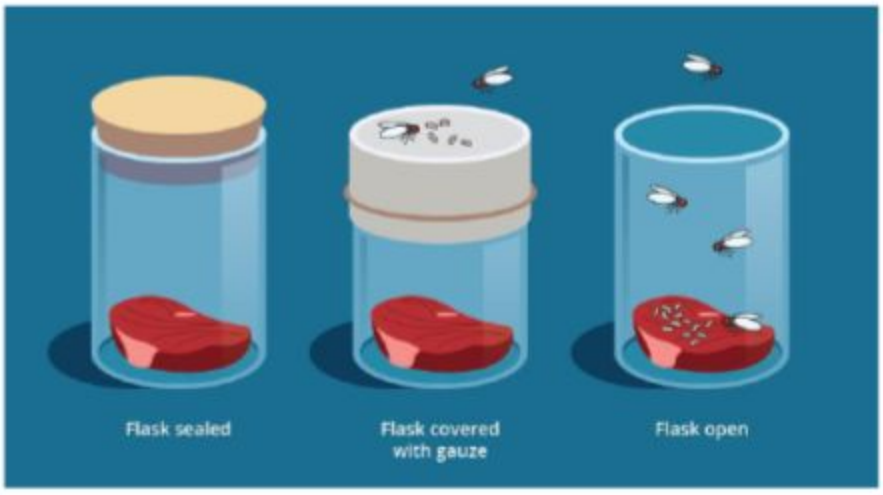
➔ This is known as spontaneous generation.

Q: What is spontaneous generation?
A: the mistaken idea that living things arise from nonliving sources

It took 100's of years of convincing but people finally understood that

This is due to the research/ work of 2 scientists –

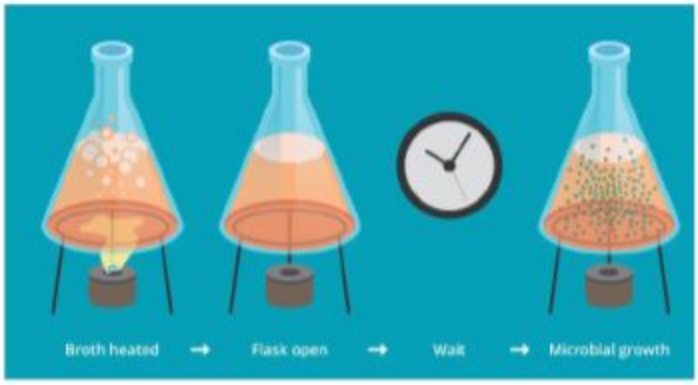
1. Francesco Redi -
   - 1600's, Italian doctor
   - Designed a controlled experiment to prove that flies didn't arise from rotting meat

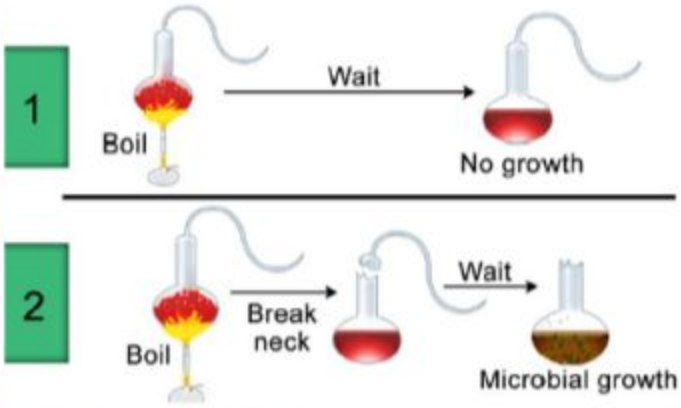


Redi's hypothesis was proven correct.

However, people continued to believe that spontaneous generation occurred in bacteria. Until...

2. Louis Pasteur (sound familiar?... got milk?)
   - 1800's, French chemist
   - Designed a controlled experiment to prove that bacteria didn't arise from spontaneous generation (nonliving material)





Okay... so we now know the characteristics of living things but what about their needs?

3 Needs of Living Things -

1. Energy

Organisms...
- use food as their source of energy
- differ in their ways of obtaining energy
  Ex. plants sunlight
- can be autotrophs or heterotrophs

How do heterotrophs depend on autotrophs for energy?

Q: What is an autotroph?
A: an organism that makes its own food (plants)

Q: What is a heterotroph?
A: an organism that cannot make its own food (animals, humans, insects)

2. Water

Organisms require H_2O to...
- survive
- obtain chemicals from their surroundings
- break down food
- grow
- move substances within their bodies
- reproduce

3. Living Space

Organisms require space to live to...
- obtain food/ HaO
- find shelter
- reproduce