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Mycelium: Archetype of Interconnectedness

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Growing up, mushrooms comprised a large part of my surroundings. I became familiar with fungi not only through the white and gray mushrooms that magically sprang up in the yard after a thunderstorm and the rubbery brown mushrooms that occasionally found their way into my spaghetti sauce, but also through my mother's decorating taste: we had mushroom coffee mugs, a mushroom-shaped cookie jar, a mushroom latch-hook rug by the front door, and numerous mushroom knickknacks scattered throughout the house. My mom had a serious mushroom obsession, especially in the realm of household tchotchkes.

Coming into this class, I felt drawn to mushrooms and wanted to explore them in depth. The more I learned, the more I saw mushrooms have a lot to teach me right now. I examined not only the objective facts about mushrooms, but also their archetypal, psychological, and psychic dimensions, and in doing so, discovered that mushrooms, and specifically mycelia, represent a prime example of the interconnectedness of life.

The Objective World of Mycelia

Mycelia, the vegetative portion of fungi, function as the “neurological network of nature” according to mushroom expert Paul Stamets (p. 2). It is not hard to come to this conclusion when one studies objective facts about mycelia. They grow in branching patterns strikingly similar to our own neural nets and the structure of the Internet, both superhighways of information. Stamets argues that mycelia are “aware [and] react to change” (p. 2). One specific type of fungi, slime mold, shows this intelligence. Scientist Toshuyuki Nakagaki conducted an experiment in which he demonstrated that slime mold chose the shortest route through a maze (it even rejected dead ends), and upon seeing these results Nakagaki argued that the findings represent evidence for the intelligence of

cells (p. 5). These findings crack open our current understanding of nature and the meaning of intelligence, leading us toward a more panpsychist view, one in which consciousness is intrinsic in even the minutest level of matter.

From a scientific perspective, one can look to the function of mycelia in a forest to find their intelligence. Ectomycorrhizal fungi link plants and trees by extending the flora's roots, establishing myriad connections that send and receive nutrients and information. Scientists found that mycorrhizae move nutrients among different tree species and therefore "one mushroom species can connect many acres of forest in a continuous network of cells" (Stamets, p. 22). The mycorrhizae respond to changes in the environment and make changes in the exchange of nutrients accordingly. This relationship between the mycorrhizae and the plants in the forest is symbiotic: the mycorrhizae live off of the host plant while increasing the host's ability to intake nutrients and water and "conferring a fungal defense against invasive diseases" (p. 24). Mycelia place the long-term well-being of the host as a priority, and it is apparent through studies performed on plants that grow with and without mycelia that the plants with mycelia grow healthier and stronger (p. 27). The intelligence of mycelia and the unique relationships they create aid the health of the entire ecosystem.

The symbiotic relationship between plants and mycorrhizae also represents an excellent picture of the web of life. This relationship is vital. As Christopher Uhl writes in *Developing Ecological Consciousness*, there are many different types of relationships between plants, but symbiotic relationships "are among the most important in life's web" (p. 78). In *Gaia's Garden: A Guide to Home-Scale Permaculture*, Toby Hemenway demonstrates the importance of symbiotic relationships by pointing out the connection

between Douglas Fir trees and a type of truffle and the relationship's significance for the entire forest. "Without the truffle, the fir forest won't have many red-backed voles, a rodent that feeds on the fungus. Lacking voles to eat, the spotted owl population will diminish. This poverty ripples through many species and the whole community is diminished" (Hemenway, p. 27). The symbiotic relationship of trees and fungi vividly reveals life's innate urge to link up with other life forms for mutually beneficial outcomes. In truth, no organism is an island; each organism on Earth depends on many other organisms for survival in a vastly interconnected web. And, as Stamets would argue, the mycelia making up the mycorrhizae so integral to the forest do, indeed, seek out this relationship in an intelligent manner.

From a philosophical view, mycelium may represent Gaia's mind. Theorist James Lovelock and biologist Lynn Margulis created the Gaia theory in the 1960s. Their theory hypothesizes that the biosphere of the planet, which they named Gaia after the Greek Earth goddess, harbors an intelligence that creates and sustains life. Stamets takes this idea one step further and speculates that mycelia are the physical manifestation of this intelligence, for they are "an exposed sentient membrane, aware and responsive to changes in [the] environment" (p. 3). This sentient membrane covers much of the earth. It stands to reason that a network so endemic to the planet may hold at least some of the intelligence of the Earth.

Beyond acting as Gaia's mind, mycelia demonstrate one of the principles of permaculture in that they act as a stacking function in the forest. They offer up more than one function to the ecosystem and are therefore a vital piece of the whole: they decompose leaves and other plant debris, they recycle what they decompose, they filter

rain runoff, and they rehabilitate soil (Stamets, p. 8). Additionally, the flowers of mycelia, mushrooms, feed many animals, bacteria, and other fungi. In an odd twist, some insects even grow and harvest mushrooms. “Many insects use mushrooms as platforms for incubating and feeding their larvae,” including termites and ants, and ants also use some mycelium as an antibiotic (p. 28-29). Another function of mycelia is holding soil together and aerating it, and mycelial networks contain “fungal enzymes, acids, and antibiotics [that] dramatically affect the condition and structure of soils” (p. 8).

Mycelia also serve as an example of the principle “diversity is stability,” in that there are a multitude of mycelia in any ecosystem and their relationships with plants and soil are a major factor in the health of the ecosystem. Each ecosystem contains saprophytic, parasitic, and mycorrhizal mushrooms. Saprophytic mushrooms decompose and build soil. Parasitic mushrooms revive weakened habitats, which may seem counterintuitive. Although parasitic mushrooms are capable of wiping out vast areas of forest, the action they take is often for the forest’s health. “Parasitic mushrooms may be nature’s way of selecting the strongest plants and repairing damaged habitats,” (Stamets, p. 21). As mentioned before, mycorrhizal mushrooms partner with plants for a variety of helpful reasons.

The revolutionary aspect of mycelia, as pointed out by Stamets, is their ability to restore toxic soil. He calls this mycorestoration and it can be performed in various ways, including mycofiltration, mycoforestry, mycoremediation, and mycopesticides. Briefly, one uses mycofiltration to filter pollutants, harmful microorganisms, and silt from soil. Mycoforestry can help preserve old-growth forests, aid the growth of replanted trees, and create a more sustainable ecosystem. Mycoremediation removes toxins from the

environment; for instance, one puts mycelium in contaminated soil or lays mycelial mats over a toxic site (Stamets, p. 82). The mycelia break down the toxins and remove them from the soil into the fruiting bodies (the mushrooms). Stamets even argues that one can eat the mushrooms after clean-up of a toxic site, although he recommends one not eat mushrooms used to clean a site that contains heavy metals until the mushrooms have been determined safe (p. 88). If one leaves the mushrooms to rot, the site can even grow new plants that will repopulate the once-contaminated area.

Looking at mycelia from a systems perspective, mycelia are the traders within a guild. A guild is a community of plants and animals that work together to maintain health. The function of mycelia in a guild is to acquire and send information and food through the roots of the plants within the guild. This is why Stamets refers to mycelia as the Internet of nature, and, as we have seen, they happen to be structured similarly to the Internet and our own neural nets.

In the garden, mycelia become especially helpful, not just because their fruiting bodies provide a delicious topping for summer salads, but because they boost the health and production of the plants in the garden. How does one add mycelia to the garden? Through sheet mulching, a permaculture technique that builds soil “by accumulating and breaking down organic debris from the top down (Hemenway, p. 71). The basic idea is to add a layer of cardboard, newspaper, clothing or wool carpet free of synthetics directly on top of the soil in the garden. Next, one adds soil amendments, then straw or leaves, then compost, then manure, and finally another layer of straw. This lasagna-like layering can be placed directly on top of weeds and, since the weeds cannot penetrate the layers, no

weeding is needed. The layers also build rich soil. Gardeners can plant directly into holes punched into the sheet mulch.

With mycelia sheet mulching, one uses a slightly simpler technique by creating one layer of cardboard or newspaper, a layer of wood chips, a layer of mycelia spawn, and a shallow layer of straw. Once again, plants can be placed directly in the ground by punching holes in the mulch or by planting ahead of time and adding the mulch around established plants. Stamets used this technique in his garden to great effect. He first tried growing corn in combination with garden giants and found that this combination works well together (p. 188). He has since tried the technique with all manner of plants and mycelia, and he writes that he “noticed significant increases in output, root wad development, and stem length” when plants were grown in this manner (p. 191).

Mycelia represent a vital piece of the ecosystem of forests and gardens. They demonstrate intelligence, cultivate symbiotic relationships, share nutrients and information, and make the health of the forest a priority. But their benefits do not end there. On a deeper psychological level they have much to teach us, and I have learned a great deal from these tiny and ubiquitous organisms.

The Subjective World of Mycelia

Throughout this class I kept asking myself why I was drawn to working with mushrooms, and I see that they arose at this time for several reasons. The first is my work on the break between me and my mother. Secondly, I have dealt with fungal overgrowth in my body for about two years and I am currently healing this. Third, I see that their purpose and my purpose are aligned; mycelia are the shamanic organisms of the void,

and in my work I am drawn to shamanic techniques and the shadow. Finally, mycelia's connection to spirals mirrors my own spiral archetype.

As I mentioned earlier, mushrooms represented a large part of my consciousness as a young child. My mom's decoration of choice until I reached 15 was mushrooms. I never discussed with her why she felt so drawn to mushrooms, but I suspect it could have something to do with her general love of fungi. As a child, my mother became fascinated with mold and she grew mold in her room one summer, a story that I eventually turned into my first published children's book. She is a microbiologist, after all, and though mushrooms represent the part of the organism seen above-ground, the tiny mycelia do many interesting things underground and their activity likely intrigued her.

I am sure that mushrooms dominate my psyche so strongly right now because I am working to heal the break between me and my mother. One of the roles of mycelia is to connect members of a family, usually the trees in the forest. It does this underground, silently, and altruistically. It creates bonds in order to establish a symbiotic and equal partnership, which is the relationship my mother and I need to forge. By examining the relationship between trees and mycelia, I can learn how to rebuild a more equitable relationship with my mother. Further, mycelia work to break down toxins, and this is integral to my situation because it is certainly toxic. Perhaps working with the energy of mycelia will help me break down the toxins that have built up over the years so my family can re-emerge clean and healthy, like a gorgeous oyster mushroom that has cleansed soil contaminated with diesel fuel. Finally, mycelia help hold the soil together, and I often think of soil as the container for life. My mother and I need something that

will create a container so we can work through the dark parts. The soil that holds the nutrients that will allow our new relationship to grow and flower.

The second connection between me and mycelia relates to my health. For nearly two years I have followed a Candida diet, which prevents the overgrowth of the fungus *Candida albicans*. Prior to this diet, I experienced a serious lack of energy, general unexplained aches and pains, and stomach distress. Once I went on the diet, which eliminates many foods that harbor or feed the fungus, including corn, dairy, yeast, and sugar, I noticed a marked improvement, including losing 40 pounds. It completely changed my psyche and my outlook on life. I felt my health had returned.

But, for the last two years I have also struggled to maintain the diet. I often suffer from sugar cravings and when I do eat sugar to combat these cravings, I experience mild relapses of symptoms. Over this time period I have not been able to completely eradicate eczema, which signals to me that I am still consuming something that feeds the fungus. I have been to several health practitioners who helped me with various pieces of this puzzle, but it was not until March, when I started taking this class and became enamored with mushrooms, that I found two healers that have helped me make incredible strides. One is an NAET allergy practitioner who resets my energy so that I do not have an allergic reaction to foods. I found I was allergic to many foods, including many of the foods that feed *Candida*. I am nearly done with my treatments and am able to add the foods back into my diet in small amounts without a reaction. The second healer is an acupuncturist who is helping me with menstrual issues, my digestion, and *Candida*.

For the first time, I have noticed a marked change. I know that the expertise of these healers has been a major factor in my healing, but I also suspect that my

engagement with the world of fungi has made a difference as well. I now have immense respect for fungi and their important role in the health of the planet. I feel that if I can continue to honor fungi and work with its energy that this, too, will aid my healing. Although I have not done this yet, I imagine that meditating in a forest and contacting the mycelia there for any insights will also yield results. After all, they are arguably the mind of Gaia. As Starhawk, an eco-activist and permaculture expert writes, “The fungus is a bit like the beggar in fairy tales, who appears lowly and dirty but offers great gifts and wisdom to those who treat her with love and generosity” (p. 173).

Another point of connection between me and mycelia is healing others. I feel drawn to help heal the planet and all its inhabitants through my work. Although I am not certain exactly what this will look like for me, I know it will involve interaction with Nature through methodologies like deep ecology, depth psychology, terrapsychology, dreams, and psychic work. My main focus is to heal relationships across the board: relationships between people, between people and Nature, and between elements within nature. It is apparent to me that mycelia represent wise teachers in this regard, for their main purpose is to create relationships for mutual benefit and healing. As Stamets writes, “As we open our eyes to the fungal opportunities – literally underfoot – we soon see many mushrooms in their roles as environmental healers. In my mind, mushrooms are shamanic souls, spiritually tuned into their homelands” (p. 53). Although I am not a shaman, I am drawn to aspects of shamanism, including psychic, dream, and healing work, communicating with other beings including those in Nature, and being “spiritually tuned into” the land – not just my homeland, but the land where I currently live. From

this point forward, I plan to work with mycelia to further my learning and help me on my path.

Additionally, I was struck by a phrase I read in Stamet's book: "The activities of mycelium help heal and steer ecosystems on their evolutionary path" (p. 1). As an important piece of my work with relationships, I feel it is my calling to help others work on the relationship with themselves so that they can find their evolutionary path. I find myself in conversations with friends, interactions with co-workers, and even brief meetings with strangers asking people what it is they really want to do. What calls to their heart? What activity or contribution would make them feel whole, as if they are contributing a vital piece to the collective? I am like the tiny mycelia in the dirt directing the nutrients toward the trees. I help people work through their shadow, the muck that needs healing, so that their roots can become strong and allow them to grow to their full potential. I believe working in the shadow/in the dirt is the most important thing that people can do to find their way in this world, for without healing the soil, there will not be a supportive container for their dreams. I have learned the importance of being grounded, being rooted, and I try to pass this on to others. It is in this dark place where the roots dwell, which seems scary/dirty/other but actually harbors life and nutrients, that we can find our true purpose.

The final link between me and mycelia is our common archetype. Stamets says that the mycelial archetype is found in the pattern of hurricanes, spiral galaxies, dark matter, and the Internet: basically a spiraling web with a center and many branches or threads (p. 7). He even points out that cultures of a species of the *Psilocybe* mushroom native to California grows in a spiral pattern. As I discovered in Archetypal Mythology

class last winter, my archetype is the storm, and through my inquiry in this class as well as Quantum Approaches to Consciousness this quarter, I have decided to refine this a bit to say that my archetype is tied especially to the shape and motion of a storm: the spiral. I constantly doodle spirals, many of my photographic subjects involve spirals (including sunflowers that demonstrate the Fibonacci spiral and trees that branch in Fibonacci numbers), and my central shamanic animal, the grouse, represents the spiral in some Native American cultures. A favorite activity of mine as a child was spinning around in circles until the world danced. I loved merry-go-rounds, carousels, and Tilt-a-Whirl rides. And, of course, my name was attached to one of the most massive hurricanes to hit the United States: Hurricane Katrina. I can see in my life that I often act as a central point connecting many different people together, as though I am the center of a spiraling web. I also tend to work with the force of a hurricane or a tornado, blazing through assignments in a dizzying manner. That last piece is something I need to temper before it adversely affects my health. I cannot escape that the spiral is part of my life, and now that I have established this, I plan to work with this energy as well.

Through my work in this class, I have come to appreciate the energy of mycelia and how it is working in my life right now. Additionally, I have gained respect for these tiny soil dwellers that provide a means for vast interconnection throughout nature. Moving forward, I plan to hold mycelia near my heart and in my psyche, drawing on their strength, wisdom, and ability to create relationships that nurture all involved.

References

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