

Bacteria living on old-growth trees

February 23 2011

A new study by Dr. Zoe Lindo, a post-doctoral fellow in the Department of Biology at McGill University, and Jonathan Whiteley, a doctoral student in the same department, shows that large, ancient trees may be very important in helping forests grow.

These findings highlight the importance of maintaining the large old-growth [trees](#) in the coastal temperate rainforests that stretch from Southern Alaska to Northern California. Lindo's findings suggest that it is the interactions between old trees, [mosses](#) and [cyanobacteria](#), which contribute to nutrient dynamics in a way that may actually sustain the long-term productivity of these forests.

"What we're doing is putting large old trees into a context where they're an integral part of what a forest is," says Dr. Lindo. "These large old trees are doing something: they're providing habitat for something that provides habitat for something else that's fertilizing the forest. It's like a [domino effect](#); it's indirect but without the first step, without the trees, none of it could happen."

There are three players in this story: 1) large, old trees; 2) mosses that grow along their branches; and 3) a group of bacteria called cyanobacteria associated with the mosses. The cyanobacteria take nitrogen from the atmosphere and make it available to plants—a process called "nitrogen fixation" that very few organisms can do.

The growth and development of many forests is thought to be limited by the availability of nitrogen. Cyanobacteria in mosses on the ground were

recently shown to supply nitrogen to the Boreal forest, but until now cyanobacteria have not been studied in coastal forests or in canopies (tree-tops). By collecting mosses on the forest floor and then at 15 and 30 metres up into the forest canopy, Lindo was able to show both that the cyanobacteria are more abundant in mosses high above the ground, and that they "fix" twice as much nitrogen as those associated with mosses on the forest floor.

Moss is the crucial element. The amount of [nitrogen](#) coming from the canopy depends on trees having mosses.

"You need trees that are large enough and old enough to start accumulating mosses before you can have the cyanobacteria that are associated with the mosses," Lindo said. "Many trees don't start to accumulate mosses until they're more than 100 years old. So it's really the density of very large old trees that are draped in moss that is important at a forest stand level. We surveyed trees that are estimated as being between 500 and 800 years old."

More information:

www.springerlink.com/content/e651740234037w62/

Provided by McGill University

Citation: Bacteria living on old-growth trees (2011, February 23) retrieved 26 April 2024 from <https://phys.org/news/2011-02-bacteria-old-growth-trees.html>

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