lawn care cause a range of health and environmental effects, including chemicals such as: (i) the weed killer glyphosate (Roundup), which is identified by the National Toxicology Program and the International Agency for Research on cancer (IARC) of the World Health Organization as probably carcinogenic, (ii) chlorophenoxyacetic acid (MCPA), mecoprop (MCPP), and dicamba (Tri-Power) weedkillers often used in combination or individually, whose label warns of "irreversible eye damage" and "allergic reactions," (iii) trichlorfon (Dylox), an insecticide that is a neurotoxic organophosphate, and (iv) azoxystrobin (Heritage), a fungicide which, along with its degradate, are known to leach into groundwater under certain soil and water depth conditions. *(See Beyond Pesticides' 30 Most Commonly Used Pesticides at* bp-dc.org/30lawncarepesticides.*)*

ADVANCING ALTERNATIVES

Central to Beyond Pesticides' continuing work is shifting the lawn care industry to organic practices and organic compatible products (see *bp-dc.org/organiccompatible*)—a systems approach that eliminates toxic chemical pesticides and fertilizers, builds soil biology, and operates in sync with nature. This approach is successfully and economically used in managing lawns, parks, and playing fields across the country.

For more information on converting your community to organic land management, please see Beyond Pesticides Lawns and Landscape page at bp-dc.org/lawns. *For community-based assistance in converting parks, playing fields, and school property to organic practices, please write Beyond Pesticides at* info@beyondpesticides.org *or call 202-543-5450.*

Beyond Pesticides v. TruGreen: The Settlement

In August, 2020, Beyond Pesticides and TruGreen Limited Partnership ("TruGreen") released the following statement: "Beyond Pesticides and TruGreen Limited Partnership ("TruGreen") today issued the following statement regarding a lawsuit (*bp-dc.org/TruGreencomplaint*) that Beyond Pesticides filed against TruGreen pursuant to the District of Columbia Consumer Protection Procedures Act in the Superior Court of the District of Columbia: The matter has been resolved to the satisfaction of the parties. TruGreen has resolved to modify or remove certain of the marketing statements at issue in the lawsuit.

Beyond Pesticides was represented by Richman Law and Policy, based in Irvington, New York.

TRACKING BIODIVERSITY

SLIME MOLDS

Yellow slime mold

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TERRY SHISTAR, PhD

They move, but they are not animals. They can solve problems, but they have no brain or neurons. They have no mouths, but they communicate with each other. They are not plants or animals or fungi. They are the fascinating, sometimes disgusting, creatures known as slime molds, which comprise several types of eukaryotic (having cells with a nucleus enclosed in a membrane) organisms within the kingdom Protista.

Although many slime molds are microscopic (like many Protists), it is the larger slime molds known as Myxogastrids (Myxomycetes) that are most fascinating. A Myxogastrid is a plasmodium—a large amoeba that can be as much as a meter across and weigh as much as 20 kilograms. Slime molds go through several life stages, but are most recognizable in the plasmodium or "slime" stage.

The plasmodium is a single cell, with multiple nuclei, that feeds by engulfing food and ingesting it through phagocytosis, then digesting it. Fungi, in contrast, release digestive enzymes to the external environment. Slime mold plasmodia often attract attention because of their colors—bright yellow, orange, or pink. The plasmodium can move at a rate of 1mm/hour. It creates spindly, vascular-like growths that connect it to food sources.

NO BRAIN, BUT PROBLEM SOLVERS

Slime molds exhibit intelligence even though they do not have a brain. When divided, they move back together.[1] They solve mazes, learning the shortest route to the food reward,[2] share information, and can keep track of time. Brian Resnick, senior science reporter for VOX, explains: "If you spread out oats (slime molds' favorite food) on a map, the slime molds will find ways to connect the sources of food with the shortest possible routes. If you add some obstacles to the map, like salt (which the slime mold hate), they'll find creative ways to avoid them. When scientists model metropolitan areas in this manner, with the food representing centers of dense populations, slime mold can somewhat accurately recreate maps—like [a] map of the Tokyo rail system. It took human engineers years to map out the system. It took slime mold just a few hours." Because of their problem-solving skills and the ability to teach one another, slime molds of the species *Physarum polycephalum* were given the position of "non-human resident scholar" at Hampshire College in 2017 and have been solving problems with the help of human research assistants, modeling a number of difficult to solve social and environmental problems.[3]

The preferred home of slime molds, however, is not in university laboratories, but in soils of moist places, especially forests, though some species can be found in almost any ecosystem. They eat bacteria and decaying plants, contributing to the recycling of organic matter. Although the majority of Macrogastrid species inhabit open forests, they can be found in snow, deserts, and aquatic environments. They are food for many insects and other arthropods, nematodes, fungi, and bacteria. Some slime molds of the genera *Mucilaga* and *Physarum* are found on turfgrass, but they do not damage living grass and do not require control.[4]

LIFE CYCLE AND SURVIVAL TACTICS

The life cycle of a slime mold begins with germination of haploid (1n chromosomes) spores in favorable moisture and temperature conditions, with formation either a myxamoeba or a myxoflagellate.[5] The former can move on surfaces like an amoeba, and the latter can swim in water. The Myxogastrid can switch between forms depending on conditions. At this stage, they consume bacteria and fungal spores, and probably dissolved substances, and reproduce through cell division.

When a myxamoeba encounters another of appropriate mating type (there can be hundreds of "sexes"), the nuclei and cell contents fuse to form a diploid (2n) myxamoeba. Within the single cell, the nucleus undergoes multiple divisions, resulting in a multinucleate single-celled amoeba, or plasmodium. This is the "slime" form, which can grow to a large size and consumes, through phagocytosis, bacteria, fungi, other single-celled organisms, small organic particles, and dissolved nutrients. The plasmodium may produce a resting stage or sclerotium—a hardened, resistant form consisting of many macrocysts with a round shape and cell wall—allowing it to survive unfavorable conditions. When conditions are right—and it is unknown exactly what "right" is—the plasmodium moves to a light, dry area to produce fruiting bodies or sporocarps and release spores. Sporocarps are quite distinctive—ranging from colorful stalked balls to tufts of chocolate-colored feathery wands to the disgusting pile of spores of the *Fuligo septica*, better known as dog vomit slime mold.

NOTES

1 *https://www.princeton.edu/news/2010/01/21/sultan-slime-biologist-continues-be-fascinated-organisms-after-nearly-70-years*

2 *http://www.abc.net.au/science/articles/2000/09/28/189608.htm?site=galileo&topic=latest*

3 *https://www.vox.com/science-and-health/2018/3/6/17072380/slime-mold-intelligence-hampshire-college*

4 *https://ohioline.osu.edu/factsheet/HYG-3074*

5 Life cycle information from *https://en.wikipedia.org/wiki/Myxogastria.*

iStockphoto/CassieB03

Terry Shistar

iStockphoto/Nicole Gilbo

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1: Yellow slime mold growing on mulch and the leaves of an orchid. 2: Orange slime mold on wild grape vine. 3: Pretzel Slim mold. 4: Sausage shaped white translucent fruiting bodies of slime mold or *myxomycete Stemonitis splendens* growing on wood.