

## Science & Philosophy

### Climbing into Crowns – a Leaf Outlook

Written by Tiago Miranda



Large canopy / Source: T. Miranda 2016

As tree climbers, we can notice how different a tree canopy can be depending on the species. It can change by colour, form and size, making us climb in distinctive ways. Our movement to a branch tip rests our ability to use specific climbing techniques, which ultimately takes our attention to safety. Our poor vision may sometimes distract us from the beauty of a leaf. Its exotic ability to produce food for the tree is astonishing. These are details that a busy arborist, pruning or inspecting a tree, may pass unnoticed.

Interest and curiosity are essential tools for science to understand nature. Therefore, we develop different mechanisms to increase our chances of looking at the details. Tree climbing is one of them. Our skills can contribute to science and create more interest in plants.

This article shows what a climbing arborist can tell about leaves.

#### **Leafy World**

Taking a closer look at a leaf may be something unnecessary or insignificant but justifies why tree climbers are there in the first place. According to Max Adams, leaves are small miracles of physics, chemistry, and microscopic construction in his book [The Wisdom of Trees](#)". They are the hope of a better future amongst environmental disasters.

Up in the canopy, you can see growth patterns in which one limb is longer than the other due to the amount of light. It can also differ in specific locations of the crown when the light is not abundant.

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The leaf has essential [photoreceptors](#) that make light absorbable and digestible, resulting in energy to expand wood cells, increasing tree height and trunk diameter.

### Okay. So far so good. Or maybe not? Photoreceptors?

Human eyes have different *photoreceptors*. One is called *rhodopsin* for light and shadows, and three *photopsins* for red, blue and green. We have to interpret light colours to create a conceive image of reality. After all, according to [Daniel Chamovitz](#), "*sight is the ability not only to detect electromagnetic waves but also the ability to respond to these waves*".

Trees are not distinctive, although they respond complexly, which is not far from what humans can do. As living organisms, we have a circadian clock regulating our body process, including our movements, sleeping patterns and brain activity. [So do plants.](#)

In this case, it controls leaf movements and photosynthesis regulated by day and night periods. If we change that or make it artificial, the plant goes through jet lag. The main advantage, in this case, is that plants do not get grumpy like us.

The two of the [Darwin family \(Charles and Francis\)](#) incredibly published in 1880 an experiment that changed plants' study forever. They proved that [phototropism](#) is the plant's reaction to light when it hits its apex shoot. The plant then follows the light, transferring this information to bend in a particular direction. When you are climbing a tree, you can notice this reaction to light.



*Tivi (Terminalia spp) from Fiji / Source: T. Miranda 2019*

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The "follows the light" aspect is present almost in most cases that a tree has been suppressed by another nearby. The inclined canopy form indicates the angle that the tree had to grow respectively to the light. The leaves at the top of this tree may occupy a region where sunlight is more abundant. Also, the leaves are strategically positioned to receive as much light as they can. This will vary from species to species.

### **Why so important to understand this concept then?**

We now have a phenomenon called [\*photoperiodism\*](#), which gives us strong evidence of how much light plants can take in. Following the same concept, one of the essential photoreceptors of a plant is the [\*phytochrome\*](#), which acclimates to environmental change.

Hence, you can easily see a leaf's blade when you put it directly towards the sunlight. It contains several 'avenues' that we call veins and most likely a central line called midrib.

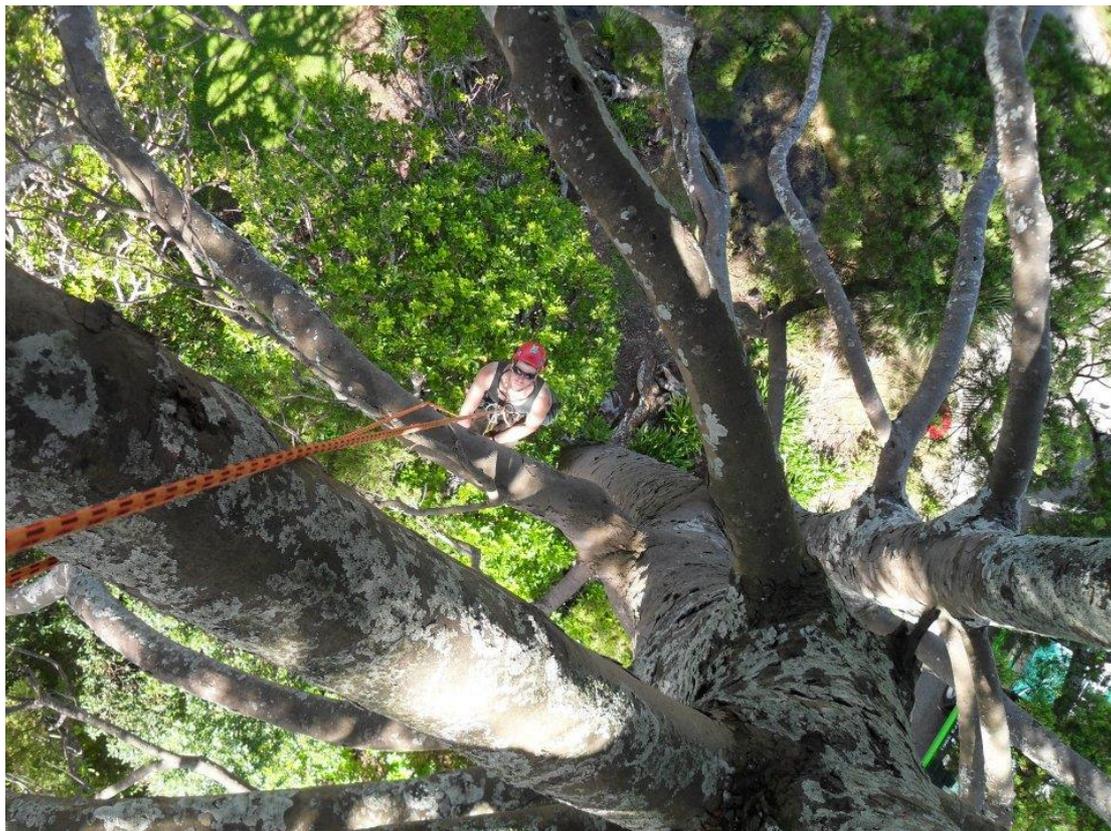
Beyond that, you find the vascular tissue, which can be observed under the microscope, showing the leaf ability to receive light cues. It initiates specific signals that shares throughout the plant, instigating flowering and growth.

Beautiful as it is, this is pure science that indeed is unseen by our naked eyes. But information can be found in various studies, making the tree climb a bit more significant (at least to me).

The beauty from all this is the profound awareness that plants do not differ from human behaviour. Whether tired or confused, they still grow accordingly to environmental attributes. We, as tree climbers, interact daily with tiny transformations, and our actions may define what this immobile being can be in the future.

Our attention to detail and respect for what we do makes us even more closely related to **tree doctors** — looking after trees. I believe this job title, most mentioned in European countries, could reach the Oceania region and the world, delineating how important we are as professionals. Maybe then we may be considered as an essential piece to the climate change puzzle ahead.

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*Ascending up a kahikatea in Wellington, NZ / Source: T. Miranda 2011*