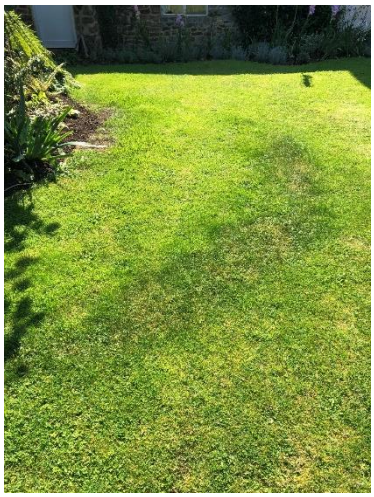
Wood Wide Web Assembly

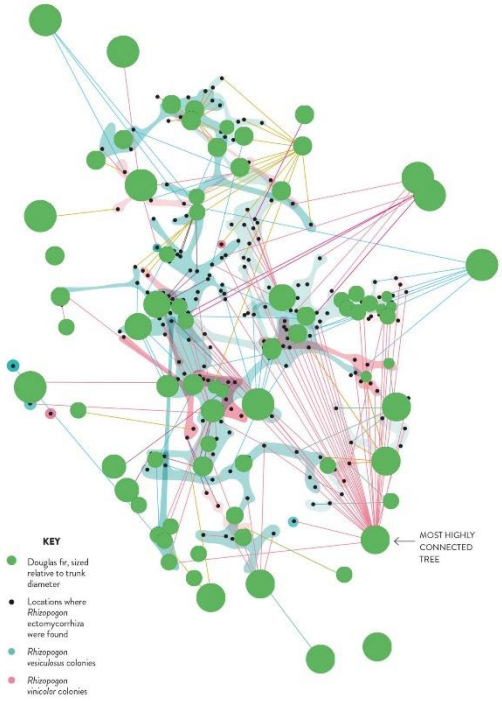
This summer I was sitting in my garden, enjoying the good weather, when I noticed something unusual in the way the grass was growing. Amongst the grass stalks, I saw that a wide circle of mushrooms was growing.



These are not unusual. What caught my eye was that the grass was growing significantly better where it was associated with the fungi. Each stalk was longer, greener and more lush than the grass elsewhere in the lawn. This piqued my imagination - after all fungi have often been thought to be a sign of disease in plants. I had assumed they only appear when something was rotting. So why did they appear to promote growth? I looked into the matter, and I would like to share with you what I found. It is something that will change the way you look at the world. I found that I had been right, in part. Some fungi do break down decaying plant material, and this was probably true of the ring in my garden, but others do something else – something quite extraordinary.

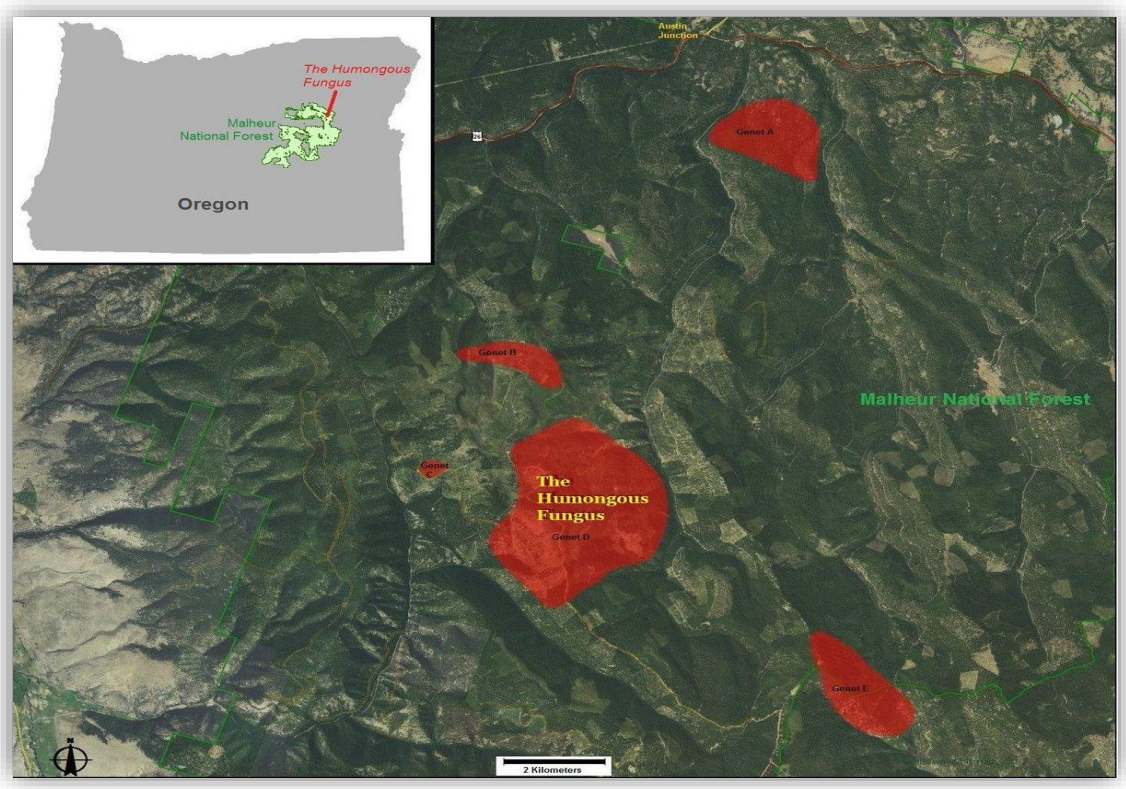
Listen to this: trees and plants and grass secretly talk to each other underground. They are linked by a vast web of connections – a huge system, through which they pass information and resources to and from each other. What links them is a network of long, thin filaments of mycorrhizal fungi — in Greek *mykós* means fungus and *riza* means root.

These fungi create a mat of threads that connect an estimated 90% of land plants by linking their root systems. These networks are huge: every cubic metre of forest soil that scientists have examined holds dozens of miles of connecting fungi. Scientists call this fungal network the Wood Wide Web. Through it, 'adult' trees can share sugars with younger trees, sick trees can send their remaining resources back into the network for others, and they can communicate with each other about dangers like insect infestations. These are not connections between plants from the same species. The underground social network links all plants and trees together alike, making a cooperative system and turning individual trees into an integrated super organism. Some older trees even nurture nearby smaller trees, acting as 'mothers'. This network is everywhere.



The relationship between these mycorrhizal fungi and the plants they connect is ancient - around four hundred and fifty million years old. It is based upon something called mutualism, where organisms choose to work together to share resources so that all of them benefit from their association. In this case, the fungi siphon off food from the plants, taking some of the carbon-rich sugar that they produce during photosynthesis. The plants, in turn, obtain nutrients such as phosphorus and nitrogen that the fungi have acquired from the soil, by means of enzymes that the trees do not possess. So plants are all connected and all sharing with each other. They pass nutrients. They pass information. They support the weak. If one of them is dying, it passes its remaining strength on to others. None are separate. In a very real sense, they are all small elements of a single larger, unified thing.

Other fungal wonders exist underground as well. You might think that the largest single organism in the world is a blue whale, or something like that. It isn't. It's a fungus. A colony living under the Malheur National Forest in the Blue Mountains of Eastern Oregon, U.S. covers 2,200 acres. It is estimated to be between 2.5 and 8 thousand years old. It may weigh 600 tons. It is called the 'humongous fungus' – with a name like that, how can it not be more famous?



But is it really the largest single organism? Think again. If we understand the wood wide web properly, almost *every* plant and tree on each continent is connected into a single organism. We are not thinking big enough.

I found the revelation of the Wood Wide Web's existence, and the increased understanding of its functions fascinating. How is it that such an incredible network can exist and go unnoticed? Well, it all happens underground, in a place inaccessible to easy observation. This natural social network of sharing plants raises big questions. If different plants and species literally grow into one another and share key resources, where do species begin and end? When we study a forest or a garden, should we not better think of it as a single entity – a super-organism rather than a grouping of independent individualistic trees and plants? Finally, what are we to make of what trading, sharing or even friendship might mean among plants.

Plants have more secrets to share: take two climbing bean plants. Each is given its own pole to climb. If you then put a connecting pole between them, they compete for it. What is interesting is the behaviour of the loser: it often senses if the other plant has reached the connecting pole they both were seeking and then starts to find an alternative. This demonstrates the plants were aware of their physical environment and the behaviour of the other plant. If these plants were animals we might call this consciousness.

We too often think of plants as rather passive and dull compared to animals. But plants are fizzing with information being exchanged between roots and leaves and flowers and pollinators and the environment all the time. Did you know that if a pollinator passes a flower, within three minutes, the plant will have increased the sugar content of its nectar from between 12 and 17% to 20%? The plant 'heard' the bee and acted quickly. All this information is being processed in the absence of a brain. We don't know how. Does this not

blow your mind? Plants have also been shown to ‘hear’ water underground, through their roots.

So let us never underestimate the wonder of plants. We look at them as inanimate objects, but there is far more going on – quite literally – under the surface. The wood wide web is more than a conceptual challenge to how we see forests and gardens. It is more than a question whether we have got it wrong in our study of individual plants or even individual species.

It offers a radical model for the school as a community as we begin this new academic year. Can we not take a lesson from what we have learned about plants? Can we begin to overcome the idea that we are separate and isolated individuals, and begin to form our own, metaphorical, wood wide web? A school wide web, if you will.

In our version we are all connected though our shared community. In our version, we aren’t passing on food and energy, but instead we pass on support, care, understanding, guidance and kindness. If it were to work as it should, then each of us benefits: we are all the stronger for our sharing. The more we give, the greater the benefit. In a cut-throat world, too often we think of life as a zero-sum game, where I can only benefit by taking something away from someone else.

Here is a radically different vision of what our school and the world could be like – informed by a 450 million year old secret system of mutualism and sharing. We have a lot to learn from the hidden life of plants. Let’s make Merchant Taylors’ School more like a forest.