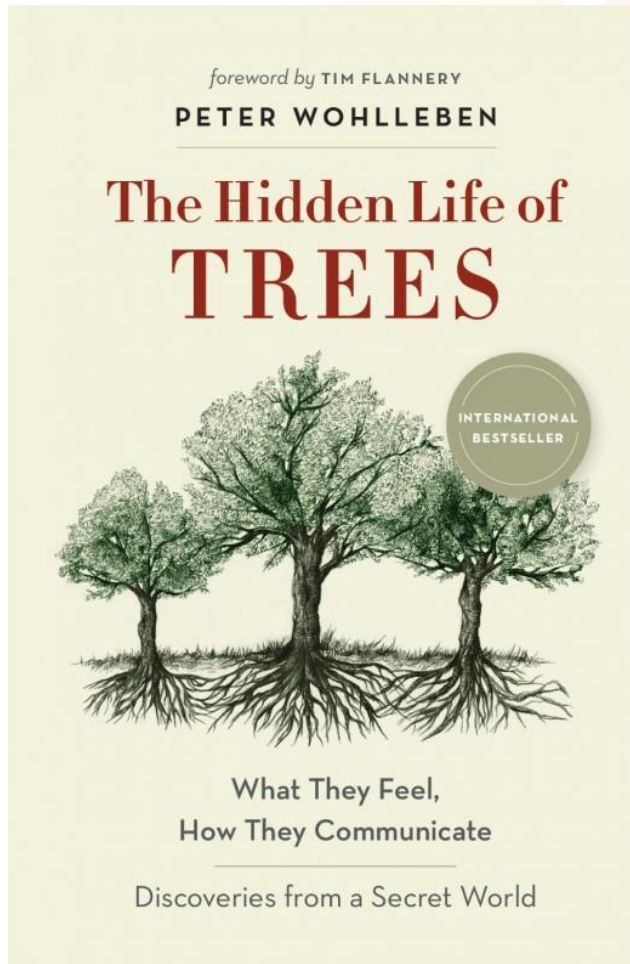




## Fungi protect trees by removing heavy metals from soil



In these amazing extracts from *The Hidden Life of Trees: What they Feel, How they Communicate – Discoveries from a Secret World* by German forester and author Peter Wohlleben (book published by Black Inc, 2015), we learn how fungal mycelium protects tree roots from heavy metals in the soil, and much more!!

Chapter 9: *United we Stand, Divided we Fall*

From *The Hidden Life of Trees*, translated from German into English by Jane Billingham.

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<https://www.blackincbooks.com.au/books/hidden-life-trees>

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...Fungi are amazing...

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Fungi are in between animals and plants. Their cell walls are made of chitin – a substance never found in plants – which makes them more like insects. In addition they cannot photosynthesize and depend on organic connections with other living beings they can feed on.

Over decades, a fungus's underground cottony web, known as mycelium, expands. There is a honey fungus in Switzerland that covers almost 120 acres and is about a



thousand years old. Another in Oregon is estimated to be 2,400 years old, extends for 2,000 acres, and weighs 660 tons. That makes fungi the largest known living organisms in the world.

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The fungus not only penetrates and envelops the tree's roots, but also allows its web to roam through the surrounding forest floor. In so doing, it extends the reach of the tree's own roots as the web grows out toward other trees. Here, it connects with other trees' fungal partners and roots. And so a network is created, and now it's easy for the trees to exchange vital nutrients... and even information – such as an impending insect attack.

This connection makes fungi something like the forest Internet. And such a connection has its price.... Therefore, they [fungi] demand payment in the form of sugar and other carbohydrates, which their partner tree has to deliver.... They demand up to a third of the tree's total food production in return for their services....

In exchange for the rich sugary reward, the fungi provide a few complimentary benefits for the tree, such as filtering out

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heavy metals, which are less detrimental to the fungi than to the tree's roots. These diverted pollutants turn up every fall in the pretty fruiting bodies we bring home in the form of porcini, cèpe, or bolete mushrooms. No wonder radioactive cesium, which was found in soil even before the nuclear reactor disaster in Chernobyl in 1986, is mostly found in mushrooms.

Medical services are also part of the package. The delicate fungal fibers ward off all intruders, including attacks by bacteria or destructive fellow fungi. Together with their trees, fungi can live to be many hundreds of years old, as long as they are healthy. But if conditions in their environment change, for instance, as a result of air pollution, then they breathe their last.

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If things become dire for the fungi and their trees despite all this support, then the fungi can take radical action, as in the case of the pine and its partner *Laccaria bicolor*, or the bicolored deceiver. When there is a lack of nitrogen, the latter releases a deadly toxin into the soil, which causes minute organisms such as springtails to die and release the nitrogen tied up in their bodies, forcing them to become fertilizer for both the trees and the fungi....