Slime molds have defied biological classification, having been at various
times (or at the same time) classified as plants, fungi, and protists. Now
they are most often classified as protists, but regardless of their family tree,
they are great organisms for classroom study.

In nature, slime molds typically live in cool, shady, moist places, such as on
decaying logs and leaves in the woods. Occasionally, they appear on lawns
just after a rainy period. In fact, there have been cases reported in the news
that “the Blob” (in reality a slime mold) was taking over some
unsuspecting homeowner’s lawn.

Slime molds feed on bacteria, protozoa, fungal spores, and other microbes.
The slime mold used in these exercises is named *Physarum polycephalum*,
commonly called the “many-headed slime.” It looks a bit like undercooked
scrambled eggs. *Physarum* creeps across the substrate in a fanlike stage
called the plasmodium. This yellow mass of goop moves about as quickly
as the hour hand of a clock. It surrounds food particles in its path and then
secretes enzymes to digest the food. As it digests its food, *Physarum*
deposits waste particles and moves away from them. *Physarum* gains
energy and the materials it needs for further growth from its food.

If *Physarum* is subjected to slowly drying conditions, it forms a hardened
mass called the sclerotium. The sclerotium can remain dormant for years
until environmental conditions are again favorable for growth.

When *Physarum* runs out of food and water or lacks the suitable
temperature, light, and pH, it enters its reproductive phase. The
reproductive structures are called sporangia. These are somewhat
analogous to seed pods in plants. The sporangia are full of spores and are
usually formed out in the open where the spores can be easily spread by
air currents. Spores can also remain dormant for years until environmental
conditions favorable to growth return.

In these exercises, *Physarum* is grown on agar dishes and fed old-
fashioned oat flakes. The agar provides water to *Physarum* and a suitable
background for viewing it under the microscope. *Physarum* is actually
eating bacteria on the oat flakes; the flakes themselves are not consumed.
*Physarum* does not do well on instant oat flakes, although scientists do not
understand why. Evidently, some vital nutrient is lost when instant oat
flakes are processed.
Materials

*included in the kit*
- vial *Physarum polycephalum* sclerotium papers
- petri dish of *Physarum polycephalum* plasmodium
- 5 petri dishes, 2% agar
- package old-fashioned oat flakes
- sterile scalpel

*needed but not supplied*
- 40x microscope

Procedures

**Growing *Physarum* from the sclerotium**

Place 2-3 *Physarum* sclerotium papers with the yellow sclerotium tissue face down in the center of one of the 2% agar dishes. Place 6–8 oat flakes about \( \frac{1}{2} \) inch away from the papers. When the *Physarum* has crept from the paper, add more oat flakes at the edge of the creeping plasmodium. Store in the dark except during periods of observation.

**Growing a new plasmodium**

To grow a new *Physarum* plasmodium, use the scalpel to remove a piece about the size of a pea from the plasmodium you have and place this piece in the center of a new agar dish. Feed the new piece of *Physarum* by placing 10–12 oat flakes on and about it as soon as you complete the transfer. Store in the dark except during periods of observation.

**Observing streaming in *Physarum***

Streaming in the veins of the *Physarum* plasmodium can best be observed using a magnification of 40x. Focus on the edge of the veins. The particles in the veins can be seen streaming in one direction for about 15 seconds, slowing, and then reversing the direction of flow. The reason for this phenomenon is unknown, but it may be that food particles are moved from the edge of the plasmodium to the interior of the mass, while waste is moved from the interior to the outer edges of the plasmodium.
Inducing spore formation
If you do not feed your plasmodium at all, you may induce *Physarum* to reproduce. Store the unfed plasmodium in the dark. When the plasmodium reaches the edges of the dish, it may form black sporangia. Observe any sporangia that form under 40x magnification.

Glossary

**agar**—a gelatinous extract of seaweed used to solidify the food medium. Agars are used for growing microorganisms.

**microbe**—microorganism.

**plasmodium**—the active, streaming life form of slime molds.

**sclerotium**—the hard, resistant life form of slime molds.

**sporangium (pl., sporangia)**—the reproductive structure that produces spores in fungi.

**spore**—a reproductive structure for dispersal of fungi, slime molds, and some plants.

**substrate**—the substance on which an organism lives.

Further Reading


To order call:
1-800-334-5551 (US and Canada)
336-584-0381 (International)

For technical help call:
1-800-227-1150

www.carolina.com