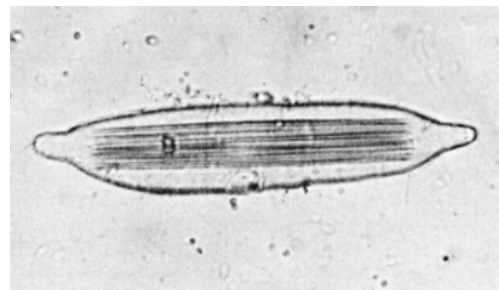


Idioblasts

The common house plant, *Dieffenbachia picta* is often called "dumb cane". *Dieffenbachia* tissue contains a proteolytic enzyme similar to the venom of scorpions and snakes. If you were to chew on a piece of *Dieffenbachia*, your mouth and throat would become paralyzed for perhaps a day. You would not be able to eat or speak until the paralysis wore off. The enzyme can affect you because specialized cells, or **idioblasts**, found in the leaves and stems contain needle-shaped crystals of calcium carbonate, called **raphides**. Each idioblast contains a bundle of raphides which are forcibly ejected from the cell when the tip of the cell is damaged, as it might be when some plant predator decides that *Dieffenbachia* looks like a tempting lunch and takes a bite. It is believed that the raphides penetrate the soft tissues of the throat and mouth making it easier for the venom-like enzyme to enter tissues and cause paralysis.



Dieffenbachia picta



An idioblast from *Dieffenbachia picta*.

Interesting as it may be to contemplate making a *Dieffenbachia* milkshake for your botany instructor, and having a respite from interminable lecturing, in this exercise we are going to visually observe the manner in which the idioblasts function.

Observing Idioblasts

1. In order to observe idioblasts, you must have freshly macerated *Dieffenbachia*. Grind a piece of leaf with a small amount of tap water with a mortar and pestle. This may have been done by your instructor or the laboratory technician.
2. After grinding, add a bit more tap water to make a total of 10ml of solution.
3. Strain the solution through a tea strainer to filter out larger leaf pieces.
4. Let the fluid rest in a test tube for a few minutes. Idioblasts will settle to the bottom of the test tube. This might be a good time to wash your hands, just in case you got a bit of the macerated material on yourself.
5. Use a capillary pipette or medicine dropper to remove a drop of fluid from the bottom of the test tube to a microscope slide. Add a cover slip and observe under medium power. (10x objective lens). Once you locate idioblasts, you can observe them in detail with higher magnification.

Look for idioblasts with broken tips. When you find one, you should be able to see the thin raphides being "ejected" through the tip. The mechanism that causes the ejection of the raphides is thought to be turgor. The idioblasts contain a mucopolysaccharide material that is osmotically active. When the tip of the cell is broken, the mucopolysaccharide material attracts water. The water increases pressure on the raphides forcing them out of the broken tip of the cell. Intact idioblasts do not release their raphides.



An Idioblast ejecting raphides. The idioblast in the lower right corner has not been broken.

When you have finished observing your idioblasts and their raphides, clean and dry your slide and cover slip thoroughly.

Materials for this laboratory were taken from *Carolina Tips*, Vol. 45, No. 7, July 1982, written by Father Eugene Middendorf, Biological Sciences Department, Quincy College, Quincy, Illinois 62301.