The Niche Kit

What exactly is a niche? Is it an organism's physical home? Its occupational role? A unique set of behaviors?

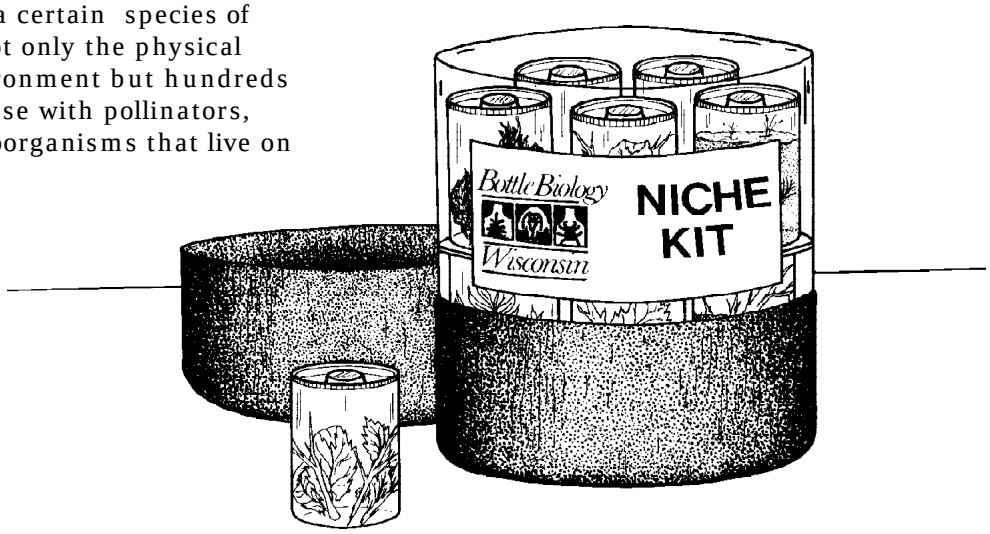
The concept of a *niche* is one of the most deceptively difficult concepts in ecology. However, grappling with this elusive idea can evoke careful and critical questioning about ecosystems, their complexity and the varied roles of their inhabitants.

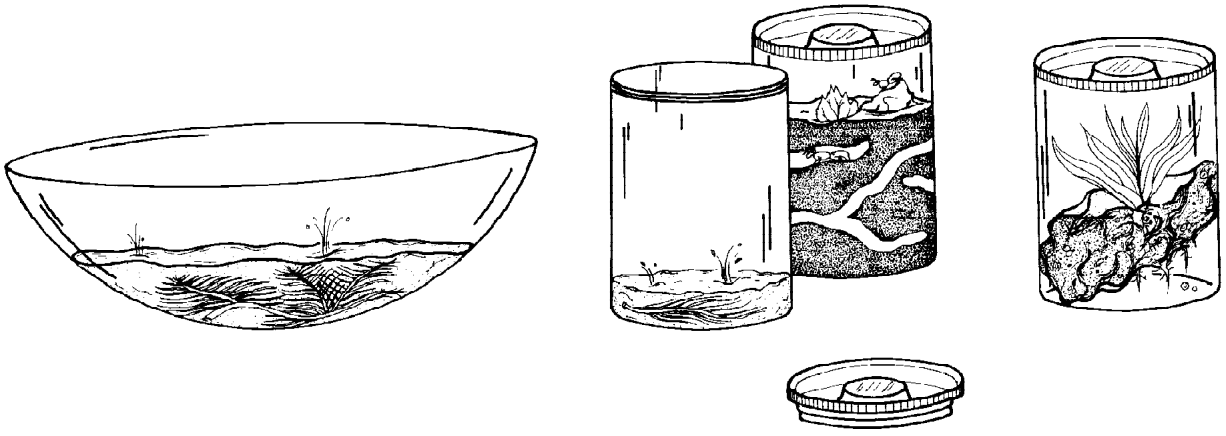
All aspects of an organism's role within a community make up its niche. The niche extends beyond physical place to include interactions with other organisms for food, shelter, reproduction, growth and development. For example, the niche of a certain species of wild sunflower includes not only the physical aspects of its natural environment but hundreds of interactions such as those with pollinators, seed dispersers, and microorganisms that live on the surface of its roots.

The Niche Kit exercise challenges students, primarily in the K-8 level, to begin examining the complexity of ecosystems by exploring the niches associated with small portions of a larger environment.

Making the Kit

Cut a 2-liter bottle halfway up the straight side. An opaque base from a different bottle (try different bases until you find one that is slightly larger) fits on the top of the first as a cap. Inside the bottle, place one or two layers of clear film





Department of Plant Pathology, 1630 Linden Drive, Madison, WI 53706 1-800-462-7417 wfp@fastplants.cals.wisc.edu

cans, each of which contains a distinctive biotic sample from an ecosystem. Collect all your samples from a small area (a few hundred square feet). For example, you might choose to collect from a pond and might fill each film can with one of the following:

- surface pond water from the center of the pond
- "muck" from the pond bottom
- pebbles and sand from the pond bottom near the edge
- floating weeds and algae near the pond edge
- mosses on the ground near the pond edge
- bark from a willow tree
- leaf litter under the tree
- wind dispersed seeds or feathers floating in the air.

Procedure

1. Divide students into cooperative groups of two, three or four. Pass out one film can to each group.

2. Each group examines the contents of the can. An inexpensive watchglass for examining the contents can be made by cutting out the round bottom of a bottle to create a shallow dish. A hand lens greatly facilitates this exploration (see accompanying article).

3. Each group addresses the following questions about their "film can niche."

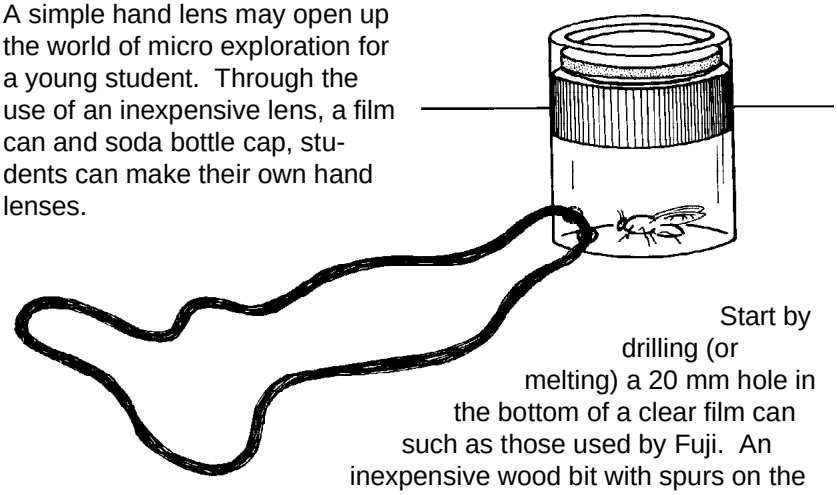
   Define the physical and chemical aspects of the environment of the "niche."

   List the organisms which would inhabit or interact directly with the "niche."

   Come up with a creative name for the niche which reflects its unique characteristics.

Film Can Hand Lens

A simple hand lens may open up the world of micro exploration for a young student. Through the use of an inexpensive lens, a film can and soda bottle cap, students can make their own hand lenses.



Start by drilling (or melting) a 20 mm hole in the bottom of a clear film can such as those used by Fuji. An inexpensive wood bit with spurs on the edge works well for this. The hole may also be melted with a heated open end of a test tube. Make a similar hole in a plastic soda bottle cap.

For a lens, we have been using double convex lenses with a diameter of 28 mm and a focal length of 59 mm. Such a lens of quality glass is available from Edmund Scientific, catalog # C96-075. A less expensive plastic lens may also be available. A lens of a smaller diameter can be used by drilling correspondingly smaller holes, and the focal length may vary by several mm and still function well.

To assemble, drop the lens into the drilled film can. Push the drilled soda bottle cap into the can until it holds the lens snugly in place. It may be necessary to cut the lower small protruding rim off the cap to push it into the can. A neck string may be attached be threading it through two small holes made in the film can. The hand lens may also be used as a bug bottle by placing a bug in the recess of the film can cap and snapping the cap back on the can. The focal length of this lens will bring an object into focus at the mouth of the film can.

4. Each group describes their "niche" to the rest of the class and pertinent details are summarized on the board.

5. A representative from each group is then chosen and, with help and coaching from the other team members, positions themselves in the room such that they are adjacent to other representatives who represent "niches" close to theirs in the ecosystem. This "ecosculpture" represents a three-dimensional recreation of the original system.

6. Have each representative discuss why they have positioned themselves the way they have.

Extensions and Discussions

- Do the film can's contents represent a niche? Many niches? A part of a larger niche? Can an entire niche be captured in a container? Can niches of different organisms overlap?
- How does one make good observations? Discern the differences between an assumption and an objective observation? When is each useful?