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# Slime Molds: No Brains, No Feet, No Problem

**BY: REBECCA JACOBSON**




In a study released last week, computer scientist **Selim Akl** of Queens University demonstrated that slime mold is fantastically efficient at finding the quickest route to food. When he placed rolled oats over the country's population centers and a slime mold culture over Toronto, the organism grew its way across the Canadian map, sprouting tentacles that mimicked the Canadian highway system. It's an experiment that's been replicated globally several times now -- in Japan, the UK, and the United States -- all with a similar outcome.

So what is slime mold, and how does it do this?

Slime mold is not a plant or animal. It's not a fungus, though it sometimes resembles one. Slime mold, in fact, is a soil-dwelling amoeba, a brainless, single-celled organism, often containing multiple nuclei. View this slide show for some examples.

**Frederick Spiegel**, a biology professor at the University of Arkansas and an expert on slime molds, first encountered them nearly 40 years ago. "I thought they were the most beautiful, sublime things I'd ever seen," he said. "I said, 'I've got to work with these.'"

They come in every color of the rainbow, except -- due to lacking chlorophyll -- a true green, according to **Steve Stephenson**, professor of biology at the University of Arkansas. They form strange and sophisticated shapes - some resemble honeycomb lattices, others blackberries. And then there's the slime mold known as "dog vomit," because it looks just like the stuff. Some remain microscopic, and others grow rogue, forming bulbous masses, as long as 10 to 13 feet. Yet humans largely ignore them.

"Very few have been consumed as food. You can't build a house with them. They escape our noses most of the time," Stephenson said.

 

exist, Spiegel said, and they're found on every continent. Stephenson and his team -- the **Eumycetozoan Research Project** at University of Arkansas -- spent years trying to catalog all species of slime mold around the globe from the Arctic Circle to the tip of Chile. Slime molds are particularly fond of forest floors where they break down rotting vegetation, feeding on bacteria, yeast, and fungus.

When all is well, the slime mold thrives as a single-celled organism, but when food is scarce, it combines forces with its brethren, and grows. Starving amoebas work in tandem, signaling to each other to join and form a multicellular mass, like a "moving sausage," Spiegel said.

Then, once the mass is formed, the cells reconfigure, changing their shape and function to form stalks, which produce bulbs called fruiting bodies. The fruiting bodies contain millions of spores, which get picked up and transported by the wind, a passing insect or an animal. There, they start the process again as single-celled organisms. Meanwhile, the cells that formed the stalks die, **sacrificing themselves.**

For creatures without feet, they can travel incredible distances. Stephenson said one of his students identified slime molds in New Zealand that are genetically identical to groups found in the United States. How they got there is unknown.

Slime molds were likely an inspiration for the 1958 science-fiction film, "The Blob," scientists say. And it's in these plasmodial, "blob" states that they spread like highway networks and even solve mazes.

When ripped in half, the halves continue to grow independently and the nuclei in each half continue to divide and develop in sync. This makes the organism uniquely appealing to cancer drug research, said Jonatha Gott at Case Western University, because it provides researchers with multiple identical samples dividing at the same time.

Plus, unlike other organisms, the amoeba's genetic information makes an uncommonly large number of corrections during the RNA editing phase, Gott said. She compared it to a contractor continually making changes to an architect's plans.

"As it's making a copy of the DNA, it changes it," Gott said, "It's incredibly precise and incredibly accurate. If it doesn't do this, it dies. It's a really crazy way to express genes."

Computer scientists like Akl also study slime mold to better understand how **nature "computes."** The hope is that these amoebas will teach them how to develop better algorithms for delivering information.

The highway experiments, for example, show that slime mold is capable of computing optimal coverage of the map while using the least amount of energy, Akl said.

Nature, in this case, was able to compute an efficient network in less time than humans could. If we could harness the algorithm to do so, we could build more efficient systems, he added.

"We are always searching for the best way to connect people...yet here is this lowly species that can do it," Akl said.





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