

Book Review

***Finding the Mother Tree. Discovering the Wisdom of the Forest.*
By Suzanne Simard. 2021. Alfred A. Knopf. New York, NY,
USA. 348 pp. ISBN: 9781486302819**

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Finding the Mother Tree, Discovering the Wisdom of the Forest, written by Dr. Suzanne Simard, is not just another book about a scientist who has made important discoveries. Instead, *Finding the Mother Tree* is about interactions that happen underground, in the neighborhood of the roots, or the rhizosphere, and a lot more. The associations take place between plant roots and fungi and they are called mycorrhizae. Mycorrhizae play a major role in plant communities by connecting plant roots and fungi physically and functionally. In her narration, Dr. Simard intertwines her professional and personal life – such an artificial separation! - exposing a lot of the shenanigans that, regrettably, still go on in scholarly circles (e.g., people who are perceived as authorities in the religious totem pole of science; dogmatism; arrogance; hatriot against people perceived as non-traditional, including misogynism; condescension of less experienced researchers; decisions about jobs to offer and offers to accept or decline; name calling, such as the purporsely and incorrectly pronouncing “Miss Birch” to address Dr. Simard’s interest in birches (e.g., alders, etc.); huge time investements to seek funding for project proposals; reviewers who hide behind the veil of anonimity to inflict unconstructive comments on authors; the importance of being extra careful with members of the media; etc.). As I like to say, this is not human nature but the nature of some humans. Yet, as there seems to be a network of corruption and its accompanying rhetoric, sometimes based on the prejudice that ignorance breeds, the author also regularly describes how a network of good-hearted people that was often available to help her in difficult moments.

As a background, plants interact with other organisms on or in different parts of their bodies². Although some form of association between fungi and plants was gleaned circa 200 years ago by Sergei Aksakov (1791-1859), *Finding the Mother Tree* focuses on one such type of interactions, that of the roots of many plants

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² Other examples of fungi-plant interactions include those taking place on the generally flattened expansions of the shoot, the leaves, also known as the phylloplane and those between fungi and green algae, known as lichens.

particularly woody plants - with fungi, whose filaments, or hyphae, interconnect the roots of trees and establish an underground network (or “tapestry”, as Simard says) of bidirectional, chemical, mutually beneficial, exchanges between members of the same and/or different species of plants. The nature of the transported materials, intensity, and direction of the exchanges vary through time. Below, I note seven of the main threads I found in *Finding the Mother Tree*. Surely the reader will find others.

Our personal life is inseparable from our professional life. Often using lyrical language, Simard describes her modest family origins in the logging industry and her work experiences in different aspects of forestry, such as private logging companies that clear-cut forests³, the government, native peoples, academia, including, more recently, The Mother Tree Project⁴. As the descriptions proceed, I often wondered what other billions of human stories have remained untold. This, however, is a story of a woman taking on a traditionally men-dominated world, supported by scientific data, lots of guts, and help from sympathetic people, including some like-minded, kind-hearted men. The book is full-packed with memorable quotes that I will let the avid reader discover and enjoy. Somehow, slowly but surely, the forests regrow, they are resilient, just as researchers must be to succeed after failures in getting what they want (e.g., a paper published in *Nature* on Simard’s second attempt). The delicate and often unsuccessful “balance” between the professional and personal lives is vividly, and sometimes also sadly illustrated in *Finding the Mother Tree*.

Money is a pervasive strong motivator in science. One of the most common motifs in *Finding the Mother Tree* is what drives decisions in different areas of human endeavor. Unsurprisingly, a lot of times, it is money (e.g., yew, *Taxus* sp., a generally ignored gymnospermous shrub until knowledge of its potential pharmacological properties became widespread when it became less abundant). Reckless deforestation (manually or via the almighty glyphosate, also known as Roundup, which Simard had to use in one of her first jobs) to replant rows of rapidly growing trees to be harvested every so many decades for one purpose, to – you guessed it! - make money. The race to get limited research funds is also obvious through the book.

What forces structure biological communities? Of major importance in *Finding the Mother Tree* are Simard’s commentaries on what forces she thinks shape community structure, namely what species are in a site and what relationships there are between them. Although Darwin spoke of competition, he was also keenly aware of non-competitive interactions. Unfortunately, the British

³ For more information about the long-term effects of disturbances on forests, consult the site for the Hubbard Brook Ecosystem Study, <https://hubbardbrook.org/> .

⁴ For more information about the Mother Tree Project, consult this site: https://mothertreeproject.org/?doing_wp_cron=1647390082.1480140686035156250000 .

philosopher Herbert Spencer (1820-1903, of “survival of the fittest” infamy; not to be confused with the US biologist, Herbert Spencer Jennings 1868-1947) popularized the competition portion of Darwinism extended to the human sphere, popularizing what became known as social Darwinism. Competition has remained a Panglossian paradigm for many decades. However, Simard’s and others have also emphasized the importance of mutualisms, a biological give-and-take, and other non-competitive interactions, including indirect ones, trophic cascades, and others in shaping the complexity of biological communities in the wild. In other words, biological communities are built, in part, using collaboration as part of their brick and mortar.

How are plant communities put together in space and time? This has been another controversial topic for decades. Do organisms assemble themselves into a site, like scrambled eggs, or are communities ultra-structured groups that come together and are replaced by others in space and time with precision? As the reader surely imagines, the truth tends to be somewhere in between and it varies on a case by case basis. A thought-provoking aspect of Simard’s narrative is her view of forests as communities that may evolve as a group, not as individuals. Many native peoples have similar views on the interconnectedness of everything in nature and, in particular, that humans are part of – not separate from – nature. Such view of trees immediately conjured in me the Last March of the Ents in the movie rendition of Tolkien’s *Lord of the Rings*, <https://www.youtube.com/watch?v=XzugQBkUrZk> and other memorable experiences with trees (e.g., people climbing the trees for fun or to explore other environments, or mentors of years long gone telling us that new biological environments would feel like a “different world”). After all, I am writing this from the former woods of William Penn.⁵

How do we ascertain that something is true: the realities of the scientific method? Another common thread in Simard’s book is the practice of the so-called “scientific method” and, in particular, the use of appropriate experimental designs, programming skills, and statistical methods to analyze the data. The author also emphasizes her systematic approach to narrow down on the mechanisms of chemical exchanges between plants and fungi. Generous and knowledgeable people and friends, mostly men in the case of statistical analyses, were particularly helpful to Simard in this area and these constructive interactions helped her

⁵ Coincidentally, in both sites of our own research on bees (c.f., page 29 of this issue), the American sycamore, *Platanus occidentalis* Linnaeus, 1753 (Platanaceae), has been planted for different purposes. In our own neighborhood, sycamores gave “Eastern”, one of its widest roads, a southern California boulevard look in the 1940’s. And, near Jacobus, the same species was planted to remember fallen soldiers in World War I. To me, being in the woods gives me peace and the joy of discovery when I am doing research. For others, forests inspire the Japanese sense of *kami*, as in the awe and respect one may feel in the presence of something greater than us. Botanical communities, whether assembled by humans or not, mean different things to different people.

develop into a more independent scholar. Of particular interest to me was the role she seems to assign to intuition is deciding what avenues of research to pursue. Of course, intuition comes as we garner experience in different situations. Furthermore, science is not a steady progress towards the truth for there are ups and downs as well as bumps on the road, including questionable - to put it mildly - behaviors among some scientists. On several instances, Simard succeeds in supporting her hypotheses and, I got the feeling that she is suggesting that sometimes success breeds a spiral of confidence and more success. Also, emotions are part of scientists' life, like those profound sensations we have when we return to a site where we did field work decades before, or the pains of catastrophic experimental failures, or humongous commutes. As much as possible, however, those emotions should not cloud rational analyses based on the available data. Some scientists, Simard included, enjoy nurturing less-experienced people, including while she was in the hospital, thanks to Skype. Simard is engaged in communicating science in intelligible ways, teaching through doing, including the shortcuts, or codes, used for fast communication among those working with her in research. Interestingly, she acknowledges that science is not the only way of knowing because there are other epistemologies, such as those practiced by many native people around the world. Like most of us, she confesses not knowing much about those other ways of knowing. Could there be parallels between human life and tree life? To Simard, the mycorrhizal connections are reminiscent of the synaptic connections in animals' nervous systems.

Environmental Policies. Simard sternly criticizes the controversial fire suppression policies in forests or the "free to grow" practices. Also, connections of these practices as well her research to major issues are suggested, such as the state of the western Canadian forests and global climate change.

Losses. Like all of us, and like the forest, Dr. Suzanne Simard had losses, which she describes with grace, such as parting ways with her companion of so many years... as well as health losses of her own on the hands of cancer. From early on in the book, I felt I could see some of these coming her way. As the forest, Simard is resilient.

Finding the Mother Tree is lightly peppered with interesting moments, like working with prisoners and the prisoners dilemma, "the Reverend" - nickname of one of those academic authority types, occasional swear words - as in the F* (Mother Trees), and hilarious situations that reassure the readers that, amidst the seriousness of research, humans should manage to retain a sense of humor. There are numerous natural history brush touches, as in how sapsuckers like to ingest the sap of some trees, or the reaction of trees to insect attack by producing resins to try stopping the advance of destructive beetles and their associated pathogenic fungi. Gorgeous groups of color photos put us in the field, being led by Dr. Simard.

The one thing I would have recommended is a system of referencing that would have rapidly allowed readers to connect specific passages with the supporting literature. Once I decided to finish reading *Finding the Mother Tree, Discovering the Wisdom of the Forest*, I could not put it down because I wanted to see what happened to Simard, professionally and personally.

If you resonate with autobiographies of modern scientists, written in a way that combines the personal and the professional, as it actually happens, and you like to know more about what happens inside the belly of the beast, this book is for you. I loved it because so many of her descriptions are familiar to me but that is another story for some other day.

The whole educational and professional training system is a very elaborate filter, which just weeds out people who are too independent, and who think for themselves, and who don't know how to be submissive, and so on - because they're dysfunctional to the institutions.
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