



senescence

changing colour through the seasons

Imagine yourself walking down a tree-lined avenue or through a wooded forest, sunlight filtering through the canopy. Imagine it is early spring, and the air is fresh and fragrant. Look up at the leaves, so new they're almost glowing. Now imagine it is the middle of summer. Now autumn. Each time looks different—and *feels* different. The green has deepened, then transformed into striking yellows and reds. They are the same trees, but the colours have changed, and so have you.

I have long been drawn to a certain shade of slightly mustardy yellow. I'm tempted to trace it to a handful of things from my youth: the yellow shirt worn by my beloved melancholic Charlie Brown; my grandpa's yellow Massey Ferguson tractor, an all-purpose workhorse from 1959 that my dad still uses today. But more significant, perhaps, is the yellow of autumn leaves.

On the prairies where I grew up, the few native trees we have—poplars, trembling aspen and a variety of knotty, stunted willows—tend to turn yellow, exclusively. There's very little dramatic, fiery red. But this never bothered me; being bathed every September in the golden-tan of harvest wheat and the soft yellow of a row of sentinel poplars always felt like wealth.

Colour is, technically speaking, a neutral thing—and yellow is a colour like any other: a specific wavelength of reflected light, received by corresponding receptors in our eyes. But of course we are not neutral creatures, and everything we see—and touch, taste, smell and hear—is filtered through our past experiences, personal predilections and cultural understandings. We bring ourselves to the colours.

If yellow is just yellow, why do I like it so much? And why *leafy* yellow? Some of us are creatures of autumn, some summer, some spring—and some, possibly the more admirable among us, winter. No matter how modern or saturated in technology our lives may be, we are,



TEXT BY
**correy
baldwin**

OPENING
PHOTOGRAPH BY
bonnie peters



as a species, embedded with millennia of deep, intimate connection with the seasons. We can't help but be attuned to these things, at some level.

I have an affinity for autumn, for its climate as well as for what it represents, for me: a time for harvest, for slowing down, a time of both preparation and reflection. But of course I am hardly an autumn person year round. We enter each season with different goals and expectations. So do plants, in a way—just as leaves alter their colour as time passes, so do we.

Consider how we come to spring: emerging from winter, that dormant season. The world has been quiet, the colours muted: greys and tans—and white, of course (a colour we think of as simultaneously all the colours *and* their absence). Winter can be a dark and difficult season, but it can also provide the space and time to think and to create, at one's own pace.

And then we leap into spring. Look up at the fresh, youthful leaves. Everything is so eager, so full of potential. As the greenery unfurls, so do new dreams and new ideas and new goals. Worlds and lives expand.

Look up at those same leaves in summer, when you're in the thick of it all: they are deep green and full, and lazy in the heat. In summer, green gets down to work. Chlorophyll, the green pigment found in leaves, is busy absorbing and capturing the sun's energy and using it to convert water and carbon dioxide into sugars on which the plant will feast and grow throughout the summer. This is a season of feasting and growing for us, too. In the summer we are meant to do it all—joyfully, excessively, luxuriously, decadently. It is a period of intensity (even if an intensity of leisure).

And then slowly, as the weeks and short months go by, the summer green grows tired, becomes spent. Leaves droop, fade at the edges. One thing may be ending, but another transformation has begun. Look up again: the leaves have turned into bursts of yellow, orange and red.



Leaf Pigments

Chlorophyll is the green pigment central to photosynthesis: capturing light waves from the sun to convert water and carbon dioxide into sugars (and producing the oxygen we breathe as a result). Yellow and orange carotenoids extend the range of the light waves that can be absorbed for photosynthesis, but they also protect chlorophyll from damaging overexposure to sunlight, absorbing (and then dissipating) excess light energy whenever the sun is too hot. Red and purple anthocyanins, another pigment, are also produced in some leaves during autumn to help absorb residual sugars in the leaf before it is dropped, and may also provide protection from the cold during the last weeks and days of autumn.



Autumn is a season of both endings and beginnings. It is the end of summer, of life in abundance, but also a return—to work, to school, to pastimes and renewed commitments. It is a time to gather all of the experiences of summer, and to harbour them, as everything around us begins to slow. Somewhere along the way, from spring to autumn, our perceptions have shifted—from seeking newness and abundance to settling into a pleasant nostalgia and an appreciation for what we have come through.

There is something poignant about the ephemeral, about something so fleeting. Green lasts for months; autumn colours for just weeks—peak colour season can last mere days. When something that beautiful passes so quickly, we can't help but find value in it. It's not something you take for granted. Autumn colours are bittersweet, and viewing them is a melancholic pleasure.

I am aware that I am writing about trees at the tail end of the worst wildfire season in my country's history, its scope and intensity fuelled by the climate crisis. Unfathomable numbers of trees—along with the homes of the wildlife and the people who live among them—are gone.

An altered climate is bringing another change to the trees as well: it is dimming their autumn colours. Trees rely on two environmental factors to know when to stop producing chlorophyll: decreased sunlight due to shorter days, and cooler temperatures. As the climate heats up, however, these necessary signals are being delayed, affecting the growth and rest cycles of the trees. Leaves begin changing colour later, and the overall season of colour becomes shorter, with a less dramatic peak. Already fall colours are appearing up to a month later than they did in the 19th century.

All of this, too, colours what we bring to the trees when we look up and consider them. It makes contemplating the autumn colours a less purely innocent activity. It's more complicated now, tinged with other, competing emotions and feelings: sorrow, resignation, frustration, determination, love. It makes me despair, and it fills me with a desire to live better, to fight harder, to appreciate more deeply. It heightens my connection with the trees, but can also make it more difficult to enter that peaceful space. There is now the yellow of autumn, and the yellow of the Anthropocene. Both can teach us about gratitude.

We tend to ascribe aging colours a certain refined beauty: trees in autumn, greying hair, old stone blooming with lichen. Over time, bronze and copper acquire a highly valued greenish hue, something we have given the pleasing word *patina*. We have a pleasing word for the changing colour of leaves as well: *senescence*. Literally, it means growing old, aging, decaying with time—compare it to other Latin-root words like “senior” and “seniority,” which convey not just age, but wisdom.

In botany, leaf senescence is the stage in which plants stop producing chlorophyll—that life-sustaining green pigment required for photosynthesis—and begin storing up their resources before the retreat into winter. Leaves change colours, are sealed off from the branch and drop. As a pigment, chlorophyll absorbs light wavelengths from the outer edges of the spectrum of visible light—the longer wavelengths of red and orange, and the shorter wavelengths of blue and violet. In the middle of this spectrum is green, which chlorophyll does not absorb, and instead simply reflects away. This is why we see the colour green when we look at leaves.

Incredibly, then, one of the most defining features of plants—the colour green—comes from something they don't even use. There is something comforting about this: that not everything needs to have a purpose. Some things just *are*—and to simply exist is enough to be beautiful.

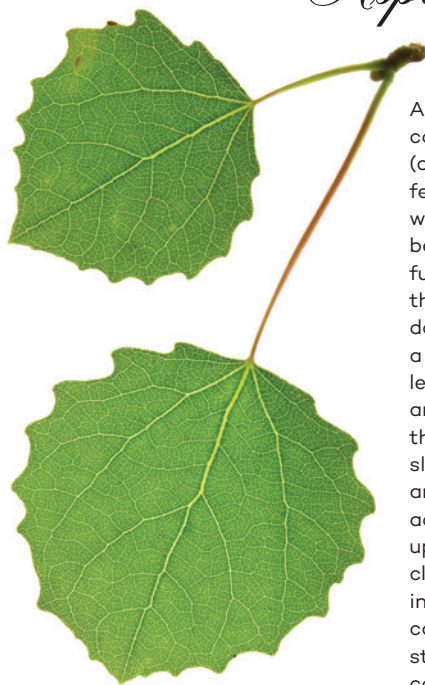
Chlorophyll is not the only pigment to be found in leaves. Leaves also contain yellow and orange carotenoids, their colour masked by the abundance of green

chlorophyll. It is only when the plants stop producing chlorophyll that the carotenoids begin to show through. As green fades, yellow and orange burst forth—having been there all along. It's another good lesson: that the most colourful parts of ourselves are often already there, just waiting for the right time to appear.

On the colour wheel, yellow and green are not opposites—this is not a flip from one side to the other, not a complete transformation. Rather, yellow and green sit beside each other. This is a shift, from one state into another. It is a step sideways—not into something utterly new, but into a new version of what already exists.

Autumn is about finding beauty in change—even beauty in loss, two things that need not be mutually exclusive. It is also about finding the beauty, the strength of colour, in our new, renewed selves as we let go of what we once were and embrace our older, hopefully wiser selves. **U**

Aspen



Aspen leaves are full of yellow carotenoid pigments. Trembling (or quaking) aspen is one of the few native trees on the prairie, where I grew up. In the maple-beech forests where I live now, further east, I have come across the bigtooth aspen, whose rather dapper leaf shape has become a personal favourite. Aspen leaves have an awkwardly long and pinched stem, which causes them to flip-flop and dance in the slightest breeze. Aspen groves are fascinating in that they are actually all one organism, sending up a multitude of connected clones that to our eyes look like individual trees. Quaking aspen can be easier to spot: groves or stands tend to be isolated, and contain enough smaller trees that there are always leaves within reach. Bigtooth aspen grow tall and among other trees, so that I often only notice their presence in autumn, when their yellow leaves start dotting the ground. Some trees begin changing colour in stages; with aspen, the entire tree—top to bottom—turns yellow at the same time.