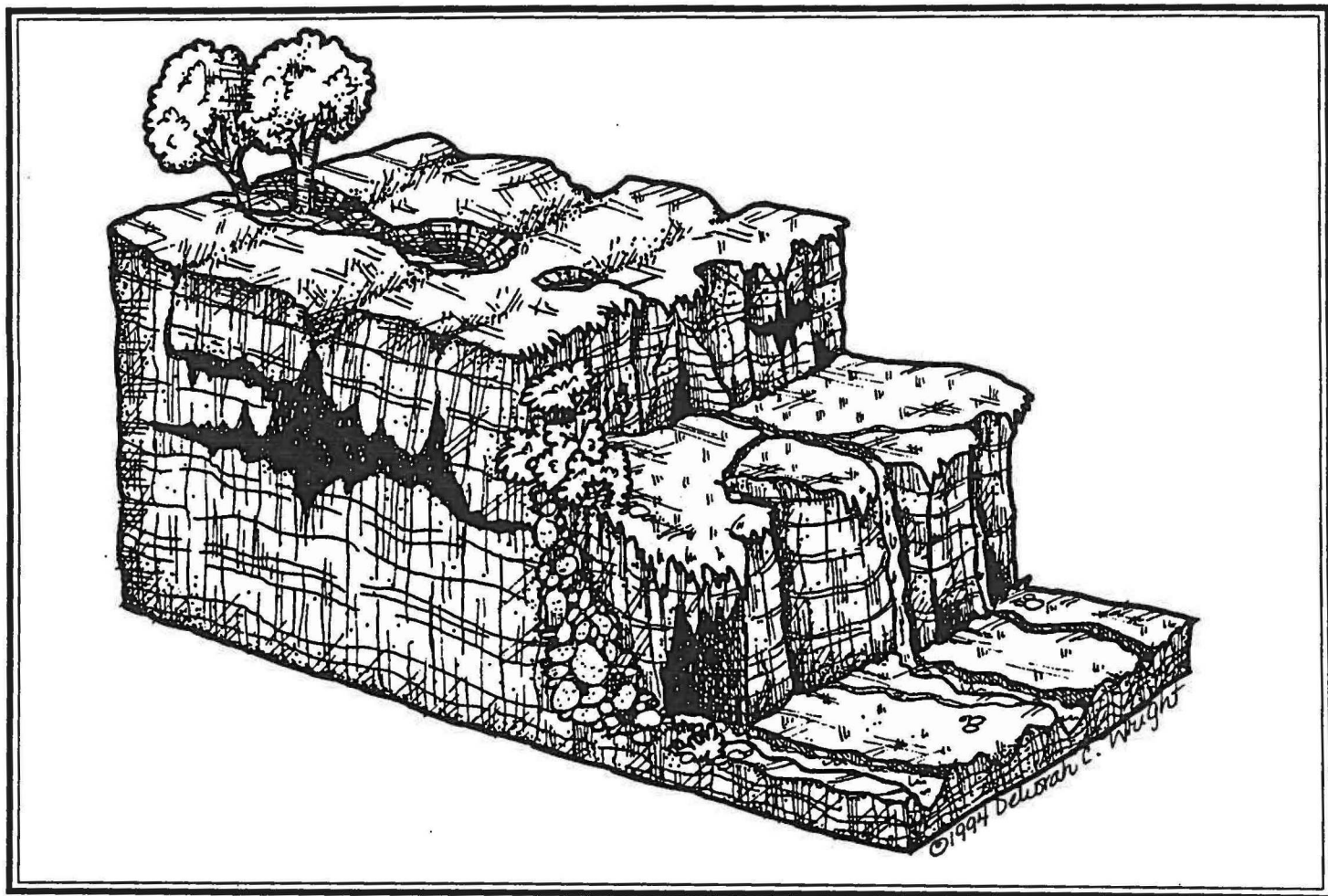


#2 - Creating a Karst Topography



Focus Question:

How are solution caves formed?

Objective:

The students will simulate a karst topography to illustrate the formation of a cave.

Suggested Grade Level:

Grades 6-9

Materials Needed:

- large baking pan
- 5 pounds of plaster of paris
- 2-3 cookie sheets
- aluminum foil
- 8-inch length of 2"x4" piece of wood
- ring stand
- 500+ml flask
- one-hole stopper
- 1-foot piece of 1/8" clear tubing necessary to fit stopper
- drip regulator for end of tubing
- supply of gravel for bed of baking pan
- supply of popsicle sticks
- white glue

Overview:

A karst topography is a geographic region characterized by sinkholes, sinking streams, springs, caves, and solution valleys. Mildly acidic ground water percolates through soil and fractures insoluble rock such as limestone, dolostone, marble and gypsum. The topography is often characterized by sinkholes and natural depressions often shaped like bowls or cones. Mismanagement of karst lands through unsupervised land development, poor farming techniques, and improper waste disposal may contribute to long range environmental problems. Polluted ground water, damaged or destroyed cave ecosystems, and endangered human structures are some of the consequences of ignoring the structure and nature of karst lands.

Procedure:

Note to Instructor: This simulation will last indefinitely. Refilling the flask of vinegar and emptying it will require monitoring in classroom.

- 1) Mix up and let set two to three 8" by 10 "sheets of plaster of paris. Each of the sheets of plaster should be no more than 3/4 -1" in thickness.
- 2) Place a layer of gravel about 1" thick on the bottom of a large baking pan.
- 3) Position an 8-inch piece of 2 by 4 at one end of the baking pan. Lay the 4-inch side down.
- 4) Incline the first of the sheets of plaster of paris, leaning one end on the piece of wood.
- 5) Cover the first sheet of plaster with a sheet of aluminum foil.
- 6) Perforate the aluminum foil 10-15 times
- 7) Glue several popsicle sticks to aluminum foil.
- 8) Allow glue to set, then place second sheet of plaster of paris on the sheet with the popsicle sticks.
- 9) Fill flask with vinegar. Place one-hole stopper with plastic tubing and drip regulator into the flask.
- 10) Position ring stand and invert the flask towards the top of the inclined sheets of plaster. Vinegar should drip and flow from the top to bottom of the inclined sheets.
- 11) Adjust drip to fall at a rate of 10-15 drops per minute.

Conclusion:

With time and patience the slow drip of the vinegar will begin to erode the plaster. Slowly the run-off will begin to dissolve a channel down the incline. Eventually, the top layer of plaster will be penetrated by the vinegar. The solution then will encounter the layer of foil and begin to seep and dissolve a passage between the layers emerging at the lower end of the inclined plaster sheets. This simulation will illustrate how caves are slowly formed.

Further Investigations:

This simulation demands a commitment of time. During the course of the simulation and as the class investigates other aspects of caves, caverns, and related geology, the class may consider the following for further investigations and research:

- 1) Research the type of aquifers found in the surrounding regions.
- 2) Develop a program for information and public education involving waste disposal of both household and industrial toxic wastes.
- 3) Develop a public education forum on the hazards of indiscriminate dumping of chemicals, fertilizers, herbicides, pesticides, heavy metal, and PCB's on a karst topography that will contaminate a ground water supply and jeopardize springs and wells.