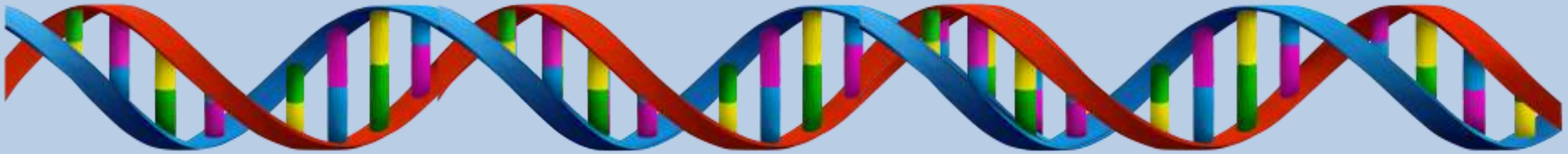
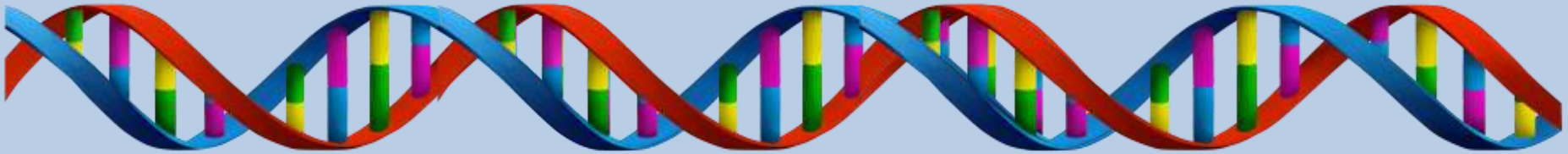


1. A scientist grows tomatoes in multiple greenhouses that each have a different amount of carbon dioxide. He compares the weight of tomatoes produced in each greenhouse, and also compares them to tomatoes grown in a greenhouse with a normal, atmospheric level of carbon dioxide.

   a) Identify the IV, DV, CVs, and control group.

   b) Is this a controlled experiment? Why?



Theories vs Laws

- Review with your group

Theories and Laws

- *ARE MEANINGFUL IN SCIENCE*
- **An idea is not elevated to a theory or law until there is a plethora of statistically significant data to support it**

Theory

- **A highly tested, reliable, significant explanation of events in the natural world**
  - **supported by copious data**
  - **unifies repeated observations and hypotheses**
  - **leads to accurate predictions**
- ***EXPLAINS THE HOW/WHY***

Law

- **Accepted as a universally accurate explanation about a phenomena**
- ***EXPLAINS THE WHAT***

Theories vs Laws

- **THEORIES NEVER BECOME LAWS**

Steps of the Scientific Method

- Review with your group

Steps of the Scientific Method

- Observation -> Curiosity -> Questions
- Form Hypotheses
- Conduct Controlled Experiments
- Collect and Analyze Data
- Draw Conclusions

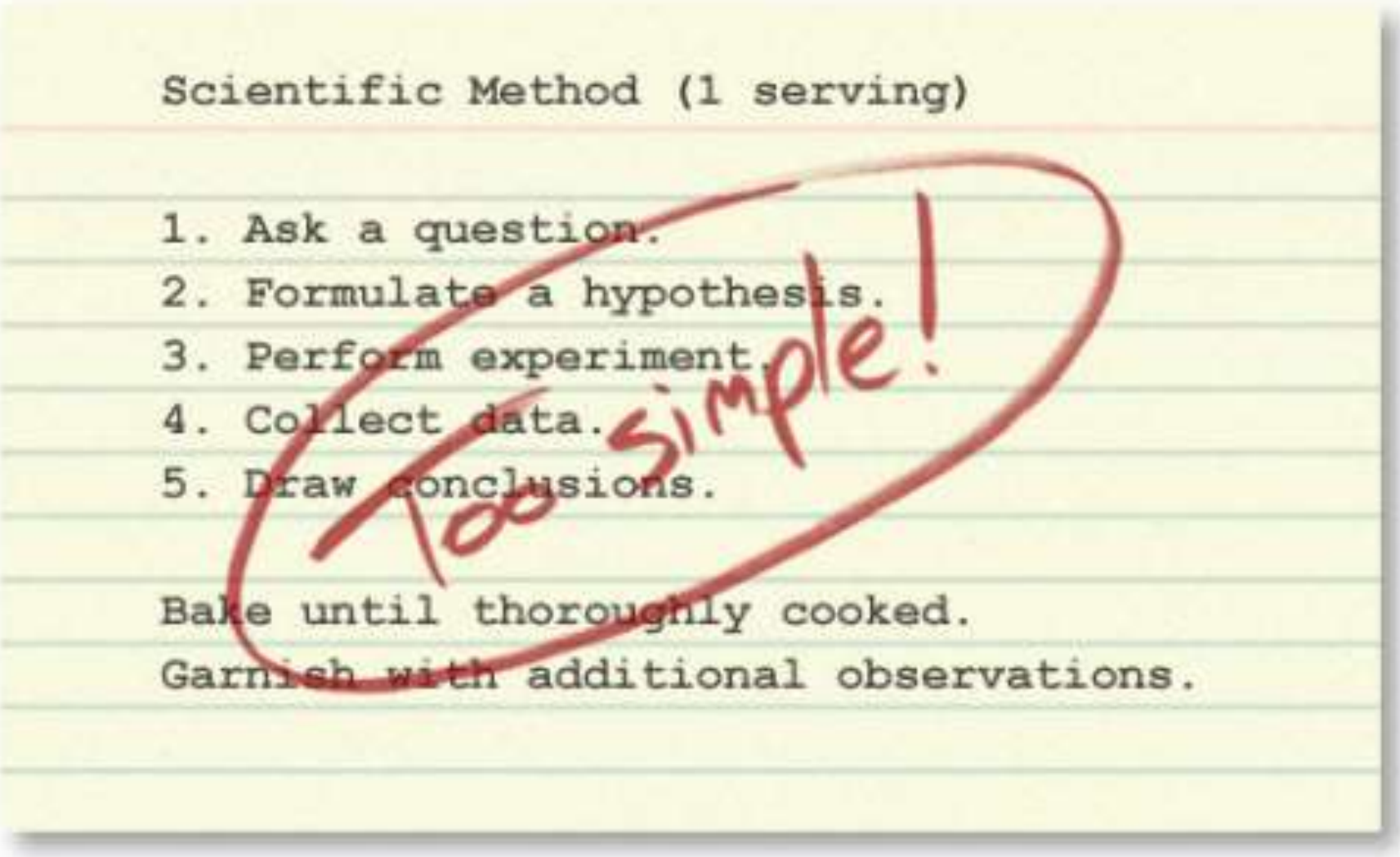
Steps of the Scientific Method

- **Observation:** the act of noticing and describing events or processes in a careful, orderly way

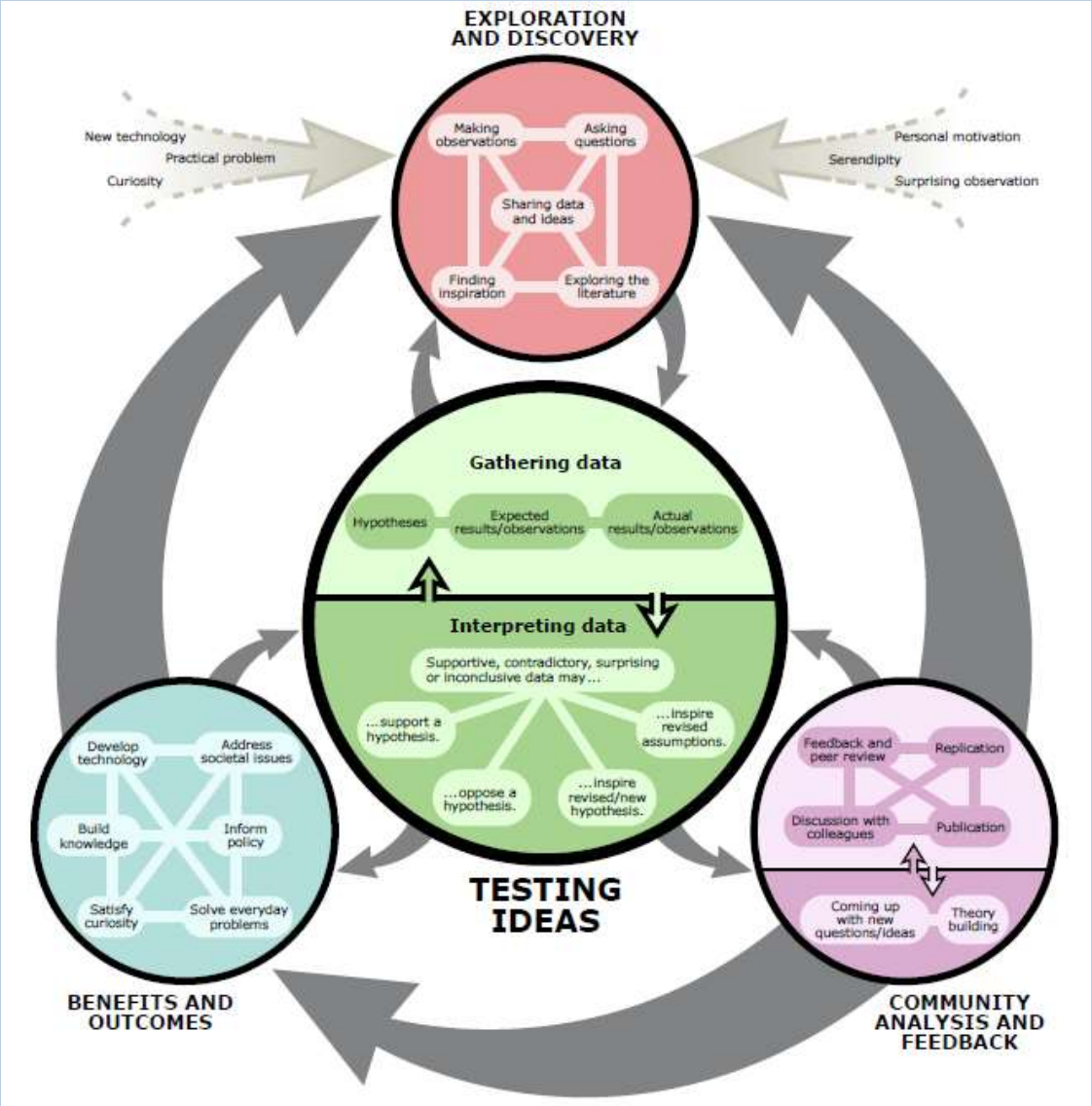
  Curiosity: wondering about what was noticed

  Question: forming a testable question about what was noticed
- **Form Hypotheses:** a tentative scientific explanation that can be tested
- **Controlled Experiment:** an experiment in which only one variable is changed
- **Collect and Analyze Data:** qualitative (descriptive) and/or quantitative (numerical) data can be collected
- **Draw Conclusions:** state what data means for the idea, and for future tests

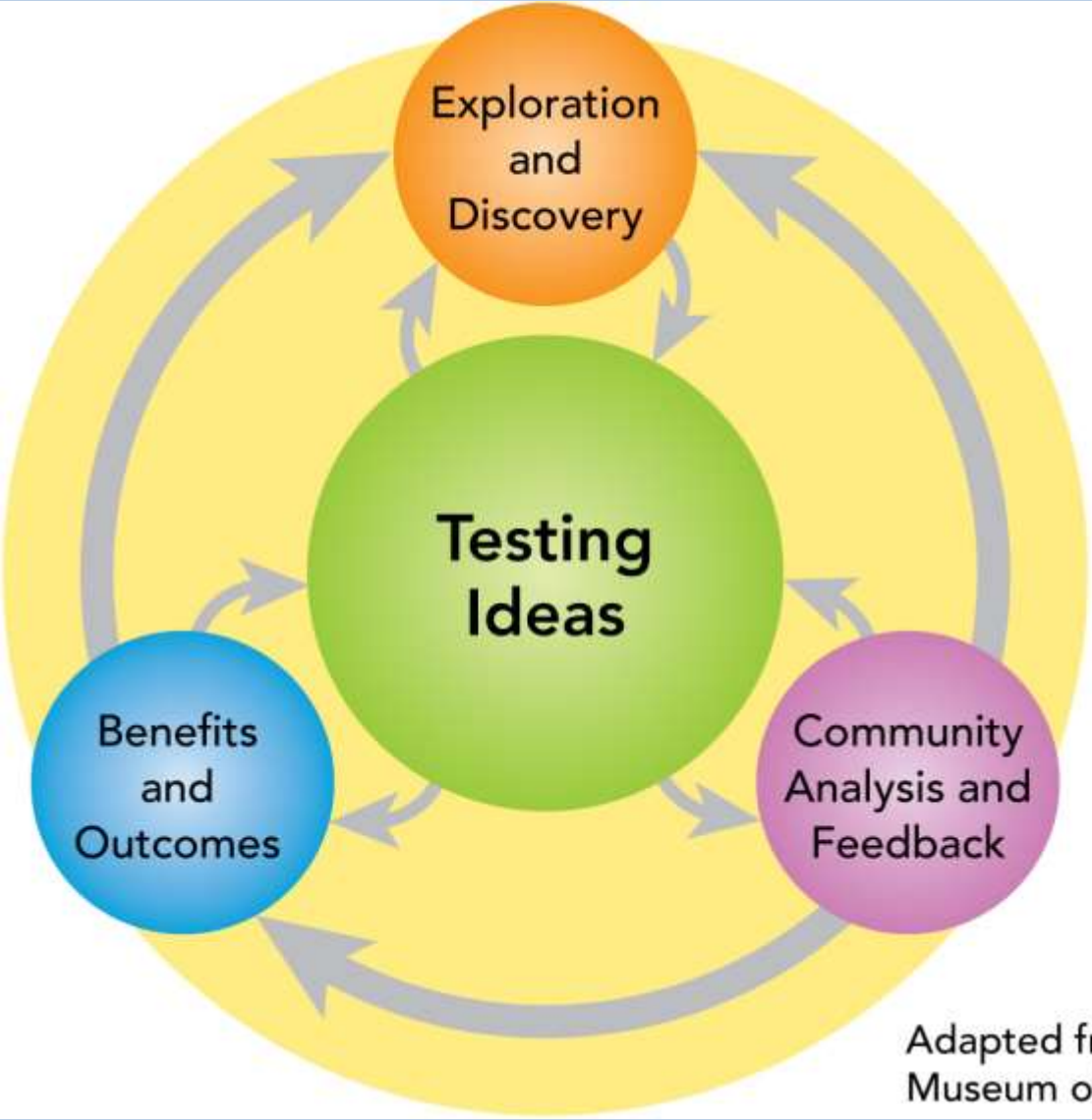
Steps of the Scientific Method



Science in Context

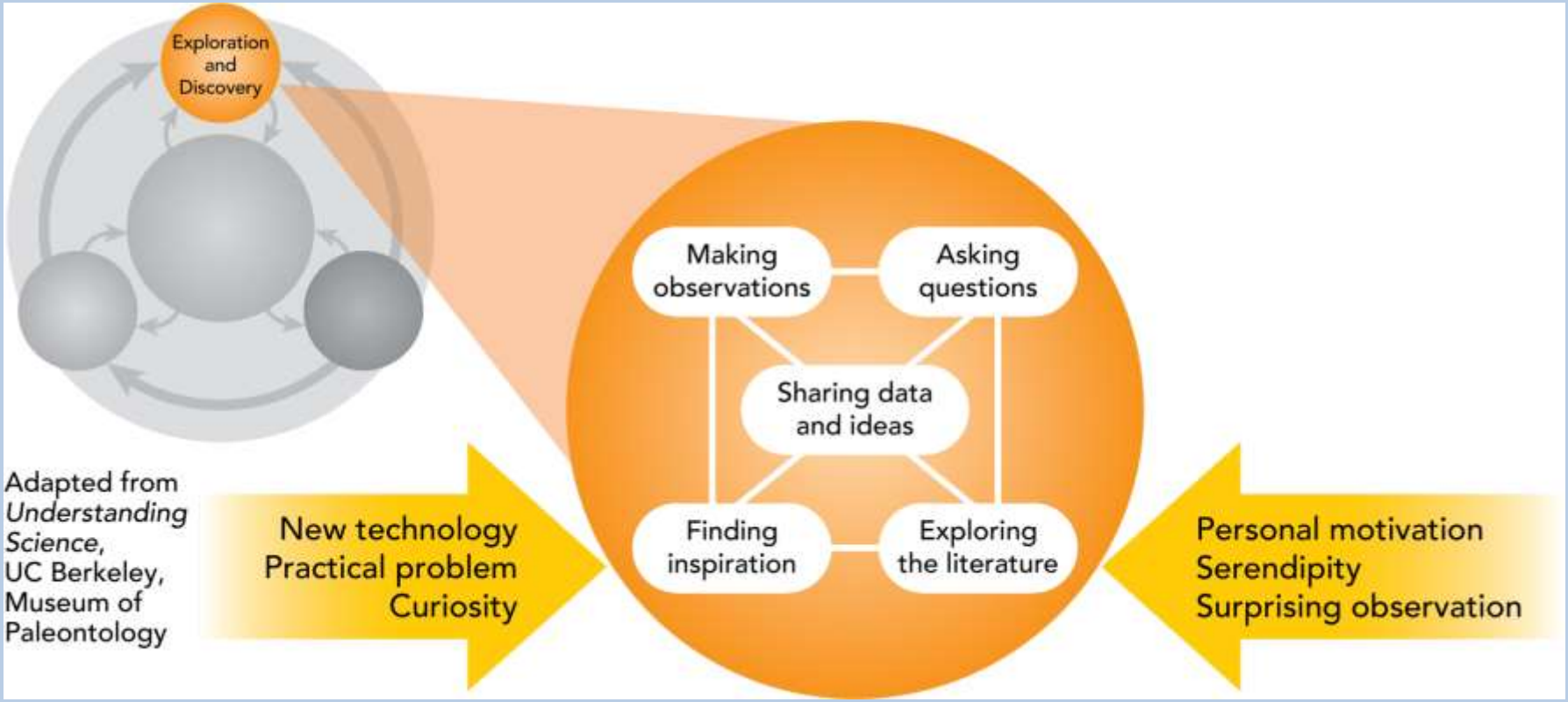


Science in Context

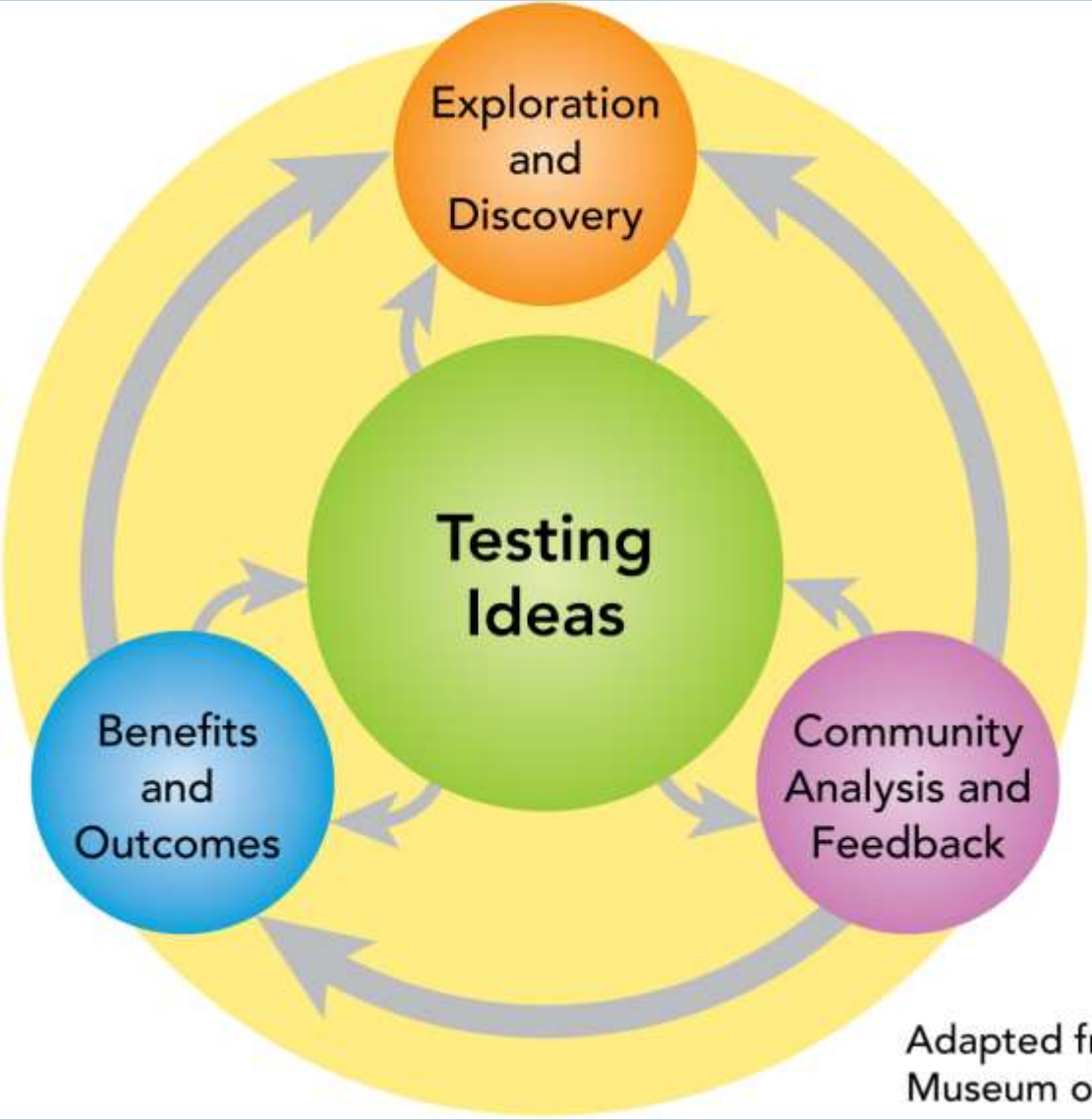


Adapted from *Understanding Science*, UC Berkeley, Museum of Paleontology

Science in Context: Exploration and Discovery

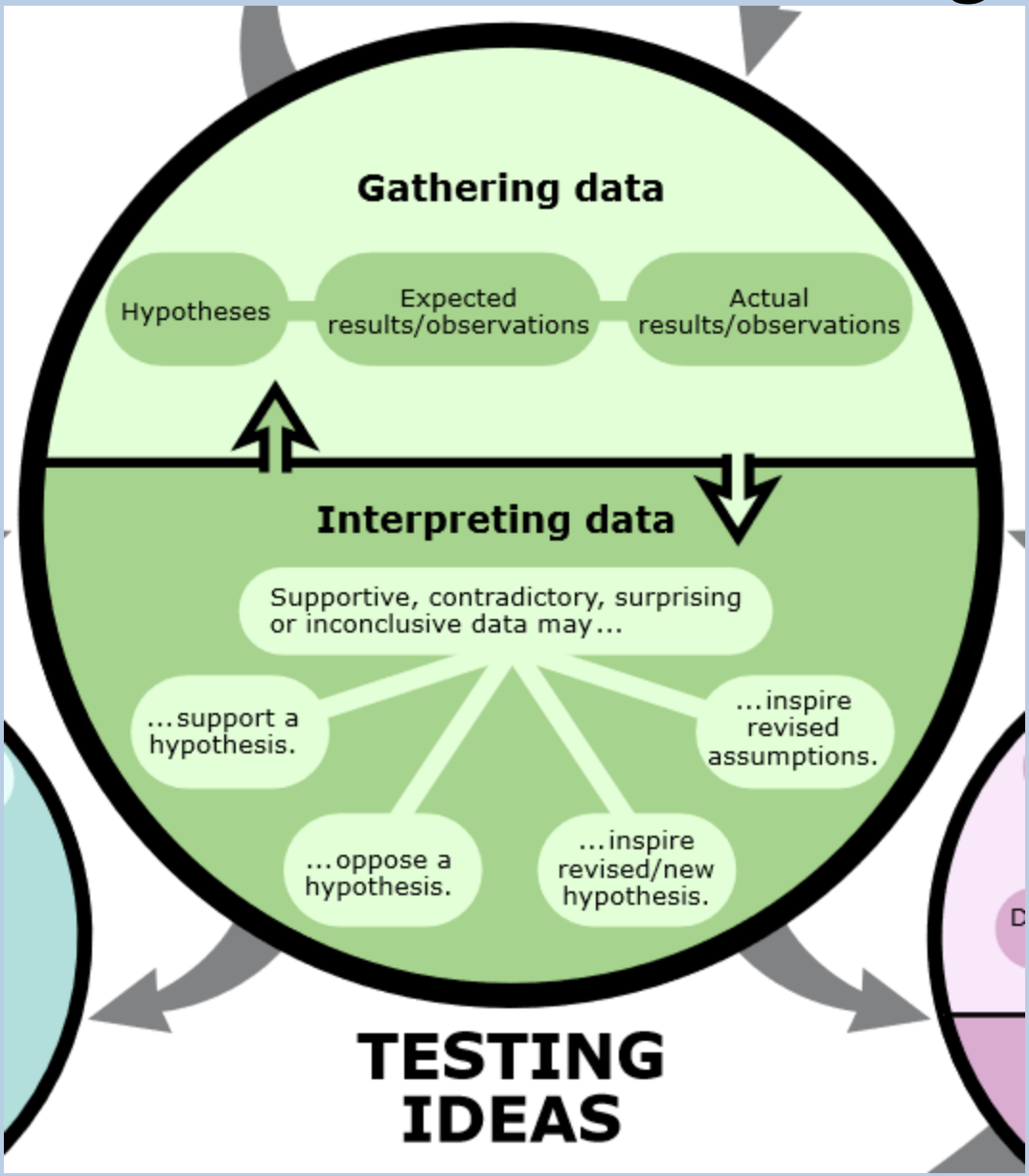


Science in Context

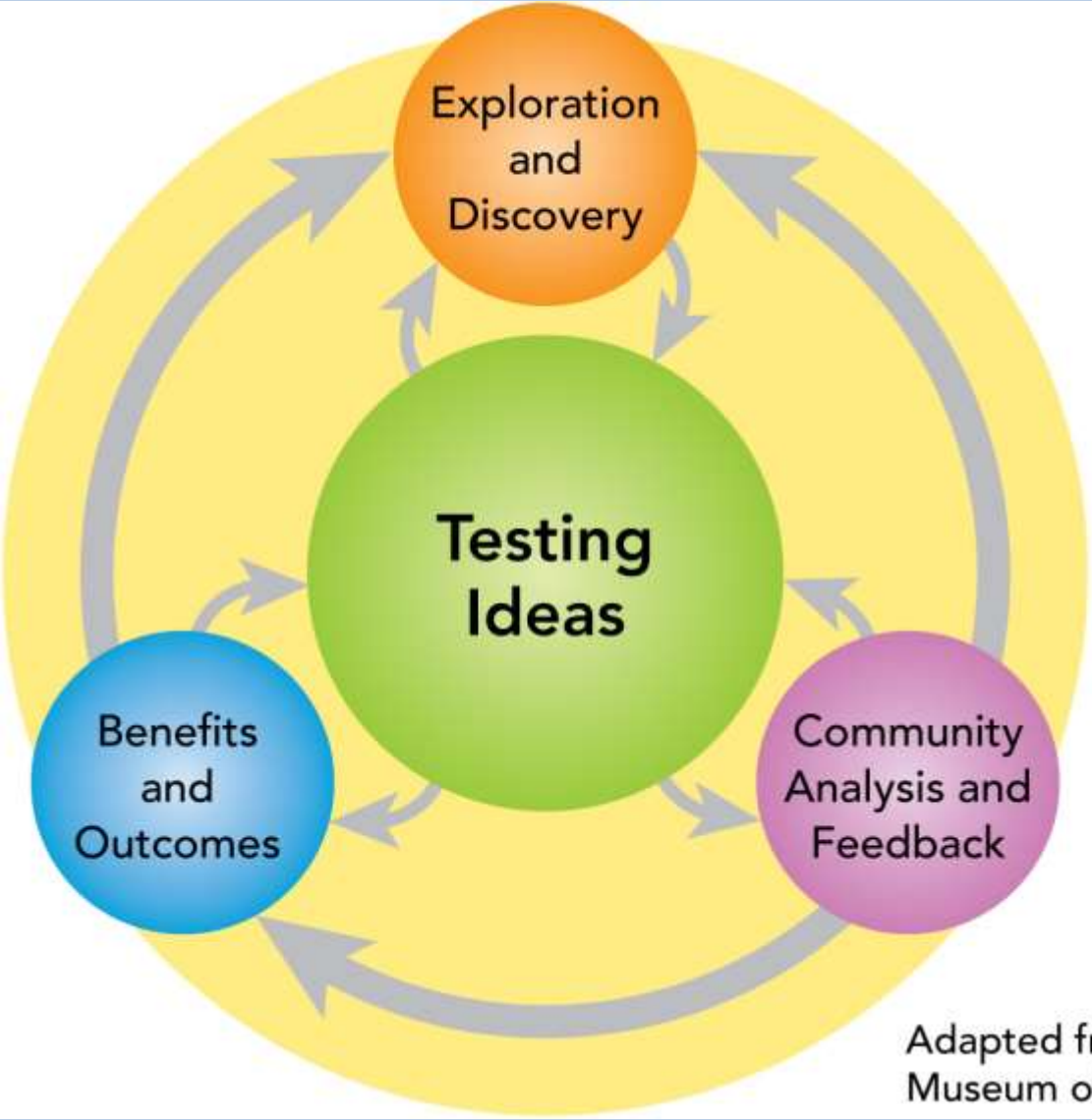


Adapted from *Understanding Science*, UC Berkeley, Museum of Paleontology

Science in Context: Testing Ideas

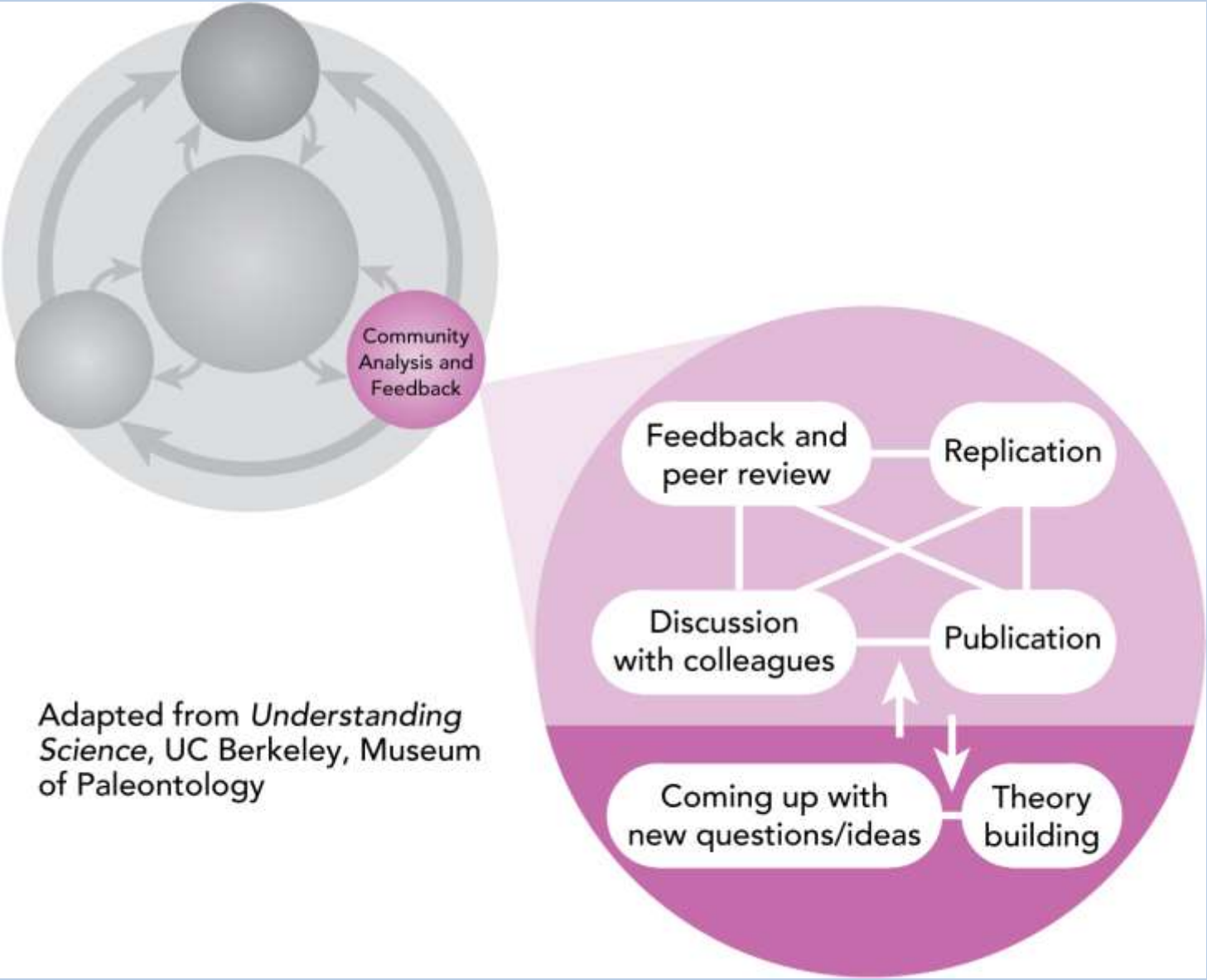


Science in Context



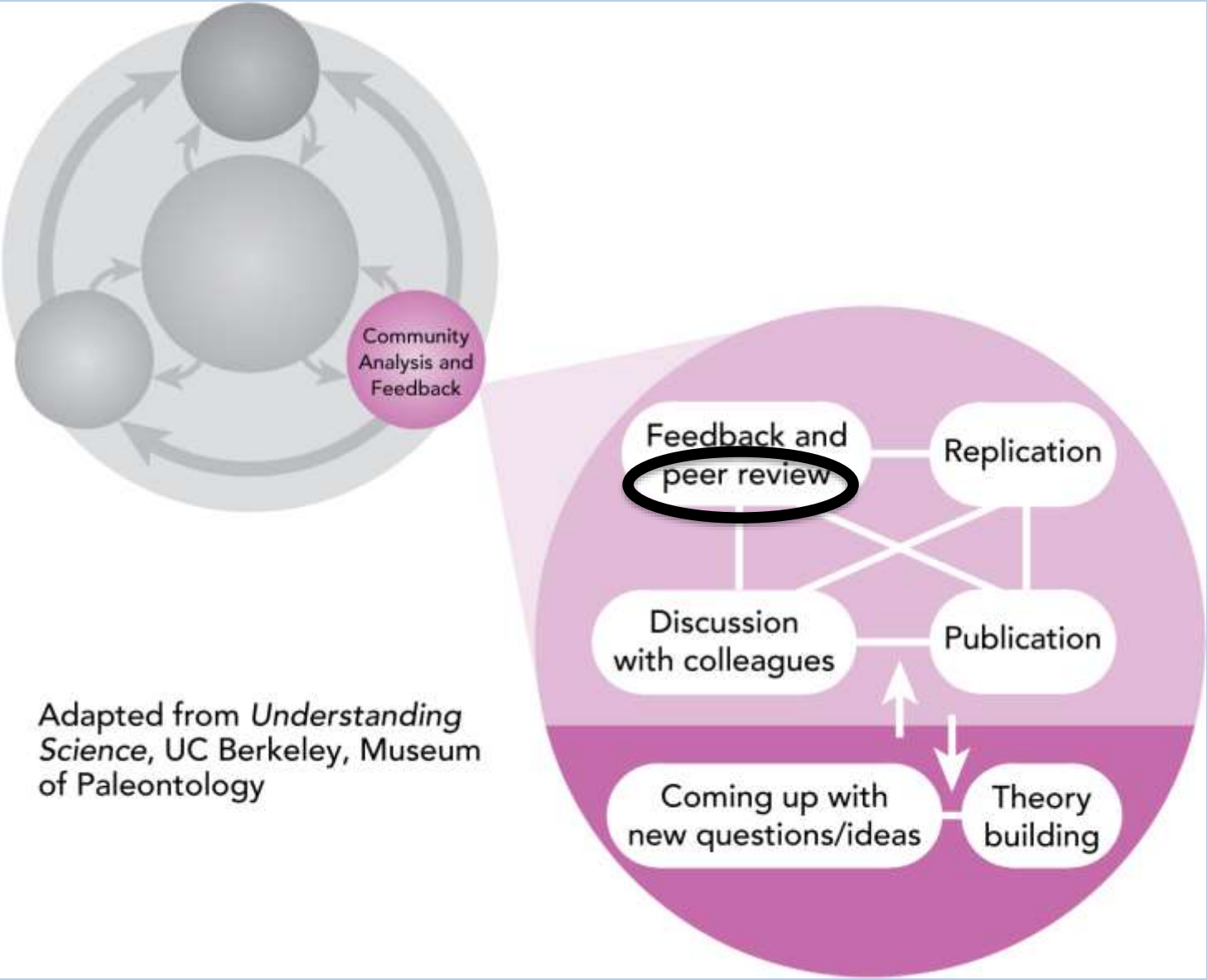
Adapted from *Understanding Science*, UC Berkeley, Museum of Paleontology

Science in Context: Community Analysis and Feedback



Adapted from *Understanding Science*, UC Berkeley, Museum of Paleontology

Science in Context: Community Analysis and Feedback



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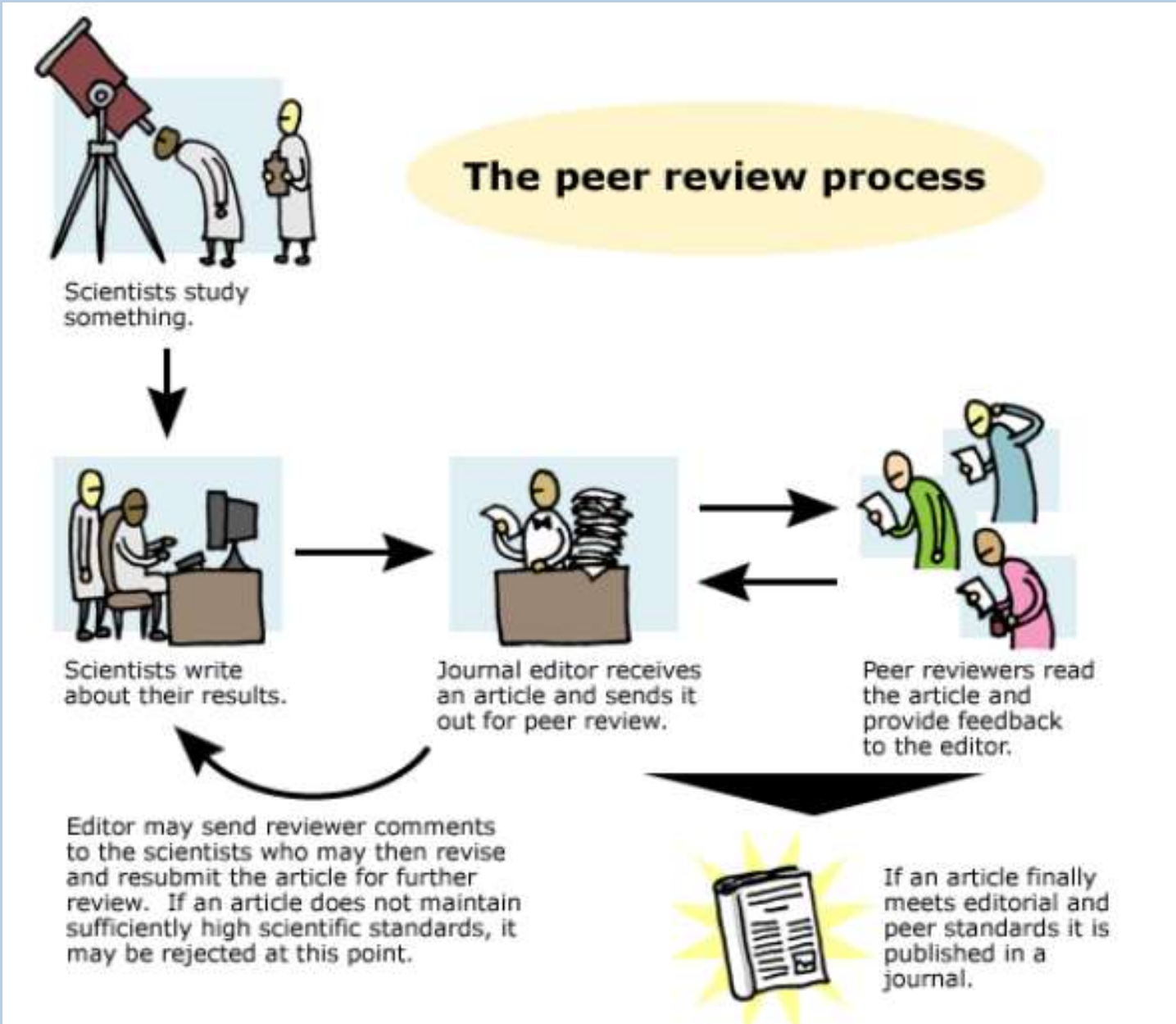
Peer Review


The peer review process
Scientists study something.
Scientists write about their results.
Journal editor receives an article and sends it out for peer review.
Peer reviewers read the article and provide feedback to the editor.
Editor may send reviewer comments to the scientists who may then revise and resubmit the article for further review. If an article does not maintain sufficiently high scientific standards, it may be rejected at this point.
If an article finally meets editorial and peer standards it is published in a journal.

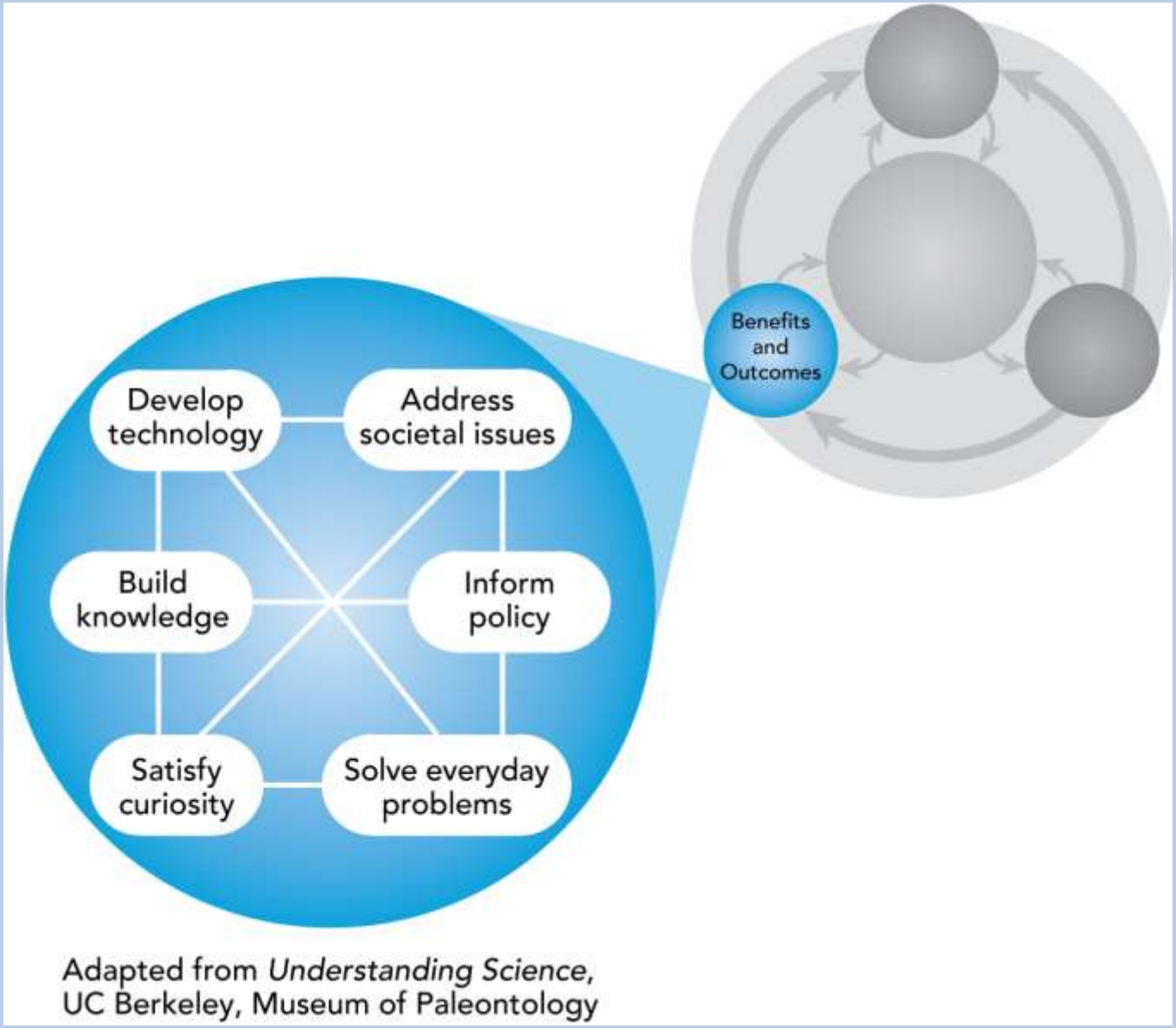
Bias

- Peer review helps to prevent bias in scientific publications
- Why is that important?

Bias

- Every person has opinions, likes, and dislikes, even scientists
- Science is supposed to define what could be done, not what should be done. That part is up to society.

Science in Context: Benefits and Outcomes



Adapted from *Understanding Science*,
UC Berkeley, Museum of Paleontology

Science and Society

- https://www.youtube.com/watch?v=8e1XX-ngJcc

Learning Objectives

4. Describe how attitudes and experiences generate new ideas.

5. Explain why peer review is important.

6. Explain the relationship between science and society.

Science and Engineering Practices

- https://www.youtube.com/watch?v=t3Z2DZIUT2U

Science and Engineering Practices

- With your group place the science and engineering practices in order on the placemat
  - BE CAREFUL AND INTENTIONAL ABOUT WHICH SIDE YOU PLACE THEM ON (science or engineering)

Both Science and Engineering Practices Include:

- Developing and using models
- Using mathematics and computational thinking
- Constructing explanations and designing solutions
- Engaging in argument from evidence

Learning Objectives

7. List practices common to both science and engineering.

Learning Objectives

7. List practices common to both science and engineering.

https://www.youtube.com/watch?v=1cYzkyXp0jg&feature=youtu.be

Engineering Challenge

- We have an engineering challenge/competition to present to you

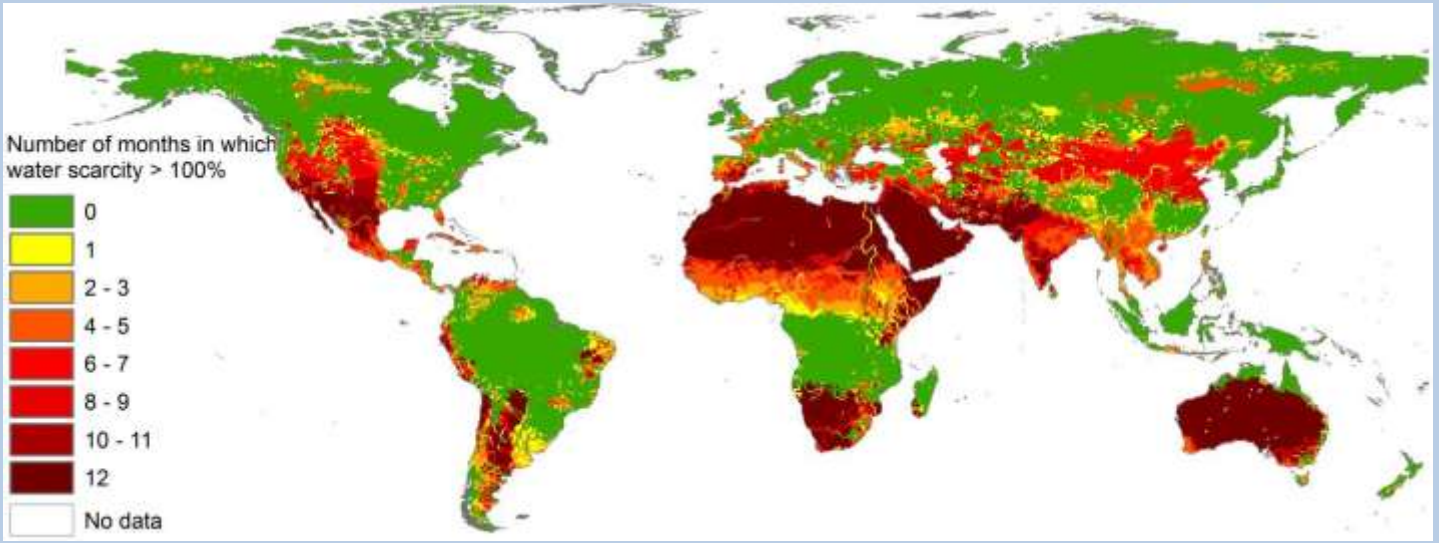
Engineering Challenge

- When you are dismissed:
  - Find a group of 4 people
  - Go to a lab station
  - Wait for further instruction

Engineering Challenge

- What was the world issue/problem that we learned about during block?

Engineering Challenge



Science matters because it finds solutions for problems the world faces.

Engineering Challenge

- What were two solutions that were presented in the NatGeo video we watched?

Engineering Challenge

Engineering Challenge

- Use what you learned about physical science and water last year to decide how you could separate fresh water from salt water

Engineering Challenge

- **Use the materials given on the front desk to *ENGINEER* a simple solution**

Engineering Challenge

- **The group that designs the still that produces the most freshwater by Monday will win a prize.**

Engineering Challenge