

Breakthrough discovery reveals how thirsty trees pull water to their canopies

January 20 2016



Credit: Wikipedia.

A scientific mystery about how trees pull water from the ground to their top branches has been solved by an international team of researchers from the University of Leicester and the Queensland University of Technology, Australia.

The team, led by Dr Adrian Boatwright, who conducted the research

while at the University of Leicester's Department of Chemistry, has examined the phenomenon of water being pulled to the top of tree branches, when [scientific theory](#) says that the maximum height water can be pulled up is 33 feet due to gravity – known as the barometric limit.

The researchers have discovered that water can in fact be held in a vacuum for almost indefinite periods of time and even under significant tension without forming bubbles or breaking apart, which helps to explain how trees siphon water to their highest points.

The team also found that water can be pulled up to as much as 45 feet - well above the barometric limit, overturning the theory proposed by seventeenth century Italian physicist and mathematician Evangelista Torricelli which has stood for the last 400 years.

Dr Boatwright said: "How is it that trees can pull water up to the top most branches? This question has troubled both botanists and physicists for many years with various mechanisms used to describe this process - ranging from capillary action to osmotic pressure.

"By siphoning water up to as much as 45 feet we have managed to 'break' the barometric limit and show that the maximum height is limited only by the strength of bonds in the [water](#)."

While the widespread view has been that siphons work because of [atmospheric pressure](#), recent research has shown that cohesion and gravity, and not atmospheric pressure is the driving principle.

Dr Stephen Hughes, Senior Lecturer in the Science and Engineering Faculty at Queensland University of Technology added: "The first recorded use of siphons was in ancient Egypt circa 1430 BC. Our experiment, conducted over 3,400 years later, is the first report published in the scientific literature of a siphon operating over the

barometric limit. How siphons work has been quite controversial. This experiment is a clear demonstration that siphons work through gravity and not atmospheric pressure as is commonly supposed."

More information: A. Boatwright et al. The height limit of a siphon, *Scientific Reports* (2015). [DOI: 10.1038/srep16790](https://doi.org/10.1038/srep16790)

Provided by University of Leicester

Citation: Breakthrough discovery reveals how thirsty trees pull water to their canopies (2016, January 20) retrieved 17 July 2024 from <https://phys.org/news/2016-01-breakthrough-discovery-reveals-thirsty-trees.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.