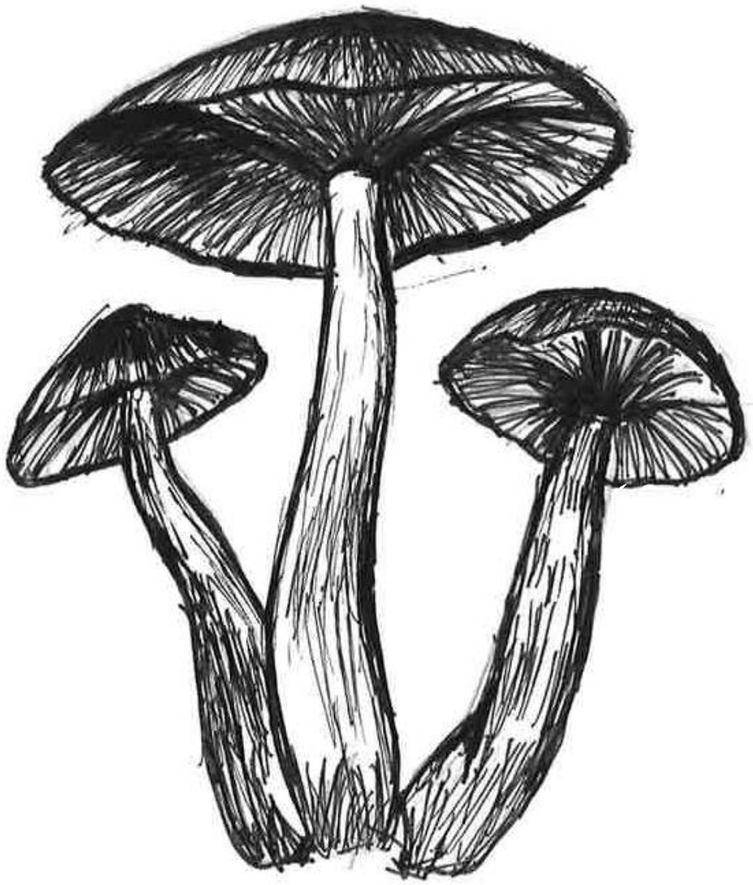
A Walk in the Woods



Take a walk in the woods. The autumn air beckons and the raspy crisp of the leaves beneath your feet lulls. **Meander through the forest** on a well-worn path that wanders and braids through the dense vegetation.

The birds overhead are in delicate conversation. Rays of sunlight manage to peak through the pockets of foliage. The **golden yellow**, **deep purple** and **fiery red** of the autumnal leaves weave themselves into a rich tapestry of vibrancy. **Distant swallows sweep through the sky in synchronous dance**.

Before you lose yourself further in the **hypnotizing swirl** and surge of the birds, **adjust your eyes**. As you stroll mindlessly with your eyes bouncing from one colour to the next, you may very easily miss **the forest's best kept secret.**

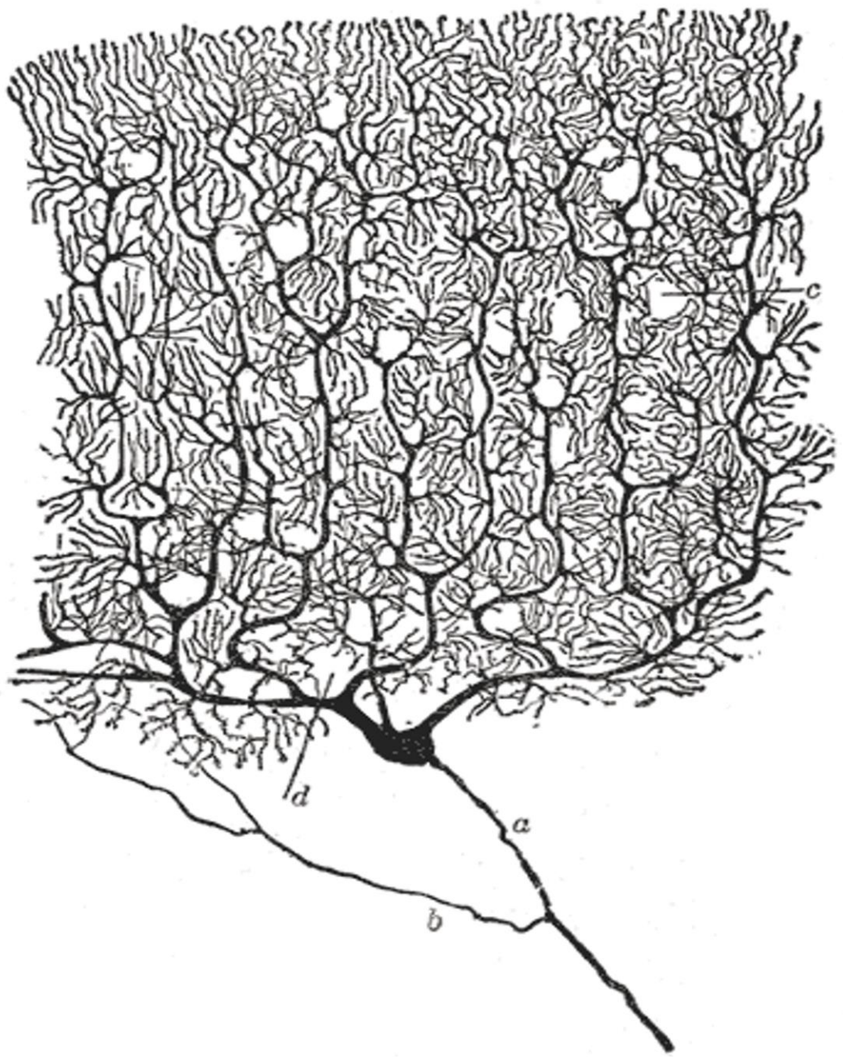
Slow down a minute and look around you. **Let natures subtle details come to life**.

Tiny little soldiers poke up from the ground between the roots of trees. A slender body and bowl-shaped helmet. These **foot soldiers of the underworld** are mushrooms, the fruiting bodies of a vast network of fungal cables called mycelium. **Mushrooms will only peak their heads up from the soil underworld once or twice a year.**

Fungi challenge our conventional understanding of intelligence. When we think of intelligence, we think of an organism's **ability to solve complex problems, think in an abstract manner or an ability to reason and plan**. Many people's thoughts might jump immediately to **Artificial Intelligence** that has been at the fore of the media and conversations recently. **This is in stark contrast to the intelligence we associate with fungi**.

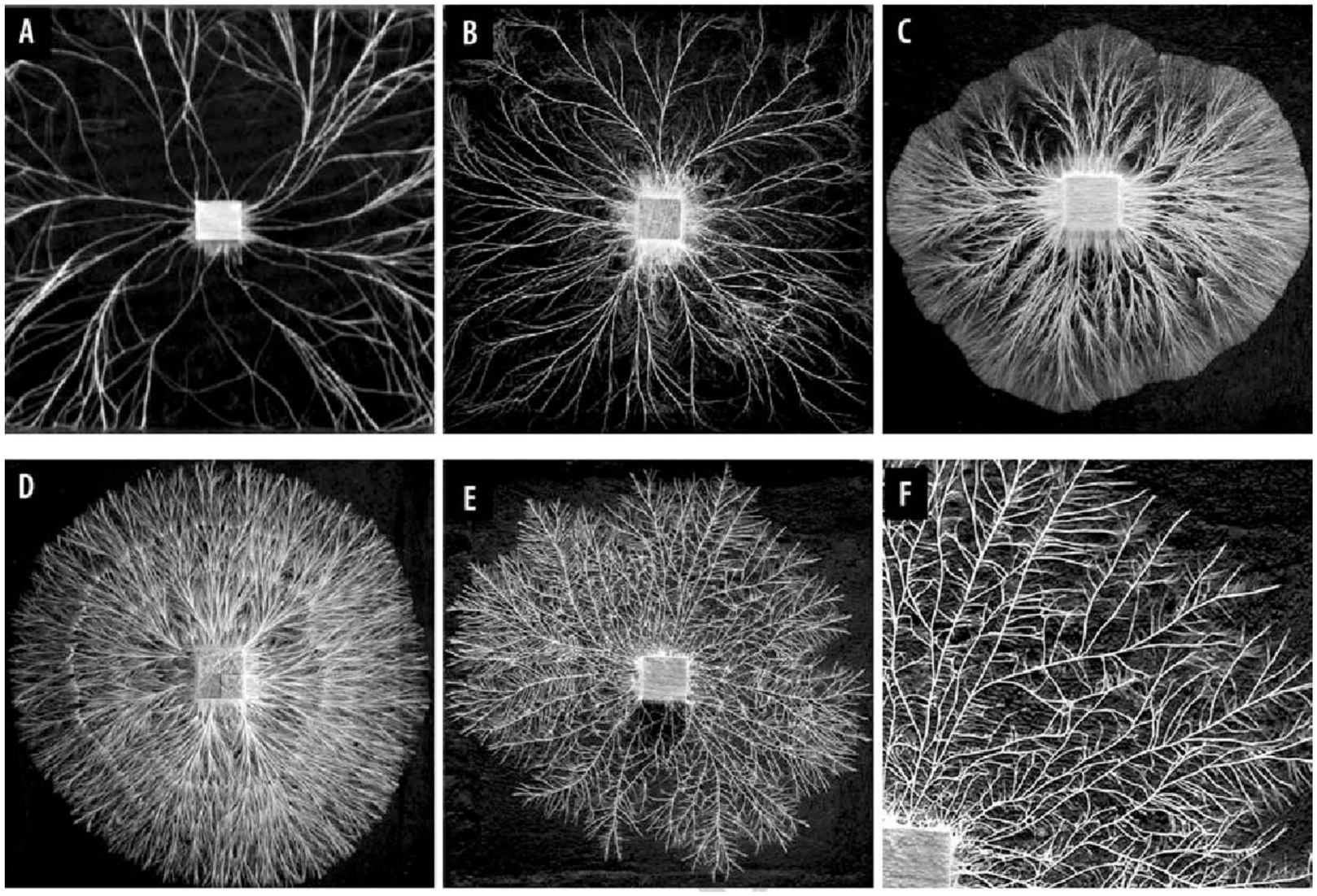
Despite **not having a central nervous system nor brain**, fungi display their intelligence through their vast **mycelial networks**, **signalling patterns** and their **symbiotic relationships**. At **the core of fungal intelligence is the mycorrhizal network**, composed of a dense mass of thread-like fibres called hyphae. This hyphal mass spreads and splays through the forest up to remarkable distance of **hundreds to even thousands of miles**, digesting substrates as it goes as a means of gaining **essential nutrients and energy**.

Mycelium not only look like the neurons of a human brain they act like them too. To communicate, mycelium **send electrical impulses** and electrolytes through the network in a similar way to neurons. Studies have even found that the electrical signals that fungi send to one another is markedly **similar to patterns of human speech**.



Original drawings of Purkinje nerve cells by Nobel prize winning neuroscientist Santiago Ramón y Cajal. At the time of publishing, these drawings were revelatory for their highly accurate depictions of neurons at a time when digital imagery did not exist. What is fascinating to note is the similarity of this drawing to mycelial networks.

Image courtesy of Wikipedia.



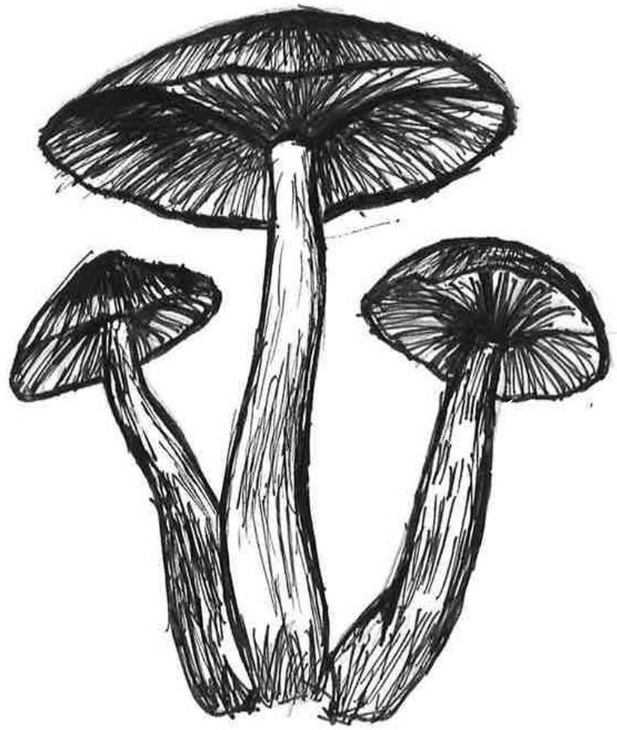
Mycelial of a fungus growing from a wooden block which acts as a food source.

Image courtesy of G. Tordoff

Mycelium also acts like a **telecommunication network** of cables, **transmitting warnings** to the network of predators like aphids which allows the plants to mount a defence. Mother trees send '**care packages**' of resources like carbon to their progeny to ensure a better survival. In this **hive of communication**, the fungal cables are actively **interpreting** and **relaying** the signals along the network.

Perhaps **fungi's** most interesting arena of activity is that of **forests**. The mycelium bore their way into the root of trees **forming an inseparable partnership**. This interconnected web of life acts like a **forest economy of barter and exchange.**

However, there is no poverty in this **flourishing economy**. Underground mycelium will do its utmost to **protect** their trading partners ensuring they have all the **resources like water and vital nutrients like nitrogen** which they need to thrive, even protecting the trees against disease. In exchange, fungi receive a **steady supply of sugar fuel** which the trees can produce through their access to sunlight. This **symbiotic partnership** allows trees to survive hostile environments like **drought** and **predator attacks**.



Humans did not descend directly from fungi. Fungi spilt from animals over 1.5 billion years ago but without them our evolution may look very different. Fungi were one of the **first colonizers of land**, where they **provided the essential minerals** for plant to survive in the early years of our **planet's apocalyptic early formation**. These plants were the sustenance of our evolutionary ancestors. **Without fungi neither plants nor animals would exist.** The evolution of man rests on the work of fungi.

To understand is to protect.

Worldwide, **10 million hectares of forest are cut down every single year**. Understanding the '**wood wide web**' as it is termed, is critical for sustaining **healthy forest ecosystems**. When fungi secrete chemicals, they break down organic matter like dead plants and animals releasing the nutrients and energy into the surrounding environment. **Fungi will only absorb a small amount for their own consumption**. The rest is absorbed by the soil, water and air. Without fungi's generous donations to its environment, nutrients from organic matter would not be recycled nor reused by other organisms. **Life on planet earth would not be able to function and cease to exist**.

Fungi have long been **ashamedly ignored** and **woefully under researched**. With **more awareness** and funds, researchers can begin to **uncover more of the wonders of this unassuming organism.**

So next time you **take a walk in the woods** stop, **take notice**. Beneath your feet there is a hive of activity.

Appreciate fungi. They're smarter than you realize.

All Illustrations are by the author.