



# Nature of Biology

Life Science: Molecular



# Vocabulary

- ➔ Science
- ➔ Observation
- ➔ Inference
- ➔ Hypothesis
- ➔ Data
- ➔ Validity
- ➔ Theory



# What Is Science?

- ⇒ **Science** is an organized way of using evidence to learn about the natural world.
- ⇒ Science is about using *critical thinking* to explain observations that we don't understand.



# Humans Are Natural Scientists

- ⇒ We begin to explore our world as infants.
- ⇒ When children interact with people and objects in the world, their understanding of the world changes. New information is organized into **schemas** (Piaget).



# Humans Are Natural Scientists

- ⇒ We are a combination of all of our experiences.
- ⇒ Behaviors are a conditioned response to prior experiences.(B.F. Skinner)

# Example

- ➔ If a child burns his hand on an iron he may believe that all irons are hot.





# Evidence Based on Observation

- ⇒ **Observation** involves using the senses to gather information.
  - sight
  - hearing
  - touch
  - smell
  - sometimes taste



# Observations

- ⇒ Observations are clues that help us develop our hypothesis or prediction.





# Collecting Data

## ⇒ Data

- The information gathered from observations is called evidence, or **data**.

## ⇒ Bias

- Be careful of *bias*. Prior knowledge or beliefs may affect your ability to be objective.



# Collecting Data

## ⇒ Quantitative

- Involves numbers such as counting or measuring.

## ⇒ Qualitative

- Involves characteristics that cannot be easily measured. Such as color, smell, or texture.

# Interpreting Observations

- ➔ An **inference** is a logical interpretation based on prior knowledge and experience.
- ➔ What is an *inference* that you can make about this stove element?





# Example

➔ What about this molten metal?





# Explaining the Evidence

- ➔ A **hypothesis** is a possible explanation for a set of observations.
- ➔ In science a hypothesis is only useful if it can be tested.



# Hypothesis

- ➔ What is a general hypothesis that you can make about all metal that is glowing red?



# What is a Theory

- ✓ A **Theory** is a well tested explanation that unifies a broad range of observations.
- ✓ A theory is not a hunch or a guess, a theory is something that explains hundreds of thousands of facts and observations.



# Validity

- ⇒ **Internal validity** means an experiment can be repeated and have the same results (good experiment). “Repeatability”
- ⇒ **External validity** means an experiment can be generalized to other situations (valid experiment). “Generalizability”



# Everyday Science

Read “A Scientific View of the World”  
Miller, Chapter 1 Page 6

⇒ How is science used in your every day lives?