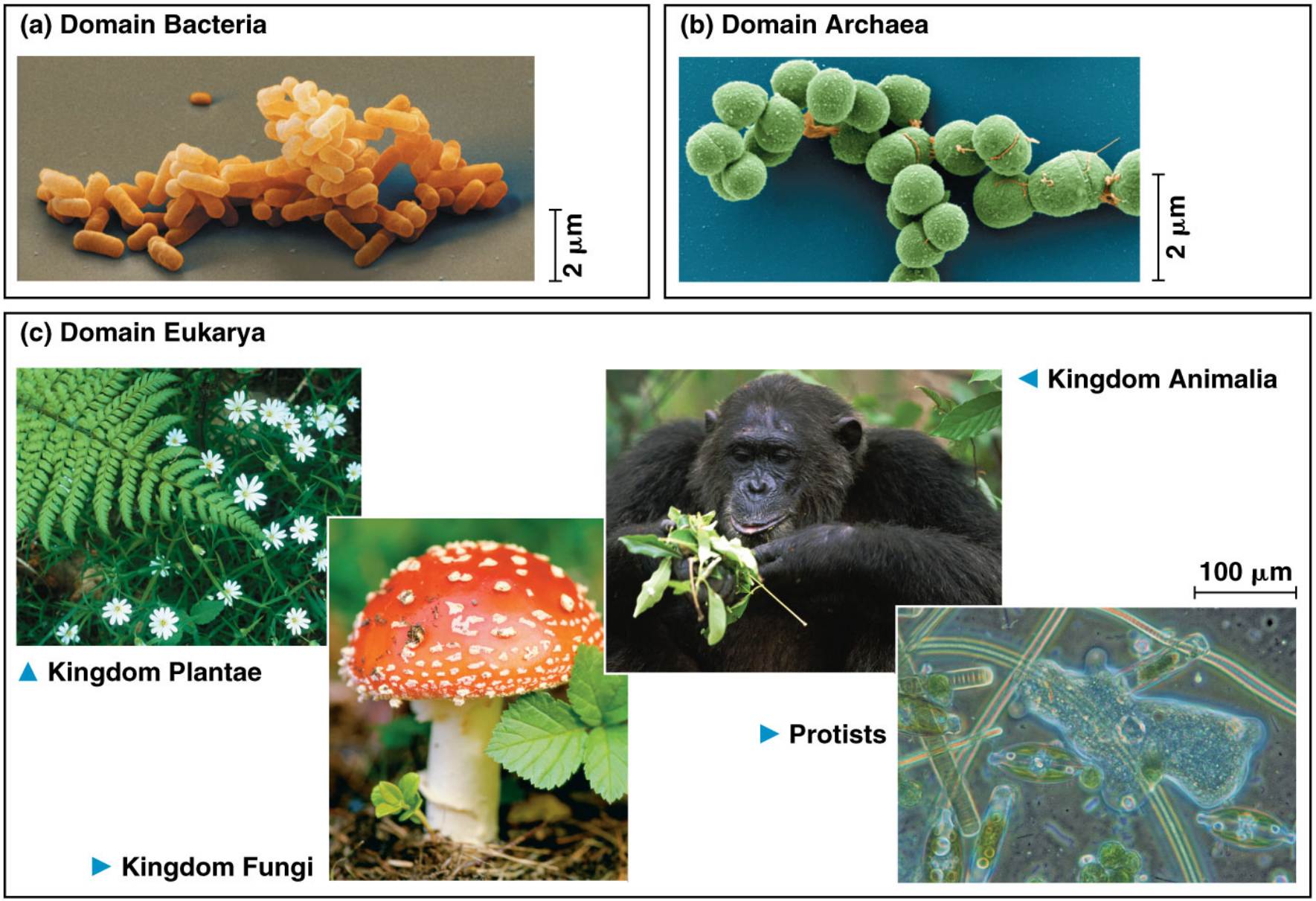
Figure 1.1

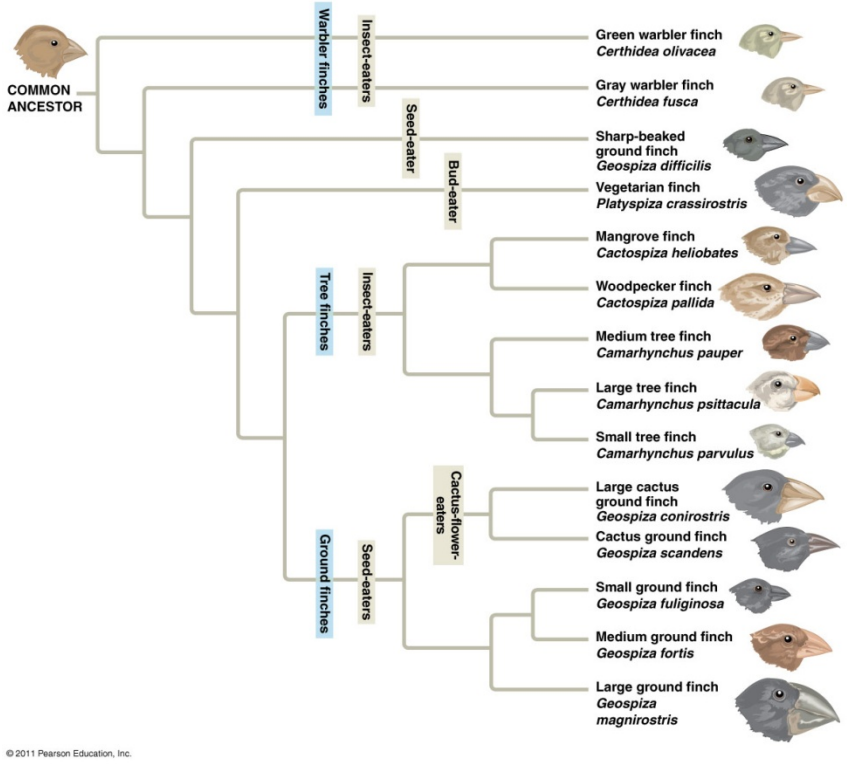
Introduction to Biology

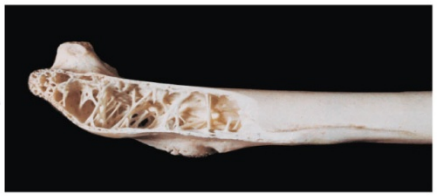
Biology is the study of LIFE!



Big Ideas in Biology

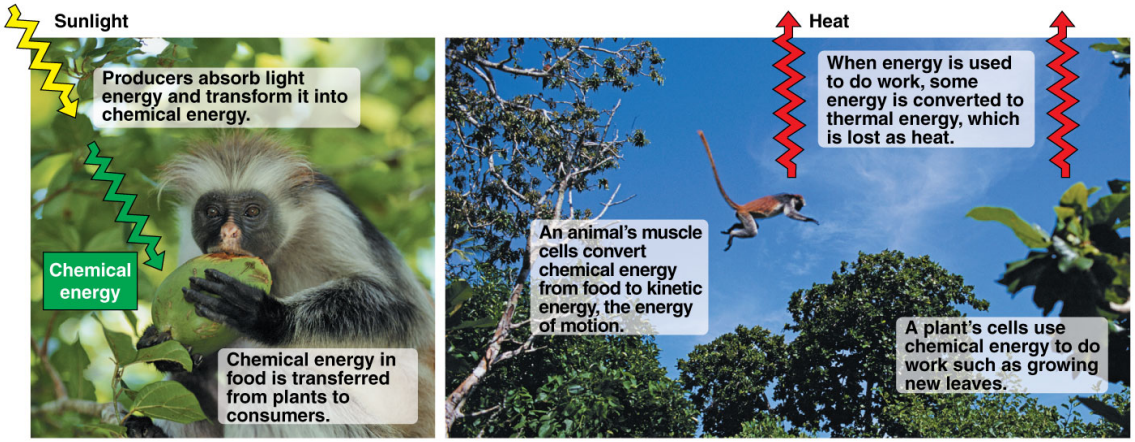
Big Idea 1: The process of evolution drives the diversity and unity of life.





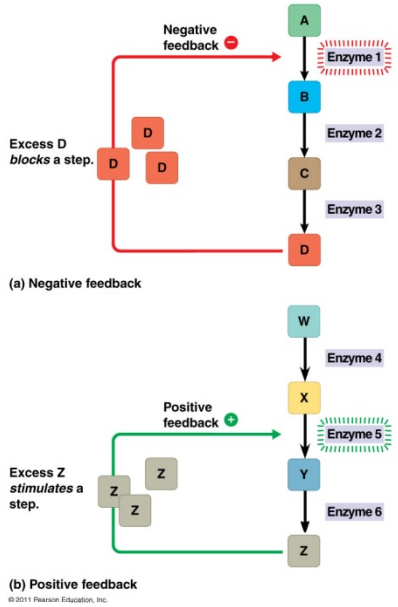
Big Ideas in Biology

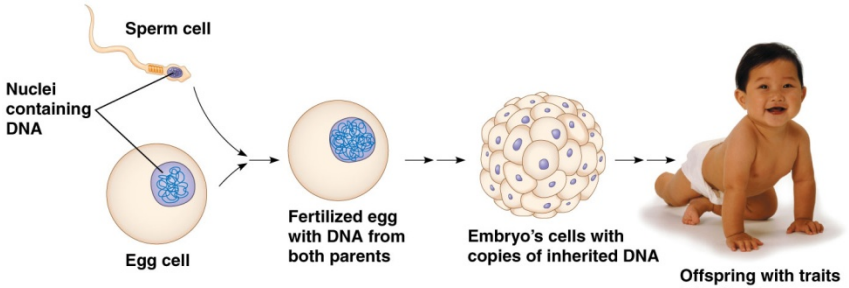
Big Idea 2: Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis.



(a) Energy flow from sunlight to producers to consumers

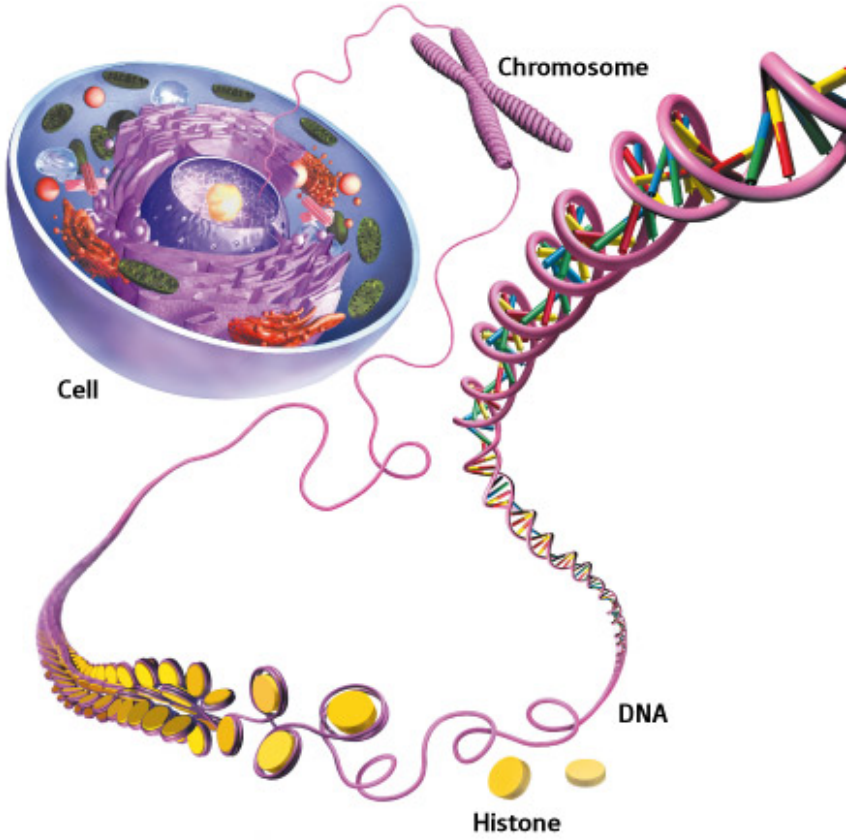
(b) Using energy to do work

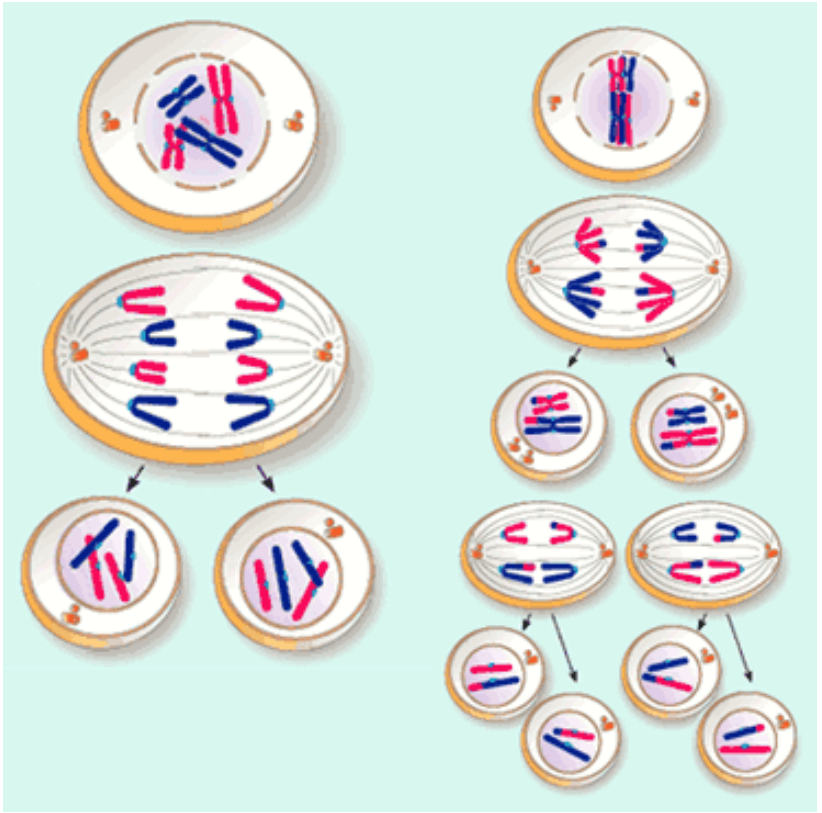




Big Ideas in Biology

Big Idea 3: Living systems store, retrieve, transmit and respond to information essential to life processes.





What is Science?

What is Science?

- *Science* = Latin "to know"

Inquiry is at the heart of science.

- Inquiry: search for information and explanation

  Two main processes:

  1. Discovery science
  2. Hypothesis-based science

Discovery Science

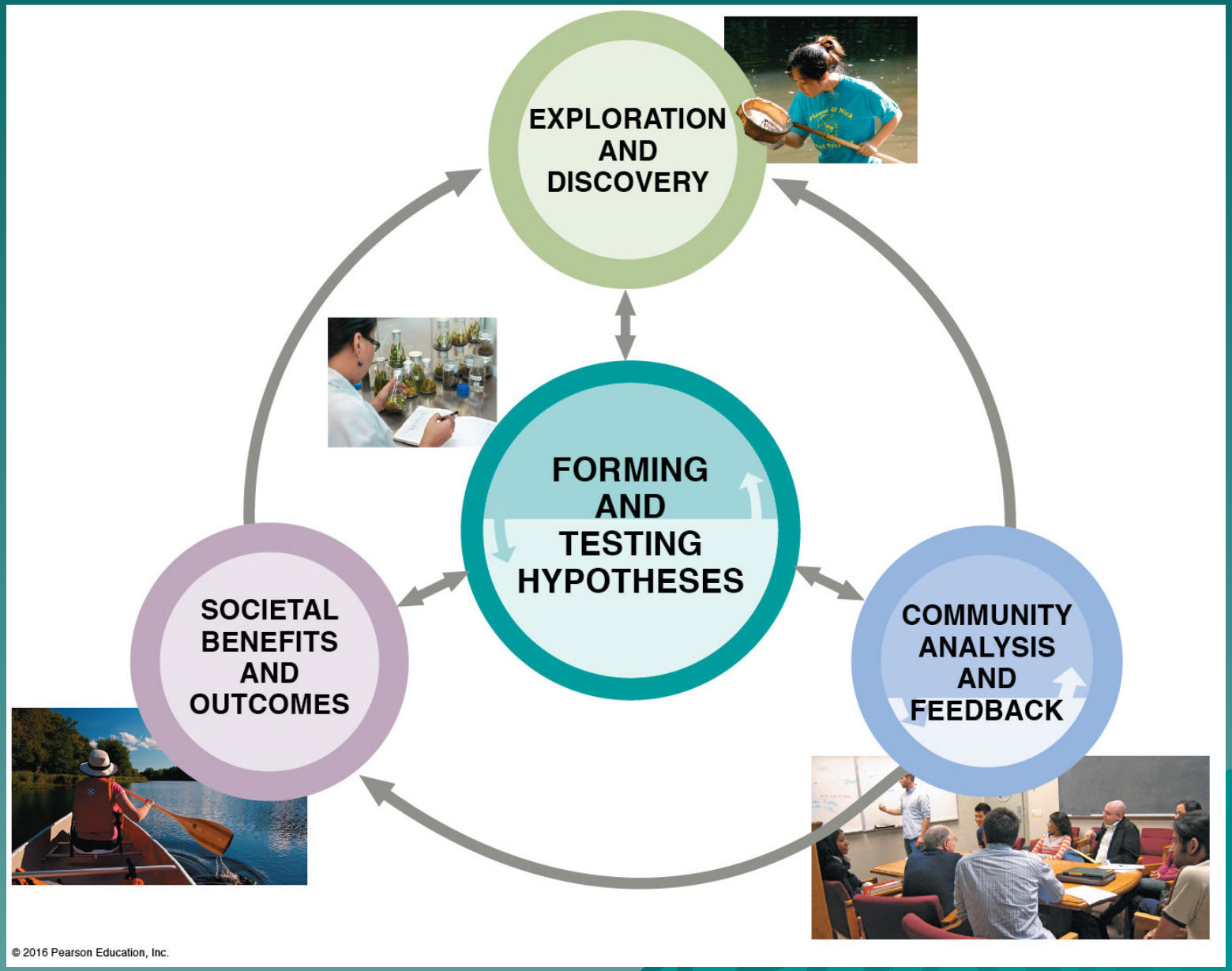
- Describes nature through observation and analysis of data
- Data = recorded observations
  - Qualitative and quantitative
- Inductive reasoning: derive generalizations based on specific observations

Hypothesis-Based Science

- Hypothesis: makes predictions that can be tested by recording more observations or experiments

- AP Biology: "If … , then … because…"
- Results can either support or refute the hypothesis
  - Not "My hypothesis is correct"

Model of the Scientific Process



FORMING AND TESTING HYPOTHESES

Testing Ideas

- Forming hypotheses
- Predicting results
- Doing experiments and/or making observations
- Gathering data
- Analyzing results

Interpreting Results
Data may…

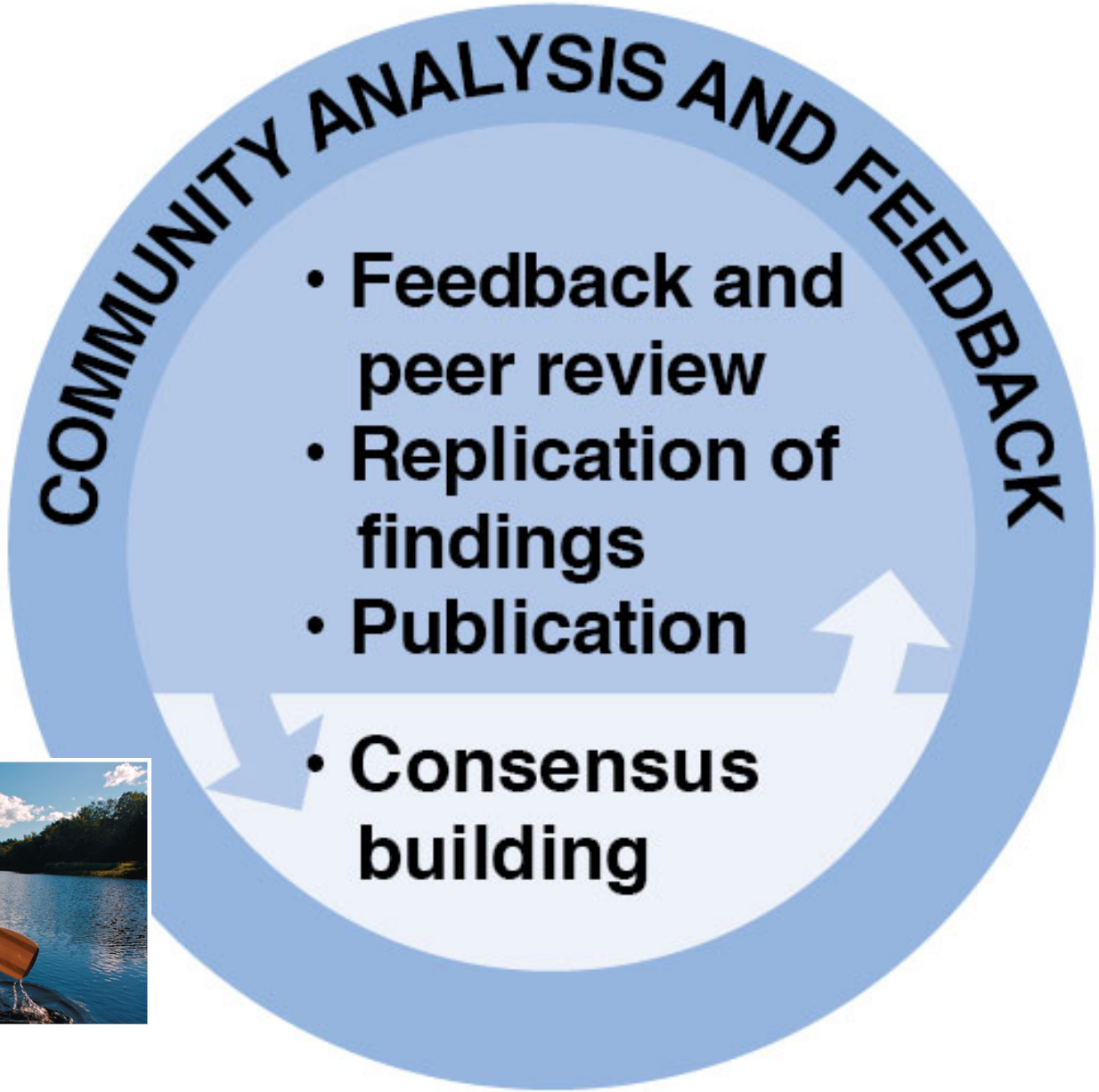
- Support a hypothesis
- Contradict a hypothesis
- Inspire a revised or new hypothesis

EXPLORATION AND DISCOVERY

- Observing nature
- Asking questions
- Reading the scientific literature

SOCIETAL BENEFITS AND OUTCOMES

- Developing technology
- Informing policy
- Solving problems
- Building knowledge



Theories in Science

- Broader in scope than a hypothesis
- Generates new hypotheses
- Supported by a large body of evidence
- Can be modified or rejected with new research evidence

Examples:

- Theory of evolution by natural selection
- Theory of gravity
- Theory of plate tectonics