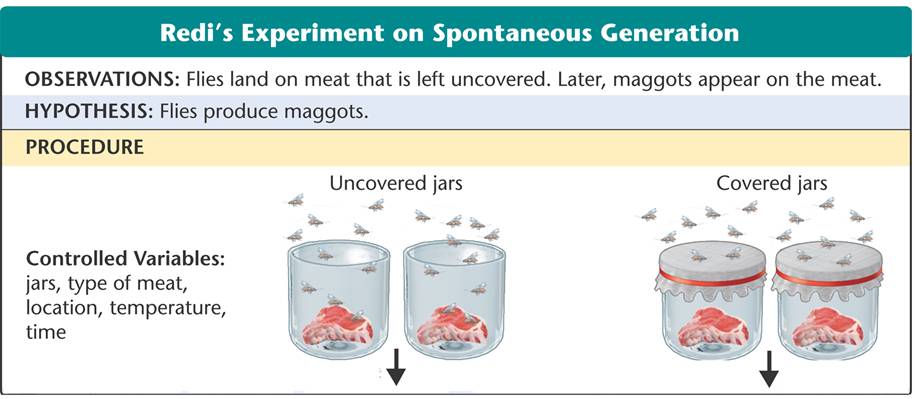
**Chapter 1 – The Science of Biology**

**Section 1 – What is Science?**

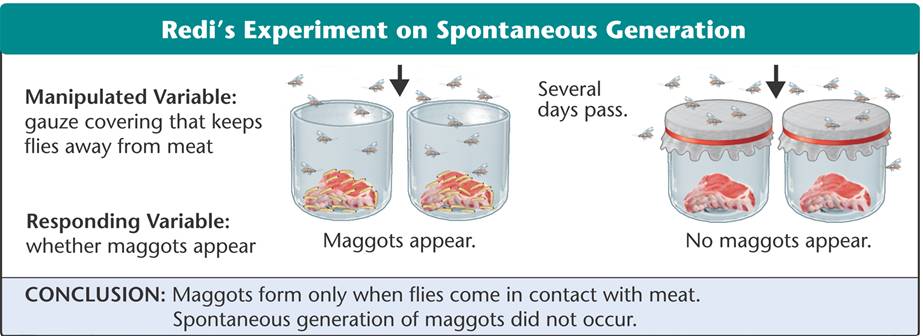
* \_\_\_\_\_\_\_\_\_\_\_\_\_is an organized way of using evidence to learn about the \_\_\_\_\_\_\_\_\_\_\_\_\_ world.
* What is the \_\_\_\_\_\_\_\_\_\_\_\_\_ of science?
  + investigate and \_\_\_\_\_\_\_\_\_\_\_\_\_ the natural world.
  + explain\_\_\_\_\_\_\_\_\_\_\_\_\_ in the natural world.
  + use those explanations to make useful \_\_\_\_\_\_\_\_\_\_\_\_\_.
* Thinking like a \_\_\_\_\_\_\_\_\_\_ .
  + Scientific thinking begins with an\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - An\_\_\_\_\_\_\_\_\_\_\_\_\_ is the process of gathering \_\_\_\_\_\_\_\_\_\_ about events or processes in a careful, orderly way.
  + The information gathered from observations is called \_\_\_\_\_\_\_\_\_\_\_\_\_ .
    - \_\_\_\_\_\_\_\_\_\_\_\_\_data are expressed as \_\_\_\_\_\_\_\_\_\_\_\_\_, obtained by counting or measuring.
      * Examples –
    - \_\_\_\_\_\_\_\_\_\_\_\_\_data are \_\_\_\_\_\_\_\_\_\_\_\_\_ and involve characteristics that can’t easily be measured.
  + Scientists use data to make an\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - An\_\_\_\_\_\_\_\_\_\_\_\_ is a logical interpretation based on prior knowledge or experience.
* Explaining an interpreting evidence
  + A \_\_\_\_\_\_\_\_\_\_\_\_\_ is a proposed scientific explanation for a set of observations.
    - They are \_\_\_\_\_\_\_\_\_\_\_\_\_ out or \_\_\_\_\_\_\_\_\_\_\_\_\_.
    - However, they must be designed in a way that can be \_\_\_\_\_\_\_\_\_\_.

**Section 2 – How Scientists Work (Part 1)**

* How do scientists\_\_\_\_\_\_\_\_\_\_\_\_\_ a hypothesis?
  + Whenever possible, a hypothesis should be tested by an\_\_\_\_\_\_\_\_\_\_\_\_\_ in which only one variable is changed at a time. All other variables should be kept \_\_\_\_\_\_\_\_\_\_\_\_\_, or controlled.
* Parts of an Experiment
  + The variable that is deliberately changed is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ variable.
  + The variable that is observed and that changes in response to the manipulated variable is called the responding variable
* The process of designing an experiment to test a hypothesis includes:
  + Asking a \_\_\_\_\_\_\_\_\_\_\_\_\_
  + Forming a \_\_\_\_\_\_\_\_\_\_\_\_\_
  + Setting up a \_\_\_\_\_\_\_\_\_\_\_\_\_experiment
  + Recording and analyzing \_\_\_\_\_\_\_\_\_\_\_\_
  + Drawing a \_\_\_\_\_\_\_\_\_\_\_\_
* Historical Example
  + Asking a Question
    - Many years ago people wanted to know how organisms came into \_\_\_\_\_\_\_\_\_\_\_\_\_, so they asked, “How do \_\_\_\_\_\_\_\_\_\_\_\_\_ come into being?”
  + Forming a hypothesis
    - One early hypothesis was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or the idea that life could come from nonliving matter. For example, most people thought that maggots spontaneously appeared on meat.
    - In 1668, \_\_\_\_\_\_\_\_\_\_\_\_\_ proposed a different hypothesis: that maggots came from eggs that flies laid on meat.
  + Redi’s Experiment



* + Redi’s Data and Conclusion



**Section 2 – How Scientists Work (Part 2)**

* Repeating \_\_\_\_\_\_\_\_\_\_\_\_\_ .
  + Scientists\_\_\_\_\_\_\_\_\_\_\_ experiments to be sure that the results match those already \_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_ Test of Redi's Findings
  + Needham challenged Redi’s results by claiming that spontaneous generation \_\_\_\_\_\_\_\_\_\_\_\_\_ occur under the right conditions.
* **Needham’s Test of Redi’s Findings**
  + Needham heated a bottle of \_\_\_\_\_\_\_\_\_\_\_\_\_
  + Allowed the gravy to \_\_\_\_\_\_\_\_\_\_\_\_\_to room temperature
  + \_\_\_\_\_\_\_\_\_\_\_\_\_ the bottle
  + After several days, the gravy was \_\_\_\_\_\_\_\_\_\_\_\_\_ with microorganisms.
  + Needham concluded that these organisms came from the gravy by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ generation.
* ***What is the problem with this experiment?***
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Spallanzani’s Test of Needham’s
  + Spallanzani heated \_\_\_\_\_\_\_\_\_\_\_\_\_ bottles of gravy.
  + He left one open and then \_\_\_\_\_\_\_\_\_\_\_\_\_ the other.
  + Open flask - \_\_\_\_\_\_\_\_\_\_\_\_ with microorganisms
  + Closed flask - \_\_\_\_\_\_\_\_\_\_\_\_ of microorganisms.
* Pasteur’s test \_\_\_\_\_\_\_\_\_\_\_\_\_Spallanzani’s results
  + The key portion of his experiment was the usage of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ neck flask.
  + Confirmed that spontaneous generation did not occur
* How a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Develops
  + As evidence from numerous investigations builds up, a hypothesis may become so well supported that scientists consider it a \_\_\_\_\_\_\_\_\_\_\_\_\_.
  + In science, the word *\_\_\_\_\_\_\_\_\_\_\_\_\_* applies to a well-tested explanation that unifies a broad range of observations.
  + No theory is considered absolute \_\_\_\_\_\_\_\_\_\_\_\_\_.
  + As new evidence is uncovered, a theory may be revised or replaced by a more useful explanation.

**Section 3 - Studying Life (Part 1)**

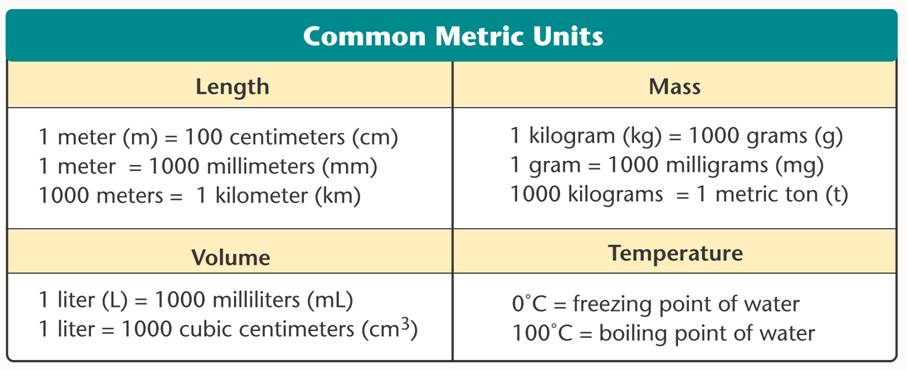
* Characteristics of Living Things
  + - No \_\_\_\_\_\_\_\_\_\_\_\_\_ characteristic is enough to describe a living thing.
    - Some \_\_\_\_\_\_\_\_\_\_\_\_\_ things share one or more traits with living things.
  + ***Living things are made up of \_\_\_\_\_\_\_\_\_\_\_\_\_.***
    - A **\_\_\_\_\_\_\_\_\_\_\_\_\_** is the smallest unit of an organism that can be considered alive.
  + ***Living things \_\_\_\_\_\_\_\_\_\_\_\_\_ and develop.***
    - During an organism’s development, cells differentiate, which means that the cells look different from one another and perform different \_\_\_\_\_\_\_\_\_\_\_\_\_.
  + ***Living things are based on a universal \_\_\_\_\_\_\_\_\_\_\_\_\_ code.***
    - Organisms store the information they need to live, grow, and reproduce in a genetic code in a molecule called \_\_\_\_\_\_\_\_\_\_\_\_\_.
  + ***Living things respond to their \_\_\_\_\_\_\_\_\_\_\_\_\_.***
    - A **\_\_\_\_\_\_\_\_\_\_\_\_\_** is a signal to which an organism responds.
  + ***Taken as a group, livings things change over time. Over many generations, groups of organisms typically \_\_\_\_\_\_\_\_\_\_\_\_\_.***
* ***Living things reproduce***
  + In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reproduction, cells from two different parents unite to form the first cell of the new organism.
  + In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reproduction, a single parent produces offspring that are identical to itself.
* ***Living things obtain materials and use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.***
  + The combination of chemical reactions through which an organism builds up or breaks down materials is called **metabolism**.
* ***Living things maintain a stable internal environment.***
  + Although conditions outside an organism may change, conditions inside an organism tend to remain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + This process is called **homeostasis**.
* \_\_\_\_\_\_\_\_\_\_\_\_\_ of Biology
  + There a many branches of biology. For example:
    - Zoologists study \_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Botanists study \_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Paleontologists study \_\_\_\_\_\_\_\_\_\_\_\_\_ life.

**Section 3 - Studying Life (Part 2)**

* How can life be studied at different levels?
* Levels of \_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_
    - Groups of \_\_\_\_\_\_\_\_\_\_\_\_\_; smallest unit of most chemical compounds
  + \_\_\_\_\_\_\_\_\_\_\_\_\_
    - Smallest functional unit of \_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of Cells
    - Tissues, organs, and organ systems
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Individual \_\_\_\_\_\_\_\_\_\_\_\_\_ thing
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Group of organisms of one type that live in the same \_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_
    - Populations that live \_\_\_\_\_\_\_\_\_\_\_\_\_ in a defined area
  + \_\_\_\_\_\_\_\_\_\_\_\_\_
    - Community and its \_\_\_\_\_\_\_\_\_\_\_\_\_ surroundings
  + \_\_\_\_\_\_\_\_\_\_\_\_\_
    - The part of \_\_\_\_\_\_\_\_\_\_\_\_\_ that contains all ecosystems

**Section 4 Tools and Procedures**

* A Common Measurement System
  + Scientists need a common system of measurements in order to \_\_\_\_\_\_\_\_\_\_\_\_ each other’s experiments.
  + Most scientists use the \_\_\_\_\_\_\_\_\_\_\_\_ system when collecting data and performing experiments.
    - The metric system is a decimal system of measurement whose units are based on certain physical standards and are scaled on multiples of \_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Because the metric system is based on multiples of 10, it is easy to use.



* Microscopes
  + **Microscopes** are devices that produce \_\_\_\_\_\_\_\_\_\_\_\_\_ images of structures that are too small to see with the unaided eye.
  + **Light microscopes** produce magnified images by focusing visible light rays.
    - These are the most \_\_\_\_\_\_\_\_\_\_\_\_\_ used microscopes
    - Light microscopes produce clear images of objects at a magnification of about 1000 times.
    - **\_\_\_\_\_\_\_\_\_\_\_\_\_ light microscopes** allow light to pass through the specimen and use two lenses to form an image.
    - **Limitations**
      * Light microscopes cannot produce clear images of objects smaller than 0.2 micrometers, or about one-fiftieth the diameter of a typical \_\_\_\_\_\_\_\_\_\_\_.
  + **\_\_\_\_\_\_\_\_\_\_\_\_ microscopes** produce magnified images by focusing beams of electrons.
    - The best electron microscopes can produce images almost \_\_\_\_\_\_\_\_\_\_\_\_\_ times more detailed than light microscopes can.
  + Laboratory Techniques
    - Cell \_\_\_\_\_\_\_\_\_\_\_\_\_
      * To obtain enough material to study, biologists sometimes place a single cell into a dish containing a nutrient solution.
      * The cell is able to reproduce so that a group of cells, called a **cell culture**, develops from the single original cell.
    - Cell \_\_\_\_\_\_\_\_\_\_\_
      * Biologists often use a technique known as **cell fractionation** to separate the different cell parts.
  + Working Safely in Biology
    - Remember you are responsible for your own safety as well as that of your teacher, classmates, and any live animals you handle.
    - \_\_\_\_\_\_\_\_\_\_\_\_ safe practices.
    - Study the safety rules.
    - Read **ALL** the steps and safety precautions.
    - Follow your teacher’s instructions and textbook directions exactly.
    - If in doubt, ask your \_\_\_\_\_\_\_\_\_\_\_\_\_ for an explanation.
    - Wash your hands thoroughly with soap and warm water after every scientific activity.