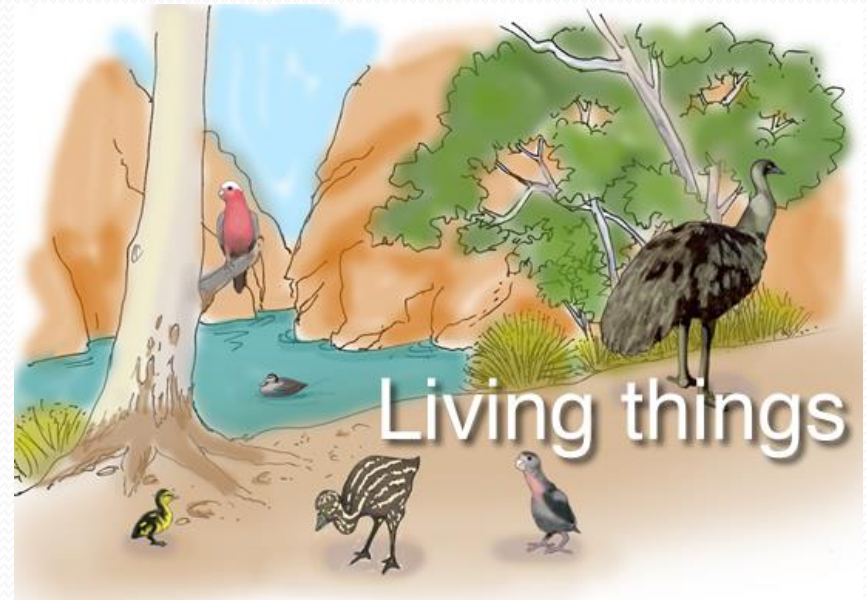


Marine Science

Ms. Murray

What does MARINE mean?

- Refers to anything of, found in, or produced by the sea.



Marine Biology vs. Oceanography

- **Marine Biology** is the study of life in the ocean.
- **Oceanography** is the study of the physical characteristics of the ocean.
 - Sir Charles Thompson is considered to be the “Founder of Oceanography”.



Ocean quiz

How much do you think you know about the ocean?

Ocean quiz

1. How much of the Earth's ocean has been explored?

- a) About 90%
- b) About 75%
- c) About 10%
- d) Less than 5%

Ocean quiz

2. As of 2008, what percent of the U.S. population lived within 50 miles of the coast?

- a) About 80%
- b) About 50%
- c) About 30%
- d) About 10%

Ocean quiz

3. Quincy Bay is what type of ecosystem?

- a) A beach
- b) An estuary
- c) A tidepool
- d) A mangrove swamp

Ocean quiz

4. Which of the following are most closely related to sharks?

- a) Whales
- b) Dolphins
- c) Lampreys

d) Rays

Ocean quiz

5. How much of Earth's water is in the ocean?

a) 50%

b) 70%

c) 90%

d) 97%

The Science of Marine Biology

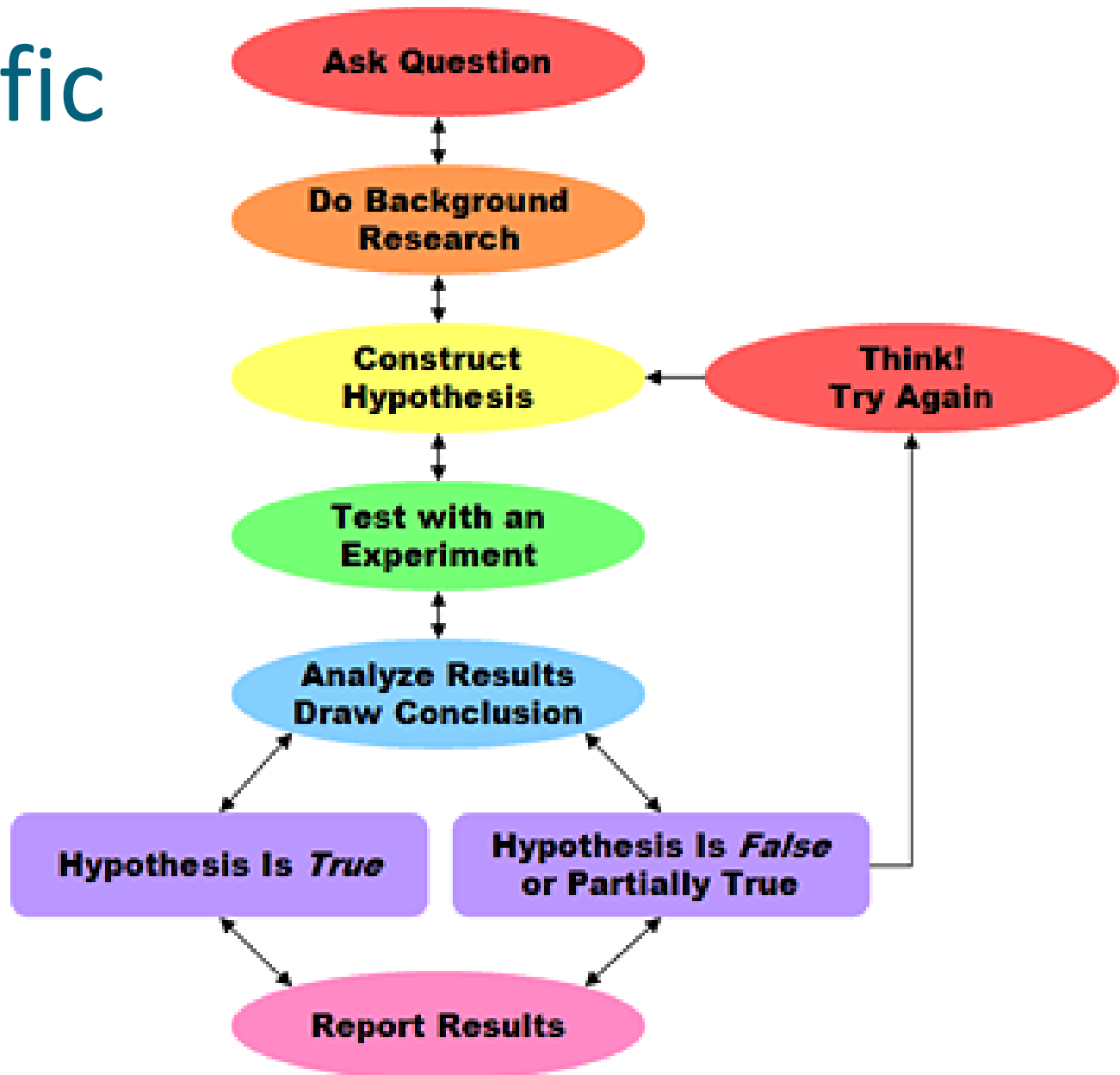
Marine Biology

Ms. Murray

The Scientific Method:

- Basic steps that scientists follow in uncovering facts and solving scientific problems.
 1. Make observations & ask a question.
 2. Background research.
 3. Form a hypothesis.
 4. Perform experiment to test hypothesis.
 5. Record and analyze the results of the experiment.
 6. Make conclusions and share results.

The Scientific Method



Observation: 2 ways of thinking....

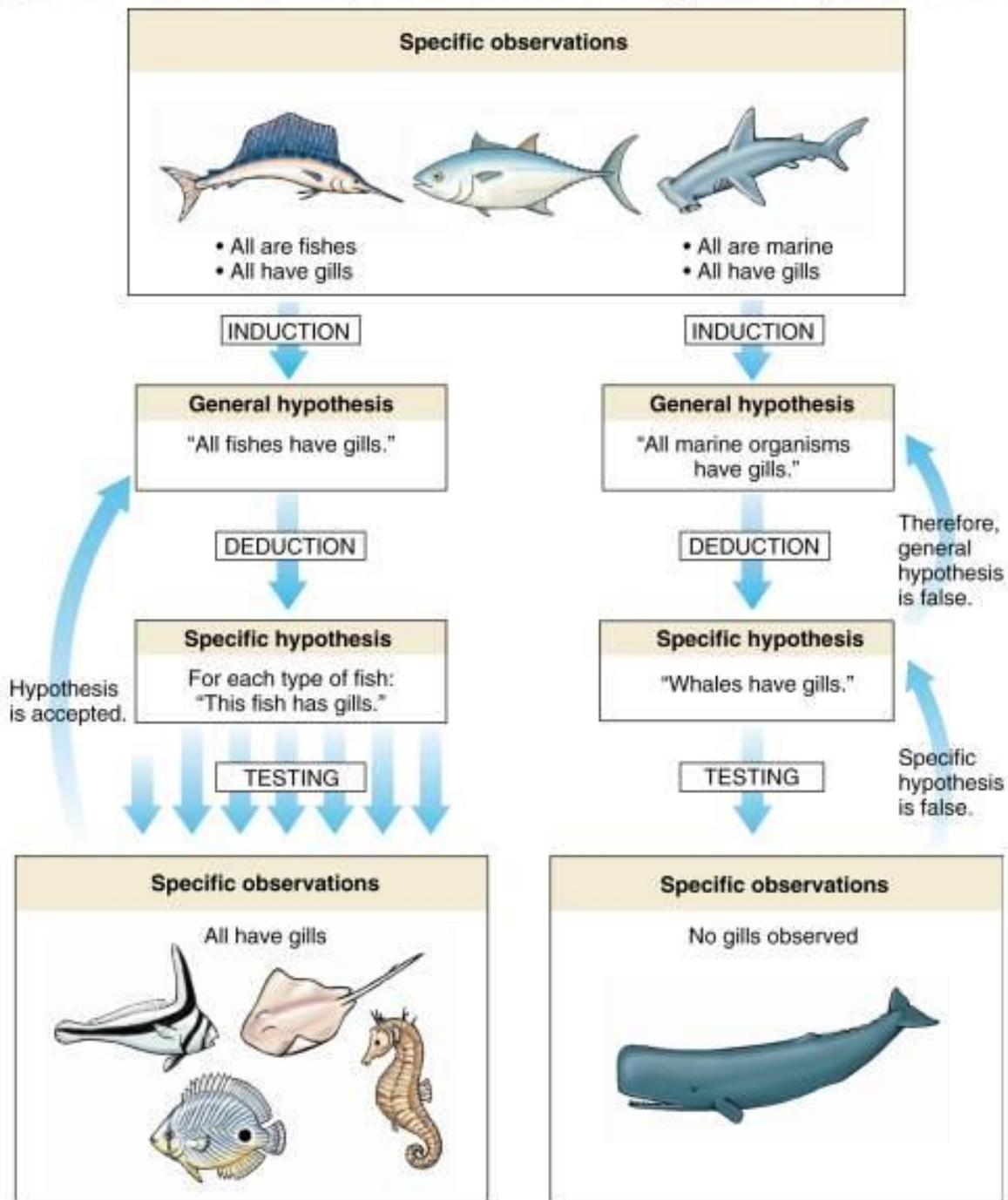
- **Induction:** scientist has no idea of what the conclusion might be.
 - Ex. A scientist observes a sailfish, shark and tuna – notices they all have gills: concludes that all fish have gills.
- **Deduction:** scientist begins with general statement predicting conclusion (may be based on induction).
 - Ex. All marine mammals have gills. Since whales are marine mammals, whales have gills.



Hypothesis

- **Statements made will lead to hypotheses:**
 - Hypothesis: a proposed scientific explanation.
 - Hypothesis must be testable (easily proven false, if it is false)
 - If a hypothesis is testable and has been proven true multiple times, it may be considered a **theory**.



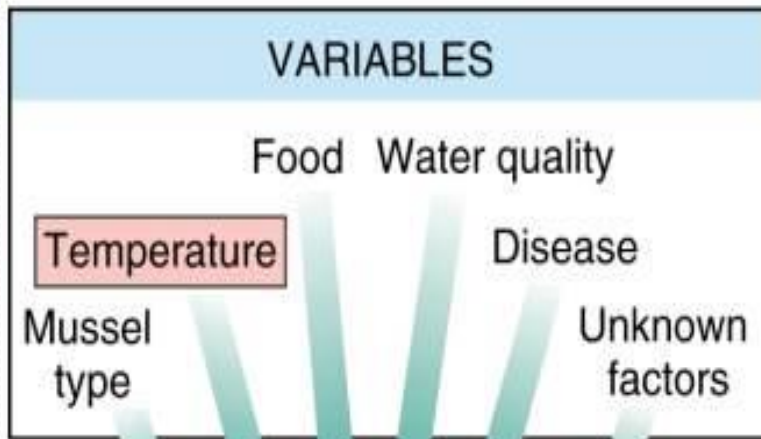


Testing (design experiment)

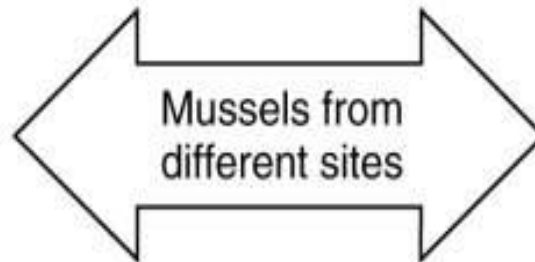
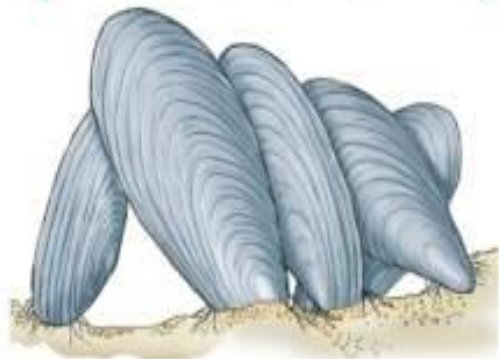
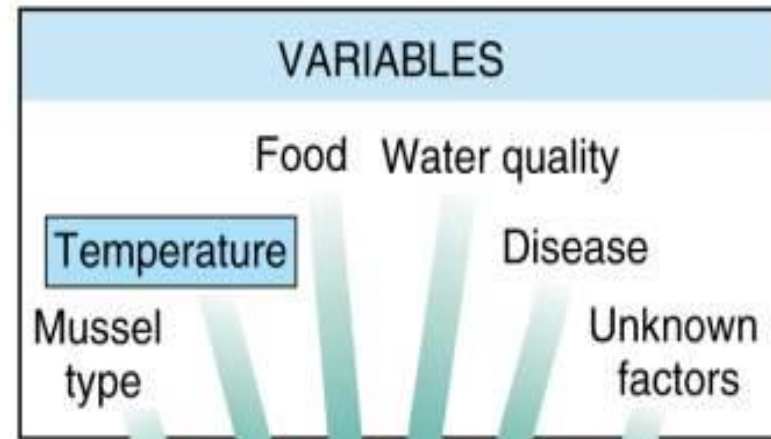
- **Variable: factor that changes, and may affect observations.**
 - Independent variable: factor that is **changed/manipulated** in experiment.
 - Dependent variable: factor that **changes** as a result of the experiment.
 - Controls: variables that are **kept constant** through the experiment.
- Experimental Group: group that is **tested on**/receives a change.
- Control Group: group that is used for comparison/baseline.

Field Observations

Warm Site



Cold Site



Analysis of Data & Conclusions

- Any observations made are considered **data**
 - Quantitative: numerical data
 - Qualitative: descriptive data
- Analysis of data can reveal trends and help to make conclusions.
 - Tables, graphs, charts
- Conclusion may prove hypothesis to be true *or* false.

Limitations of the Scientific Method

- Included in a strong conclusion are some limitations which may affect the scientific method:
 - Sources of error
 - Scientist bias