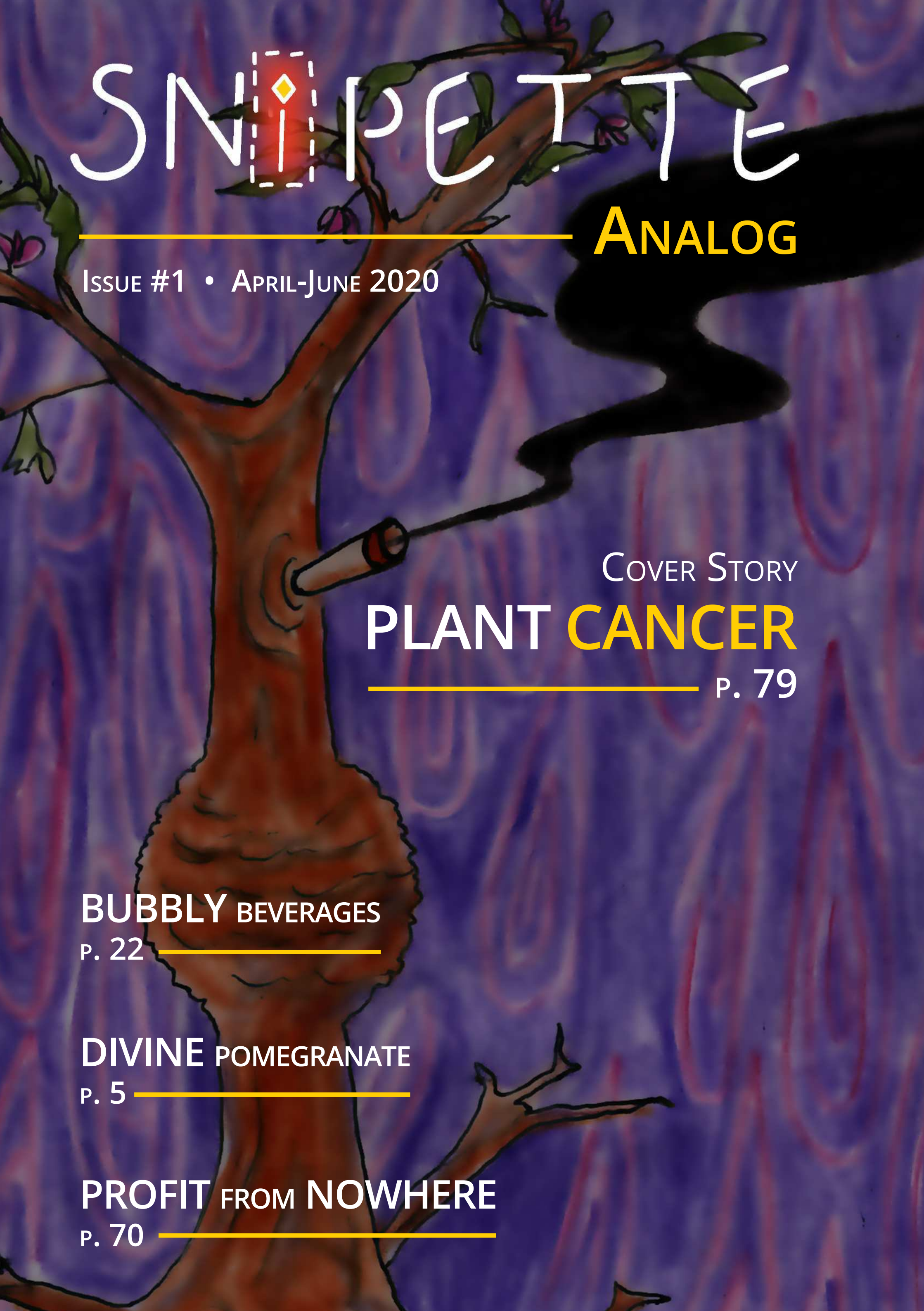


SNIPETTE

Analog

Issue #1 • April-June 2020

Cover Story

PLANT CANCER

table of contents


WELCOME
TO SNIPETTE

editors' note

Dear Readers,

Welcome to the first issue of Snipette Analog!

Although this is our first print edition, this is far from our first rodeo at writing. We, the editors, have been working on Snipette in one iteration or another since 2016. What started as a simple creative exercise and a handwritten periodical has evolved over the years into the online presence we have today. From our initial days of writing everything ourselves, our team has grown to include about a dozen active authors and over a dozen more one-time writers. We are now, truly, editors.

This has also meant that we're able to turn our attentions towards expanding our horizons and go offline.

In case you're wondering what Snipette is about, here's a quick explainer. You know how most magazine articles are either all fact or all fiction? We're trying to be something in between. Our pieces combine the exciting facts from science with the easy-to-access style you enjoy through fiction: they try to take you through the whole journey, instead of just listing sights on the way. And it's not just science; we're working to showcase history, culture, technology, and other aspects of the world we inhabit.

But all this takes effort, and right now we're on our own. A big thanks to our authors, who currently write for nothing more than our adoring support. (Through Analog, and through the support of readers like you, we hope to compensate them financially too!). We've been lucky to work with interesting people of all kinds, from different countries around the world, and, whether they're a school-student or a PhD, we must say the experience has been wonderful.

Along with this magazine, we also try to help other people onto the road of being a writer. Through the Snipette Writers' Programme, we're proud to have helped budding writers reach their full potential, and enable scientists to share their findings to the common world. "You don't need to be good at writing" is our motto: "you just need something to say."

We hope you enjoy these writings, and, if you want to go a step further and write with us too, you're always most welcome to join.

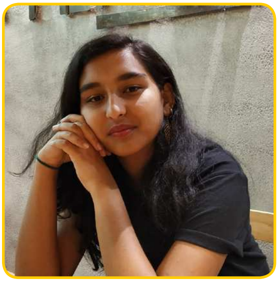
Happy reading!

Manasa and Badri

Editors at SNIPETTE

our team

Badri Sunderarajan
Editor
Thekambattu, India



Manasa Kashi
Editor
Bangalore, India

Nia Chari
Assistant Editor
Bangalore, India

Authors

Aashutosha Lele
Minnesota, USA

Abbey Thiel
Wisconsin, USA

Bianca Pascall
Cornwall, UK

Lila Westreich
Seattle, USA

Lindsay Gray
California, USA

Pam Lazos
Pennsylvania, USA

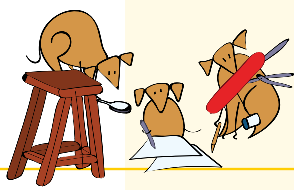
Phillip Shirvington
San Francisco, USA

Ryan Reudell
Texas, USA

Thuan Sarzynski
Hà Nội, Vietnam

Layout and Graphic Design

Pragnya Ramjee
IIT Guwahati



divine pomegranate

How a peculiar fruit captured hearts and imaginations across the world.

It wasn't long ago that I ate a pomegranate and relished it for the first time. Not that it was the first time I had tried the fruit.

Before I was eight, my mother gave me a pomegranate sliced into halves to eat with a toothpick. She told me not to make a mess because the juice stains. So I sat for a long time, stabbing each ruby jewel—as if the only way to eat a pomegranate was painstakingly carefully.

Mum was struggling to recall an ancient story about the goddess Persephone who was tricked by the cruel god Hades into eating pomegranate seeds and forced to live in the underworld for six months of the year, which explains why there are no fruits or flowers in winter.

I listened but the story failed to spark my curiosity. Like most children I approached any new food with suspicion. Foods I knew and enjoyed I took for granted, never asking where they came from or how they were made.

Why would you be curious about a pomegranate? It has a tough leathery pericarp with an antique hue. A spongy inner wall conceals a complex of white chambers, home to glassy clusters of well over a thousand crimson juicy arils.

As in all plant species, if you look closely enough you'll find mesmerising complexity. Every one has a unique history encoded in its genetics. With genome sequencing we can know precisely where a plant originated and how it has evolved over millennia.

But this pomegranate story isn't about the actual plant, rather what it has meant to people.

In other times and places, the pomegranate captured many hearts and imaginations. Ancient poets praised the tree from fruit to flower; it was mythologised by pagans and sanctified by both church and state.

The pomegranate has been a symbol of profoundly spiritual aspirations of the human race. Decoding the symbolism reveals more about the state of our belief systems than about the fruit.

An important need has been satisfied by this tradition: our ancestors might have given cherished plants special meanings in order to describe their uses and make a personal claim to them. When scientific truth is absent, myth is king.

In the Greek myth of Persephone and Hades, the pomegranate is a metaphor for worldly temptations that bind one to the underworld. In non-western versions of Adam and Eve, the pomegranate appears as the forbidden fruit in the Garden of Eden—a metaphor for desire and sin.

These stories explained the dawn of human history and birth of the seasons. They conveyed major beliefs about good and evil, life and death. Today, they also reveal the disconnection between the stories we ascribe to fruits and their actual stories.

The taste of pomegranate is temptingly delicious. When you bite on the crisp clusters they burst with a sweet and tart flavour, quenching your thirst like ripe berries or wine. But would its wild ancestor have been so enticing to our taste buds?

Studies of plant genes describe the wild ancestors of fruits as mostly bitter or sour, or with tough or stringy textures, and sometimes they were downright poisonous. The wild pomegranate is no exception.

Fruit has undergone a long yet subtle journey of cultivation and selective breeding to achieve perfect forms and flavours. Hybridisation also plays a part, occurring randomly according to changes in climate and soil, for better or worse.

These historical interventions ended up with the tasty varieties we enjoy, and elevated the importance of many fruits, lending them grander mythical status. In every case, the symbolism seems to take its own route, ignoring the fruit's cultivated evolution.

From Judaism to Christianity, Buddhism, Zoroastrianism and Islam, the pomegranate symbolises fertility, resurrection, death, eternal life and love. Nowhere in the genetic story do we find a correlation with these human conditions. So why did our ancestors ascribe it these complex meanings?

The pomegranate originated in the Arabian Peninsula and was one of the earliest cultivated fruits—also a prominent ingredient in local cuisines.

From ancient Egyptian tombs, the Hebrew Scriptures and Zoroastrian temples, the pomegranate was lavished with spiritual meanings. The Persian poet, Rumi, in the 13th century, gives the pomegranate the meaning of joy and love, the highest attainment of the human spirit:

> A laughing pomegranate
> brings the whole garden to life.
> Keeping the company of the holy
> makes you one of them
> whether you are stone or marble,
> you will become a jewel
> when you reach a human being of heart.

For Zoroastrians, the pomegranate was a symbol of immortality and perfection in nature. In Iran, Esfandiyar eats pomegranate and becomes an invincible hero. An-shih liu was a favourite among classical Chinese poets for its uniquely beautiful red flower with healing virtues.

What is it about the pomegranate that captures so many poetical hearts?

One clue might be found in the intersection between science and culture called medicine. From the 2nd century BC the pomegranate travelled the Silk Road and appeared simultaneously in ancient pharmacopoeia in India, China and Southern Europe. The pomegranate became a prized health commodity and all parts of the plant were traded for use in medicine.

Modern clinical trials confirm that pomegranate fruit is good for health and contains some important compounds.

Soft drinks companies were quick to exploit the correlation. POM Wonderful built a multimillion-dollar company on the statement "pomegranate juice is packed with antioxidants that keep your heart healthy." The Food and Drug Administration later warned the company against misleading consumers and promoting the juice as a life-saving drug.

Despite losing the case in 2016 the company's sales continued to increase annually, outperforming its nearest competitor by more than ten times.

Behind their continued success is a lingering belief that drinking pomegranate juice will slow prostate cancer, shrink tumours, reduce cholesterol and rejuvenate an ageing heart. POM Wonderful's zealously marketed statements have the hallmarks of mythology.

Pomegranate symbolism might be understood as a form of propaganda and advertising: a story that people want to believe that masks a less comfortable reality. Let's look at a well-documented example.

In Tudor England it had long been customary to assign a motif of a wildflower or an important crop to a governed county. These botanical emblems were worn as "heraldic devices" for the purpose of propaganda. The Tudor rose was formed of two cultivars of wild dog rose (Rosa canina) and united the two most powerful factions in the court of Henry VIII.

The pomegranate makes a dramatic appearance when Catherine of Aragon from Spanish Granada married Henry VIII in 1509, the first of his six wives. Catherine claimed the pomegranate as her heraldic crest: a symbol, by then, of the indissolubility of marriage and fertility, associated as it was with the biblical Tree of Knowledge.

Her family had conquered the Kingdom of Granada during the 13th century, where pomegranate trees flourished in abundance (and still do), like oranges in Seville.

The pomegranate had been at the centre of religious ritual and worship long before Catherine's birth, making it a natural choice for her emblem.

At court the symbol was pervasive: Queen Catherine's supporters wore a small pewter pomegranate badge; the fruit was also depicted in embroidery and the Tudor rose coat of arms was combined with depictions of the fruit.

In an ironic twist, Henry VIII divorced Catherine on the grounds that she could not produce him a male heir, and in doing so he broke with the Catholic Church in order to marry his Protestant mistress Anne Boleyn.

The failure to unite the dynasties of Spain and England in the 14th century diminished the power of the pomegranate emblem with the dissolution of marriage and, subsequently, the Catholic order. By the end of the Tudor period in 1603 a spiritual connection had been forged, nonetheless. The greatest culmination of pomegranate symbolism was just on the horizon.

The new dawn came in the reign of Elizabeth I, Henry's daughter, during an era of world exploration. As new trade routes opened up with previously unexplored territories, shipments of exotic plants and valuable goods came to England.

For the first time it seemed tantalisingly possible to improve the quality of life for all. The pomegranate's association with extravagance at court was over. Its symbolism would gain a new lease of life in the Puritan kitchen and herb gardens.

Puritanism was a socio-religious movement that sought to cleanse society and its institutions of the "corrupting influence of church and state".

A key feature was an egalitarian vision for a protestant utopia in the image of the Garden of Eden. Mass-produced pamphlets advised lining the streets with varieties of fruit and nut trees to alleviate food poverty.

It followed that imported plant species from across the Atlantic Ocean became a big commercial enterprise. However, although they tried hard, the Puritans ultimately failed to cultivate the pomegranate along with other valued fruit trees. Religious thinking dominated all earthly pursuits: such failures were always taken as a sign of God's abandonment.

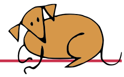
Was it not because of the pomegranate that we are fated to endure winter? In the Greek myth which my mother tried to recall, Hades kidnapped Persephone and took her to his underworld kingdom.

By eating pomegranate seeds she was bound to him for eternity. Persephone's mother, the corn goddess Demeter was distraught at the loss of her daughter. While she was unhappy, no crops or flowers grew and the soil was infertile.

King of the gods, Zeus, decided something had to be done and worked out a compromise: Persephone would live with Hades for half the year and the other half with Demeter. And so Persephone's return from the underworld each year is marked by the arrival of spring and regeneration.

Had England succeeded in recreating Eden with the pomegranate at its heart, the country might have achieved a level of agricultural self-sufficiency that would have changed the course of history.

It would be another two centuries of increasing globalisation before trade caught up and enabled an abundance of fresh fruit and vegetables—including the pomegranate—all year round.



Bianca Pascall

Writes about the relationships between human society and the plant world. Following degrees from the London College of Communications and the London School of Economics, she began a programme of research on our interactions with plants as the bases of culture and commerce. In addition she runs a business-to-business copywriting agency, specialising in digital strategies for not-for-profit organisations. She lives in Cornwall in the UK with her partner and beach-loving dog, Serif.

no matter: no mind?

A HISTORY OF THE UNIVERSE
IN VERSE.

When the sun in the east punctures the dawn
A red glow in the sky heralds the morn.
Why does it come and go every day
When it would be much easier to stay?

But science gives a simple explanation
Earth on its axis is in rotation.
But what makes the Earth spin like a top?
Why in the longer run does it not stop?
Maybe the hand of God keeps it going
To prevent it from toing and froing.

In the beginning it all got started
With the explosive energy imparted.
Through the crimson fireball filling the sky
Chaos did reign as the cosmos did fry.

From chaos, what order could come to be?
Only a great mind could possibly see.
Some claim it was all a matter of chance
That led the sky on such a merry dance.
If this be so, our entrance on the stage
May never have adorned history's page.

Yet we do exist and possess a mind
For the mysteries of the universe to find.
All neurons fire fast within our big brain
Advantage over other life to gain.

So humans have come to rule the planet
And now have invented the internet,
To connect Jack with Jill and Jill with Bill
And with all the others over the hill.
With each one attached to their own machine
Such a powerful brain was not foreseen.

Where is the mind which inhabits this brain,
Which connects us all in an endless chain?
Before man arrived it did not exist.
After he is gone, will it still persist?

Was the universe destined to be smart,
To go well beyond the horse and cart?
Perhaps a kind of intelligent life,
Which evolved with time until it was rife?
Was it in God's plan for this to take place,
That his mind and ours would have the same face?

Phillip Shirvington

Has an MSc from the University of Sydney and attended Stanford University. He became a scientist, diplomat, CEO and writer. He lives in San Francisco.

bubbly beverages

The 17th-century mistake that put the 'fizz' into fizzy.

The year was 1693, and a 19-year-old named Dom Pierre Perignon was put in charge of the extensive wine-making, then being carried out by the Abbey of Hautvillers in Northeastern France. Legend has it that this is where sparkling wine was discovered for the first time — and it was in fact an accident.

It's said that, when Dom Pierre Perignon finally tasted one of his bubbly concoctions, he exclaimed "I'm drinking the stars!"

From sparkling wine to soda pop, bubbly drinks are hard to resist. Carbon dioxide bubbling out of the drink results in a tingling sensation in the mouth and throat. Many of us crave these fizzy concoctions, but did you ever wonder how these tiny bubbles even got trapped in these drinks?

The funny thing is, Perignon was actually tasked with preventing the wine from becoming sparkling [2]. It was unknown then, but the cause of all this trouble was the cold winters. At low temperatures, yeast enters a hibernation-esque phase. And the monks, assuming the fermentation to have ended, would bottle, cork, and bring the wine down into the storage cellar.

When spring emerged with warmer times, the yeast would suddenly awaken. They would begin metabolizing sugar again, producing a surge of carbon dioxide that led to higher and higher pressures being built up in the glass bottles.

Eventually, as you might expect, the bottles would explode.

This was all too common an occurrence, with either the cork ejected from the bottle or the glass shattering. And once one bottle exploded, it all too often led to a chain reaction with glass and corks and wine flying everywhere. To protect themselves from injury, cellar workers would often wear protective masks.

But in spite of the potentially dangerous circumstances, a period of great appreciation for the fizzy had just begun

.

Sparkling wine includes any type of wine that is bubbly. This covers everything from Champagne to Cava to Prosecco. In fact, the only way these three sparkling wines differ is by the country they were produced in. Champagne is the most popular sparkling wine and legally must be made within the Champagne wine-making district in Northeastern France. Similarly, Cava is produced in Spain and Prosecco in Italy.

This means that the type of grape may be different, but the process of turning the wine into a sparkling, bubbly concoction is much the same, regardless of where the wines originated.

The key to creating those tiny bubbles within the wine relies on secondary fermentation, which begs the question: what is primary fermentation?

During the first fermentation, the juice from the grapes is placed in large, open vats. With the addition of the yeast, Saccharomyces cerevisiae, the fermentation begins. The yeast eats up the sugars in the juice and produces ethanol and carbon-dioxide (CO_2). Since the vats are open, any carbon dioxide is actually lost to the air. The first fermentation is only important for increasing the alcohol content to about 11% [2].

The second fermentation is where the magic happens. The wine has been sealed into a glass bottle with a cork, so this time, when the yeast creates carbon dioxide, it has no place to escape.

The CO_2 continues to be produced and entrapped within the wine. At this point, most of CO_2 is dissolved in the wine or in the liquid phase. Only a small percent is actually gas bubbles.

And as this CO_2 is produced, the pressure within the bottle gradually increases. By the time the yeast are done, the cork is holding each bottle under about six atmospheres of pressure. That's about the same as being under 50 meters of water [3].

The high pressure within the bottle is exactly why the cork goes flying off the bottle as you open the sparkling wine. The pressure release also spurs the dissolved CO_2 to enter the gas phase, forming those tiny bubbles.

And that pop you hear is the high pressure finally being released.

Saccharomyces cerevisiae is also known as baker's yeast, since it's so commonly used in bread making. Like the other ingredients, the yeast is added to the dough, which is then usually rolled into a ball and left out at room temperature overnight. This time allows the yeast to rehydrate and start doing its work.

Professional bakers usually have a 'proofing cabinet' that holds the dough at 80–90°F, which is optimized for the yeast's activity. Most amateur bakers who just let the dough sit out in the kitchen find that the yeast can work just fine at lower temperatures, around 65–70°F.

During proofing, the volume of the dough can double as the yeast produces carbon dioxide, which forms pockets within the dough. At this time, the gas pockets are pretty small, but once the dough is put in the oven, the heat results in all the gas cells expanding, often called oven spring.

The proofing step is named quite literally as it proves that Saccharomyces cerevisiae has been at work. Clearly, a yeast that is multi-purpose when it comes to making food and drinks.

The second way to get the "fizzy" into fizzy drinks is using artificial carbonation, which is largely credited to the Englishman Joseph Priestley.

It's rumoured that in the mid-1700s Priestly suspended a bowl of water above fermenting beer. Some of the carbon dioxide that was being produced in the beer ended up being dissolved in the water giving it a slight carbonation [4]. At the time, Priestley didn't understand it was carbon dioxide lending the effervescence to the soda water. Instead, he cited "fixed air" impregnating water to give it the bubbliness.

Priestley, of course, wanted to find an easier way than suspending water over fermenting vats of beer to result in carbonation. He found success in chemical carbonation when he mixed sulphuric acid with chalk (calcium carbonate), which did produce carbon dioxide gas. If the gas was directed into vessel of agitating water, the result was carbonation [5].

As you may have noticed, there was a little bit of a safety issue with Priestley's new method. Sulphuric acid is an extremely strong reagent that can burn through skin and other materials. Not to mention, the reaction resulted in acid vapours that could be inhaled by the worker. These drawbacks help explain why Priestley's process was never commercialized, but with time, other scientists would optimize artificial carbonation leading to the popularization of bubbly drinks.

Another scientist by the name of Johann Jacob Scheppe, a name still printed on cans of ginger ale and seltzer, helped to modernize artificial carbonation by studying how it was affected by temperature and pressure. This new approach on carbonation would rid the process of sulphuric acid, which was Priestley's main downfall.

Using his own hand cranked compression pump, Schweppe saw that more carbon dioxide could be dissolved in water under high pressures. He also noted the importance of cold temperatures, which also seemed to aid more CO_2 to dissolve [7]. What he realised was that carbonated water could be held stably if it was in a pressurized container, and that it would only would release bubbles once the pressure was released. This is exactly what happens when you pop open a soda can: release the pressure, and you'll immediately see bubbles emerge to the surface.

The same principles of pressure and temperature are still exploited in any soda machine seen in fast food restaurants or soda guns used behind bars. If you could see the inner workings, there would be a pressurized container holding CO_2 and booster pumps that increase the pressure of the water reservoir.

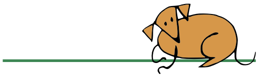
The bubbly water could be made in two ways. Either the pumps increase the pressure of water to allow plenty of CO_2 to dissolve or the equipment is capable of cooling water to a temperature that enables more CO_2 to be dispersed in the water.

That bubbly water is then mixed with flavouring syrup to make the drink Pepsi, Sprite, or Dr. Pepper, but each soda ultimately starts from the same source of carbonated water. Only at the last moment is a syrupy mixture of flavor and sugar added to distinguish each type of drink.

The science of carbonation may have begun with uncontrollable yeast and corrosive sulphuric acid, but with a little bit of experimentation, the field moved steadily forward.

Whether natural or artificial carbonation is used, the result is a delightful, bubbly beverage that kids and adults find hard to resist. Remember, this all started in a monk's cellar full of exploding wine bottles and has somehow become one of the most popular ways to drink beverages.

And that, is progress in science!



Abbey Thiel

A graduate student at the University of Wisconsin-Madison and is working towards her PhD in Food Science. She enjoys translating all the interesting things she's learned by being immersed in the food industry for the past decade in such a way that everyone can understand. She's here to share the crazy, cool, and curious aspects of our food supply directly with you.

plant cancer

PLANTS SPEND ALL DAY IN THE SUN WITHOUT SUNSCREEN. SOME TREES LIVE FOR THOUSANDS OF YEARS. WHY DON'T THEY DIE FROM CANCER?

If you live long enough, cancer is inevitable. Humans get cancer. Animals get cancer — we see it most often in our pets, who are kept safe from predators and other diseases. Live long enough, and cancer becomes a part of life for all of us...

Except, seemingly, plants.

How can a tree grow for hundreds, even thousands of years without succumbing to the same disease that brings down a human in their first century? How can they stand in bright sunshine, absorbing ultraviolet rays day after day, and yet keep all their cells under control?

Why don't plants get cancer?

What is cancer, exactly? It's a disease caused by the uncontrolled growth of abnormal cells in a part of the body. But these abnormal cells aren't foreign invaders. They're our own cells, turned against us by mistake, due to an accumulation of errors in their genetic code.

As we age, our cells pick up more and more errors in their individual copies of DNA — the genetic code that contains the blueprint for a human body. Sometimes, these errors are because of mistakes made in copying the DNA when the cell divides. Other times, they're caused by external factors that interact with our DNA, like free radicals or ultraviolet radiation.

A good analogy is to think of a robot going haywire. The robot is still attempting to follow its programmed instructions, even though they no longer make any sense. Cancerous cells are attempting to follow their mutated, error-filled instructions, even though this is unwanted and deadly to the host organism.

Most of the time, when a cell has too many errors to function normally, it undergoes "apoptosis". In other words, it shuts down and dies. The robot turns itself off. Occasionally, however, these accumulated errors cause the cell's growth process to get stuck in the "on" position, and the cell begins growing and dividing. This is a rampaging robot, causing all sorts of destruction!

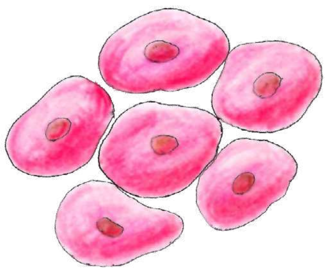
An unwanted growth of cells is called a tumour. Some cells may grow very slowly and don't spread beyond their initial location: these are called benign tumours. Other tumours, however, known as malignant tumours, contain fast-growing cells. These cells may break free of the tumour, spread through the bloodstream, and attach at another location, where they start growing anew.

This process of tumours and cancerous cells spreading throughout the body is a major part of how cancers become deadly. And because it's so important, you should probably know the technical term: metastasis. The word comes from ancient Greek and literally means "rapid change", describing how cancerous cells rapidly change, mutate, and grow. One cancerous cell quickly changes and grows into a large tumour.

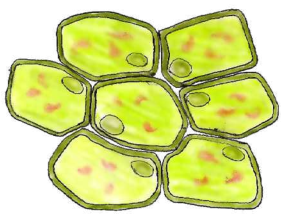
But why doesn't it happen in plants?

One of the most devastating features of cancer is its mobility: how does it travel when it breaks free from its initial location? `All our cells receive nutrients from our bloodstream, like a highway bringing supplies to different cities. This highway lets all our cells receive nutrients — but it can also become a speedy path that lets cancer cells loose and sends them hitch-hiking to other areas of our body.

In animals, cells hold onto each other's membranes, but they can freely release these holds and move around. Nothing prevents them from detaching and migrating to a different location. Thanks to the superhighway of the bloodstream, a single cancerous cell can start at the toes and end up at the head — or almost anywhere else. Such is the power of metastasis.



In plants, however, cells are far more stationary. Each plant cell is surrounded by a hard, mostly impenetrable cell wall. This wall around each cell helps give plants their structure and rigidity, but it also locks each cell in place, preventing them from migrating within the organism.



Plants do possess their own circulatory system, but it's used to pump water through the plant, mostly up from the roots to the leaves.

Instead of using a pumping heart, like our bodies, plants use their own method of circulating nutrients. This process is more passive, and is known as "capillary action".

Put a clear straw in a glass half-full of water. Immediately, you'll notice the water rise up a bit. The water level inside the straw will become higher than the water level of the rest of the glass. The water sticks to the sides of the narrow straw, and, since the water wants to stick together, it's pulled to a higher point than in the wider glass. That, in essence, is capillary action at work.

Water in tight tubes will flow to fill that tube — even when it's moving against gravity.

Plants use this process to much greater effect, pulling water from their roots all the way up to their leaves. They do this by having many levels of capillary tubes, rather than just one long, tall straw.

The water the pull, flowing up to be used by leaf-cells to produce energy, can carry nutrients like sugar — but it doesn't carry cells. The highway in plants is closed to their cells; there are no blood cells or immune cells or any other kind of cells roaming throughout the plant. That means, cancer cells can't get in either.

Plants have much less complex internal structures than animals. A plant doesn't possess vital organs, and its cells are not incredibly specialised. If you cut off part of a plant, chances are it can grow back — but don't try that trick with your own nose or leg! This why gardeners can often propagate plants from cuttings (and why your clipped-off nails don't grow into a new you). Even though a cutting doesn't have any root system, it can regrow roots when placed in the right conditions.

That's another reason plants are more immune to cancer. Even if a particular cell in a plant goes crazy and becomes cancerous, it won't cause too much trouble to the plant. It's not a specialised, vital cell; the plant can survive without it.

Does that mean plants are immune to cancer? Not at all. Plant cells are still cells, and these biological "robots" can still go haywire if their instructions break down or get too mixed up.

Plants sometimes develop cancerous cells, often due to bacterial, viral, or fungal infections. However, as these cancerous cells are locked in place and cannot spread throughout the plant, they end up being more of a minor annoyance, rather than a deadly disease.

When a tumour occurs, the plant simply grows around the tumour, just like it would grow around an unexpected rock in the soil. The robot has gone haywire, but it's locked down and cannot move — so the rest of the plant simply grows and works around it, ignoring it as it stays locked in its own little walled-off cell. That tumour may continue to grow for years, but it doesn't spread to the rest of the plant.

There's no route for metastasis, you see.

If you want to look for an example of these, look up pictures of plant galls.

A gall is the term for a lump in a plant — it's sometimes caused by a burrowing insect, but other times it's a tumour. When it's a cancerous tumour, the cells can't go anywhere, so it's little more than an unsightly blemish! They can occur on roots, stems, or leaves of plants.

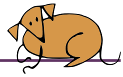
So there you have it. Plants can get cancer. But.

Because their cells are stationary, and because they don't have vital, complex organs like humans and animals do, a cancerous tumour is more of an inconvenience to a plant than a deadly threat.

Imagine if our bodies worked the same way. Imagine if cancerous tumours were nothing more than slow-growing lumps! The rest of our body would pick up the workload previously handled by the cancerous cells, and we'd see "cancer bumps" as just a minor inconvenience of growing old.

Sadly, our specialised systems keep us vulnerable to cancer. But then, they also let us eat food, move around, create art, and understand our world.

I think I'm happy with that trade-off.



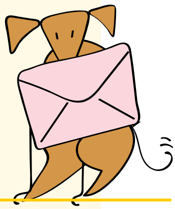
Sam Westreich

Earned his PhD in genetics and genomics from the University of California, Davis, where he developed bioinformatics software to analyze large-scale sequencing of the gut microbiome. He currently works for a startup focused on developing a cloud platform for hospitals, researchers, and diagnostic centers to analyze their genetic information. Dr. Westreich publishes regularly on Medium, focusing on the intersection of biology, technology, and health.

subscribe to us

Snipette Analog is published every quarter. Your subscription helps us cover our costs and fund our authors. If you're interested, subscribe now at

www.snipettemag.com/subscribe



Contact

https://www.snipettemag.com/

editors@snipettemag.com

liberapay.com/snipettemag (donate)

fb.me/snipette

twitter.com/snipettemag

instagr.am/snipettemag

@snipette@squeet.me
(squeet.me/u/snipette)

You write. We set it right.

Want to write an article, but don't know how to go about it?
The Snipette Writers' Programme is here to help.

Aspiring Writers

Whether it's giving you tips or writing paragraphs for you—we'll help you as much or as little as you need.

Scientists and Researchers

Share your work beyond its specific niche. Put your technical writing on hold and let creativity run wild—because it's time the rest of the world knows what you're doing.

Established Writers

Try out a new writing style with quirky rules. What we're doing here is neither fact nor fiction—but something in between.

write.snipettemag.com