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Slime Mold Growing Kit

Teacher's Manual

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 ½ 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

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Stephenson, Steven. 1994. *Myxomycetes: A Handbook of Slime Molds.* Timber Press, Portland, Oregon.

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