

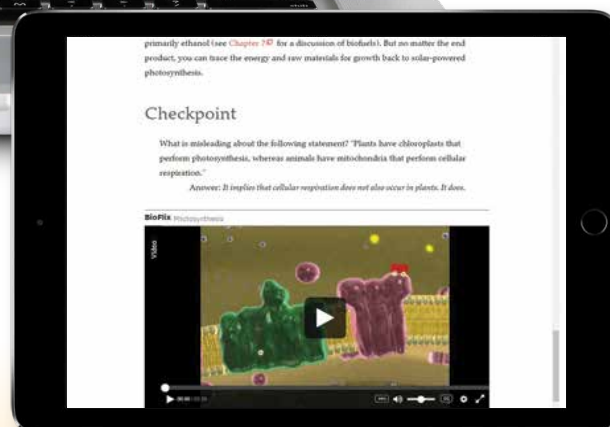
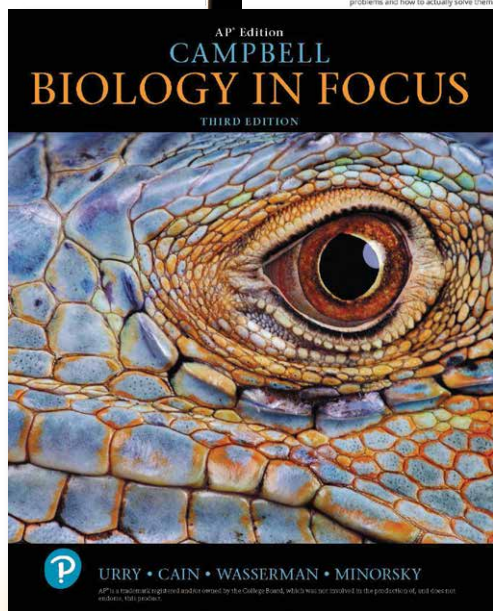
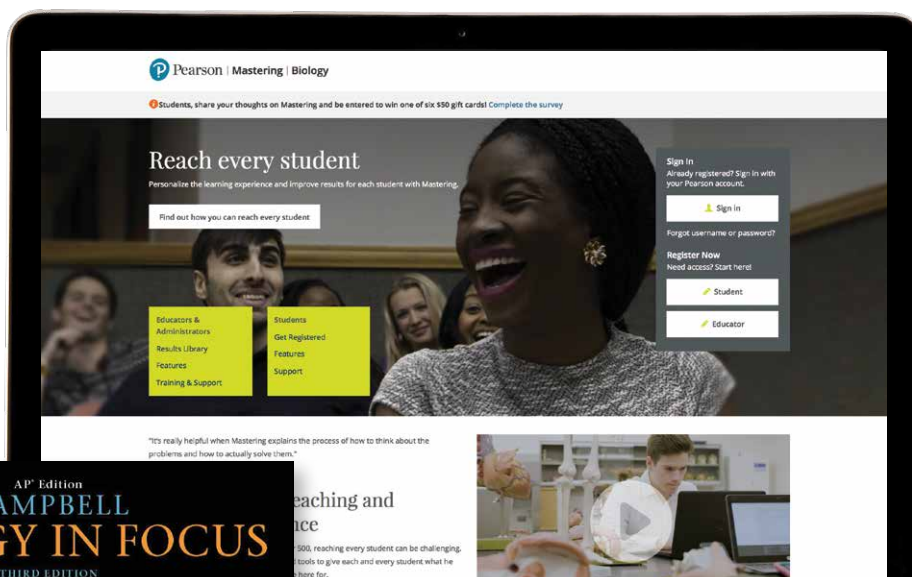


Pearson

# Campbell BIOLOGY in Focus

Published by Pearson

3rd Edition, AP<sup>®</sup> Edition © 2020 with  
Mastering<sup>®</sup> Biology from Pearson with Pearson eText,  
*Urry et al.*



Savvas Learning Company is the official distributor for Pearson in offering effective, hands-on content in AP, Honors, and Electives programs to K-12 schools and districts.




## Practice Scientific Skills

**Scientific Skills Exercises** help students master the **Framework's Science Practices** by using real data to build key skills needed for biology, including data analysis, graphing, experimental design, and math skills.

**NEW! Problem-Solving Exercises** guide students in applying scientific skills and interpreting real data in the context of solving a real-world problem.

**Problem-Solving Exercise**



**Are you a victim of fish fraud?**

Mastering Biology  
ABC News Video: Fake Fish in Stores and Restaurants

When buying salmon, perhaps you prefer the more expensive wild-caught Pacific salmon (*Oncorhynchus species*) over farmed Atlantic salmon (*Salmo salar*). But studies reveal that about 40% of the time, you aren't getting the fish you paid for!

Instructors: A version of this Problem-Solving Exercise can be assigned in Chapter 3 of *Mastering Biology*. A more extensive investigation is in Chapter 20 of *Mastering Biology*.

In this exercise, you will investigate whether a piece of salmon has been fraudulently labeled.

**Your Approach**  
The principle guiding your investigation is that DNA sequences within a species or from closely related species are more similar to each other than are sequences from more distantly related species.

**Your Data**  
You've been sold a piece of salmon labeled as coho salmon (*Oncorhynchus kisutch*). To see whether your fish was labeled correctly, you will compare a short DNA sequence from you to standard sequences from the same gene for three salmon. The sequences are:

Sample labeled as *O. kisutch* (coho salmon) 5' -AGGCAACGGCCCTAA-3'

Sequence for *O. kisutch* (coho salmon) 5' -AGGCAACGGCCCTAA-3'

Sequence for *O. keta* (chum salmon) 5' -AGGCAACGGCCCTAAGCCGAC-3'

Sequence for *Salmo salar* (Atlantic salmon) 5' -AGGCAACGGCCCTAAGCCGTC-3'

**Standard sequences**

**Your Analysis**

- Circle any bases in the standard sequences that do not match the sequence from your fish sample.
- How many bases differ between (a) *O. kisutch* and your fish sample? (b) *O. keta* and the sample? (c) *S. salar* and the sample?
- For each standard, what percentage of its bases are identical to your sample?
- Based on these data alone, state a hypothesis for the species identity of your sample. What is your reasoning?

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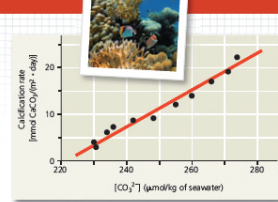
**Scientific Skills Exercise**

**Interpreting a Scatter Plot with a Regression Line**

**How Does the Carbonate Ion Concentration of Seawater Affect the Calcification Rate of a Coral Reef?** Scientists predict that acidification of the ocean due to higher levels of atmospheric CO<sub>2</sub> will lower the concentration of dissolved carbonate ions, which living corals use to build calcium carbonate reef structures. In this exercise, you will analyze data from a controlled experiment that examined the effect of carbonate ion concentration ([CO<sub>3</sub><sup>2-</sup>]) on calcium carbonate deposition, a process called calcification.

**How the Experiment Was Done** For several years, scientists conducted research on ocean acidification using a large coral reef aquarium at Biosphere 2 in Arizona. They measured the rate of calcification by the reef organisms and examined how the calcification rate changed with differing amounts of dissolved carbonate ions in the seawater.

**Data from the Experiment** The black data points in the graph form a scatter plot. The red line, known as a linear regression line, is the best-fitting straight line for these points. These data are from one set of experiments, in which the pH, temperature, and calcium ion concentration of the seawater were held constant.



Data from C. Langdon et al., Effect of calcium carbonate saturation state on the calcification rate of an experimental coral reef, *Global Biogeochemical Cycles* 14:639–654 (2000).

**AP<sup>®</sup> SCIENCE PRACTICES 1, 2, 4, 5**

- Based on the data shown in the graph, describe in words the relationship between carbonate ion concentration and calcification rate.
- If the seawater CO<sub>3</sub><sup>2-</sup> concentration is 270 μmol/kg, estimate the rate of calcification.
- Based on the data shown in the graph, describe in words the relationship between carbonate ion concentration and calcification rate.
- Based on the data shown in the graph, describe in words the relationship between carbonate ion concentration and calcification rate.

**INTERPRET THE DATA**

- When presented with a graph, first determine what each axis represents. (a) In words, what is shown on the x-axis? (Include the units.) (b) What is on the y-axis? (c) Which variable is the independent variable—the one that was manipulated by the researchers? (d) Which is the dependent variable—the one that responded to the treatment, which was measured by the researchers? (For additional information about graphs, see the Scientific Skills Review in Appendix F.)

Instructors: A version of this Scientific Skills Exercise can be assigned in *Mastering Biology*.

AP<sup>®</sup> SCIENCE PRACTICES 1, 2, 4, 5

**AP Biology Framework Science Practices** are highlighted at point of use.

**NEW! Scientific Skills Exercises and Problem-Solving Exercises** are all assignable through *Mastering Biology* and are **automatically graded**.

## New and Improved!




**Pearson LabBench** features thirteen online investigation tutorials that retain many of the elements of the original LabBench, assignable in *Mastering Biology*. Designed to prepare students for their lab work and reinforce key biological principles, these pre-labs are correlated to **AP<sup>®</sup> Biology Curriculum Framework Learning Objectives and Science Practices**.

Campbell Biology 11e, Third Edition

**Ready-To-Go Teaching Modules**

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 Mechanisms of Evolution CONCEPT 21.3	 Transport in Plants CONCEPT 28.2	 The Human Digestive System CONCEPT 33.3

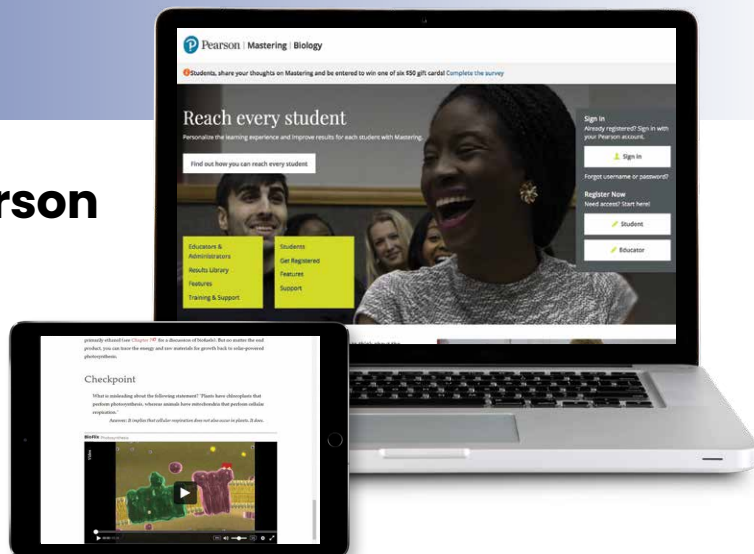
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