

Mycelium as a Material

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OVERVIEW

Through a UCLA college course, I studied mixology and mycelium and the many characteristics of fungi with Artist, Ecologist, and Mycologist Professor Kaitlin Bryson. We looked into the different usages of mycelium from digesting chemicals to remediating landscapes suffering from environmental injustices to creating sustainable housing bricks for homeless shelters.

RESEARCH

Fungi exist in their own kingdom situated in between plants and animals, but contrary to popular belief, are more closely related to animals. Fungi have cell walls made of chitin instead of cellulose. Additionally, fungi are heterotrophs, just like animals, and acquire food from absorbing devolved molecules. The mycelium's stomach is on the outside of their body, and through extracellular digestion, they secrete enzymes on the outside of their skin to get nutrients. Fungi's bodies are made out of mycelium which look like white fuzz, which takes the shape of what they are molded in. Mycelium have cells called hyphae that make up their threads, which are permeable. That means that nuclei can move fluidly throughout the organism which helps with their ability to shape. Mushrooms are the reproductive structure of the fungus, and are nothing more than the reproductive structure of mycelium. When mycelium needs to reproduce, they form tightly wound mushrooms that produce spores to copy genetic information (like to fruit from trees).



Mycelium have many benefits in nature for organisms and systems within the environment. For instance, fungi are able to attach to plant's roots in order to create a symbiotic relationship that transfers resources to enhance growth and create a healthy ecosystem. Scientists have found that over 97% of plants have a relationship with mycelium and fungi in some form. This also plays a key role in interspecies communication between trees and other plants. Studies by scientists such as Suzanne Simard show that trees are able to help their offspring and other organisms gain nutrients and carbon through the fungi connection systems underground.

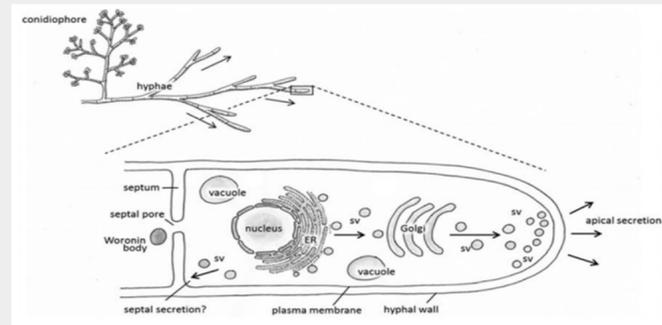


FIGURE 1: The cell of Fungi and the different characteristics of their structure

Fungi are loosely classified by where they live and what they eat. Two important classifications of mycelium are decomposers and symbionts. Decomposer fungi live on decaying matter. If they are parasitic, they are able fill the organisms they live in to eat and decompose their structures.

Symbionts form mutually beneficial symbiotic relationships (with organisms like plants and aloe) that create a balanced exchange of minerals, carbon, nutrients, and more.

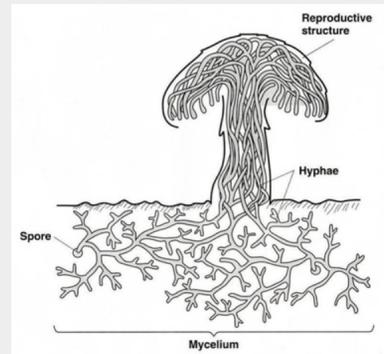
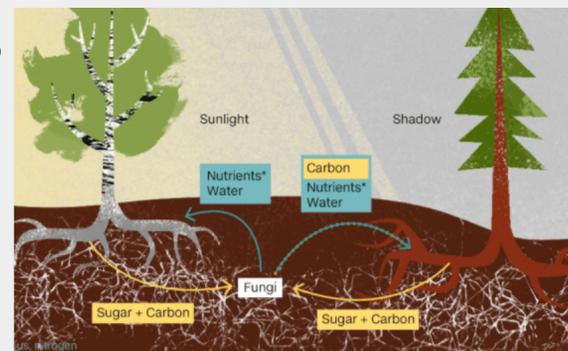


FIGURE 2: Mushrooms/ mycelium reproduction process



PROJECT/PROCESS

Bags of mycelium from a company called Ecovative are transported in a dormant state, which means to use it you have to activate the organism. To do this, I had to thoroughly clean and sterilize surfaces and tools the mycelium would interact with since it is easy for mycelium to get contaminated. For the purposes of this project, it was important to avoid exposure to other bacteria. First I opened the bag and combined it with a water and flour mixture. The flour acts as a food source for the mycelium and the water helps to activate the growth process of the fungi. To stimulate mycelium you have to reduce the rhodium and carbon dioxide, which means keeping it in a bag to activate it with an air filter at the top. In order ensure the best results, you have to keep the mycelium in a cold but light environment, and wait 4-5 days for it to wake up.



Once the mycelium has been woken up, it will have white fuzz and be very dense. From there, you are able to shape the mycelium into forms such as hands and flower planters (pictured in figure 5). It is difficult to get mycelium into a state that is easy to use, because the developmental processes of fungi is very particular.



In 2019, the Navaho Nation had a fracking spill that released 3,000 barrels of oil and other byproducts that got into the water systems of residents near by. My project was sending mycelium I grew into the shape of hands to help the Dinê Tah remediation installation that is low on materials. The mycelium helped clean up crude oil, benzene chemicals, and fracking fluid that still ruminates on the landscapes of the fracking sites.



FIGURE 3: The first day growing mycelium

FIGURE 4: Day 5 of growing the mycelium



FIGURE 5: Molded mycelium

Mycelium can not only be used for remediation, but sustainable design alternatives such as packaging, architecture, and more. Scientists have been building bricks out of mycelium for decomposable temporary housing like homeless shelters. There has also been a large spike in alternative boxing for products such as wine and skin care that needs insulation.

CONCLUSION

This project sought to engage surrounding community members to raise awareness about the issues in addition to create spaces for people to talk about the issues. This is also meant to encourage policy change by asking oil and gas companies to better inform inhabitants about when dangerous byproducts effect them, as well as find better, more safe ways to run through programs.