

Autumn Leaves

Science Talent Search 2024

Science Photography

JF-1-1211

Sasha Pietsch, Princes Hill Secondary College

1. The Science of Autumn Colour – Chlorophyll

Most of the year, the leaves of deciduous trees are green due to the pigment chlorophyll, the pigment that is in all green plants. Chlorophyll allows leaves to absorb energy from sunlight and convert it into sugars to feed the tree – the chemical reaction we call photosynthesis.



2. The Science of Autumn Colour – Carotenoids

With shorter days and less sunlight available in Autumn, chlorophyll production in deciduous trees slowly decreases before stopping fully. As chlorophyll's green pigment fades, the yellow and orange pigments in the leaves called carotenoids which were previously hidden by the chlorophyll, are revealed.



3. The Science of Autumn Colour – Anthocyanin

As a tree prepares to lose its leaves in Autumn, a protective seal is formed for the Winter, between leaves and their branches. This seal can trap sugars in the leaves and produce new pigments called anthocyanins – this is the pigment responsible for the red and purple colours we see in Autumn leaves.



4. The Science of Autumn Colour – Variegation

How much and how fast autumn leaves change their colour varies by species and is influenced by weather conditions. As a tree's ability to photosynthesise slowly decreases, a tree's individual leaves can be at various stages of change, sometimes resulting in different pigments within one leaf – called variegation.



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Aim

My aim was to present the natural phenomenon and beauty of autumn colours from the scientific point of view of the pigments involved in this process of transformation.

Method

I collected leaves from my garden and on a walk around my neighbourhood. I created arrangements of leaves on a white paper background and used an iPhone12 to take the photographs. I used natural daylight for the images and I moved my background around until I found a place which created soft shadows to give the leaves dimension and help them pop off the background. There was no retouching or filters used in the images.

Scientific Content

Rather than photograph trees, I chose to photograph the leaves on simple white backgrounds. I felt this brought focus on the colour palette of the leaves in each image. It also allowed me to show leaves from a variety of species in one image that were at a similar stage in pigmentation. I wanted the images to make you think about autumn colours in terms of the pigments Chlorophyll, Carotenoids and Anthocyanin and also see how they combine in variegated autumn leaves.

Bibliography

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Oral Presentation Download

<https://drive.google.com/file/d/1HbcC2QTpRNmVB3J8KIKVnbxky9klfXsu/view?usp=sharing>