SCIENTIFIC AMERICAN FRONTIERS

TEACHING GUIDE

www.pbs.org/saf/1204

Alien Invaders

Activity 1: Grades 5-8

Unwanted Travel Partners

As you learned in segments like "The Silken Tree Eaters," alien invaders are not beings who have space-hopped down to Roswell, New Mexico. They are animal and plant species that are transported to regions outside of their natural habitat. Within a new environment, these invaders may be free of the natural controls like predators and disease that had previously regulated their population numbers. Without this control, the aliens can rapidly overpopulate an area, destroying the region's established ecological balance.

In this activity, you'll observe an actual problem that is faced by tropical fish enthusiasts. When new fish or plants are introduced into a stable and maintained fish tank, unwanted organisms may inadvertently be transferred along with the new arrivals. Here's an activity that demonstrates both the transfer process and the problem faced by owners of tropical aquariums.

OBJECTIVE

This activity page will offer:

- An operational definition in alien invasion
- Hands-on activity in the inadvertent transfer of organisms
- An opportunity for microscopic observation

MATERIALS

- Two large test tubes, labeled "A" and "B"
- Dropper pipette
- Distilled water
- Sprig of *Elodea* (also called Anacharis)*

- Forceps
- Microscope
- Slides
- Coverslips
- Sterile Cotton Ball

***Teacher Note:** Prior to this activity, sprigs of *Elodea* should be maintained in a standard, non-sterile aquarium tank that has sufficient aeration to support a rich aquatic community. A tank overgrown with algae is ideal. You can also obtain these or similar plants at most tropical fish stores.

PROCEDURE

1. Use a clean pipette to transfer a drop of distilled water onto a glass slide.
2. Gently position a coverslip over the drop.
3. Examine this drop with a microscope using both low and high power magnifications. Record the presence of any observed organisms. If applicable, use classroom resources to identify these organisms. Include a sketch of what you see.
4. Fill both sterile test tubes "A" and "B" two-thirds full with distilled water. Make sure not to contaminate either of these tubes with unwanted organisms.
5. Use forceps to transfer a sprig of *Elodea* to test tube "A".
6. Set both test tubes aside. Both tubes should be exposed to sufficient light to meet the photosynthetic needs of the plant.
7. Plug the mouth of each tube with a sterile cotton ball.
8. Each day examine the appearance of the tube walls, water, and plant surface. Record the appearance of any additional life forms.
9. Use a sterile pipette to remove several drops of water from each tube. Examine these droplets using a microscope. Note the appearance of any microorganisms.
10. After recording your observations for one week, compare and contrast the appearance of the water in both tubes "A" and "B".

QUESTIONS

1. Why did this activity require two test tubes, if only one was needed for the *Elodea* sprig?
2. What happened to tube "A", into which the *Elodea* sprig was introduced?
3. What happened to tube "B"?
4. What types of organisms were transferred along with the *Elodea* sprig?

EXTENSIONS

On Your Own

Contact a local pet store that maintains tropical fish. Discuss the different types of species that are common invaders to local fish tanks. Identify the

preferred means of dealing with each of these unwanted organisms. What types of techniques are biological controls? Which ones are chemical controls?

Sterile Transfer
Suppose you wanted to introduce *Elodea*, and only *Elodea*, into a new environment. How could you improve the transfer technique so that few if any unwanted organisms were imported into the new environment?

Art Extension
Imagine if you were the size of a tiny protozoan species. How might the surface of an aquarium plant appear to you? Think about the nooks, crannies and other types of microorganisms you'd uncover. Use classroom resources to investigate the flora and fauna common to such environments. Working in a team, create a classroom mural that depicts this microscopic universe.

WEB CONNECTION

Noxious, Invasive, and Alien Plant Species
http://www.pwrc.usgs.gov/WLI/wris1.htm
Government site that addresses alien species infringing on wetlands.

Anacharis-Elodea densa
http://animal-world.com/encyclo/fresh/plants/anacharis.htm
Description and great image of Elodea sprigs.

Basics of Fish Care
http://www.ahc.umn.edu/rar/MNAALAS/Fish.html
Basic fish care with a section on quarantine of newly acquired individuals from the Minnesota Branch of the American Association for laboratory Animal Science Inc. website.

The activities in this guide were contributed by Michael DiSpezio, a Massachusetts-based science writer and author of "Critical Thinking Puzzles" and "Awesome Experiments in Light & Sound" (Sterling Publishing Co., NY).

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ANSWERS

QUESTIONS

1. Why did this activity require two test tubes, if only one was needed for the *Elodea* sprig?
   (Test tube "B" served as the control, while "A" was the experimental setup.)
2. What happened to tube "A", into which the *Elodea* sprig was introduced?
   (Other organisms began growing in and on the inner surface of the tube.)
3. What happened to tube "B"?
   (Most likely, this tube retained the same sterile appearance - unless it was accidentally infected with organisms.)
4. What types of organisms were transferred along with the *Elodea* sprig?
   (Answers will vary but may include snails, other types of algae, rotifers, copepods, and various protozoa species.)

EXTENSIONS

Sterile Transfer

Suppose you wanted to introduce *Elodea*, and only *Elodea*, into a new environment. How could you improve the transfer technique so that few if any unwanted organisms were imported into the new environment?
(Accept all reasonable answers such as swiping plant surface with alcohol, isolating sprigs before transferring them, etc.)