

Why do Trees Stop Getting Taller?

Team tests treetop turgor to find an answer
Notable notes in forest research at Oregon State University College of Forestry



Have you ever wondered why trees stop getting taller—even though they live for a long time? Some trees live to be more than a thousand years old, so why don't they stretch hundreds of meters into the sky?

That's what Dr. Barbara Bond, Dr. Rick Meinzer, and research assistant Dave Woodruff wanted to find out. Could the answer have something to do with the way trees transport water? Inside a tree, water travels from the roots to the leaves through a tissue called xylem. The water moves upward because it is pulled towards the leaves,

where it evaporates into the air through tiny pores called stomata. The cells inside the leaves and stems are inflated with water, kind of like air in a bike tire. The water generates a pressure called turgor that is needed for cells to expand and grow. The scientists hypothesized that perhaps once a tree gets very old, and therefore tall, it becomes difficult for the tree to pull the water all the way to the top, because of the downward pull of gravity. Gravity's pull reduces turgor, and that may be why trees stop growing at a certain height.

But how could the scientists check the needles at the top of the tree and test their hypothesis? The solution to their problem was the Wind River Canopy Crane. The Canopy Crane was once an ordinary construction crane—until it was taken out of the city and moved into the Wind River Experimental Forest in southwest Washington State. Now, instead of carrying construction materials to the tops of buildings, the 75-meter tall crane carries scientists and foresters to the tops of trees! “This kind of research,” Woodruff says, “was not possible before the crane.”

Several times a day and in different seasons, scientists climb into a little gondola and ride up into the canopy of the old-growth forest. It takes about two minutes to go all the way to the top. To test the hypothesis about gravity and turgor, they take samples from five different trees, at three different levels on each tree. Each sample is a tiny twig, which they put into a little pressurized chamber. Woodruff applies pressure to the twig until it releases the water it has inside, which shows him how much turgor the cells had. The team is already finding that the older trees have lower turgor near their tops than younger ones do.

Check back for updates to this ongoing research project!