

8.1

BRAIN BOOST

0:00–1:16

A MIND-ALTERING
CHEMICAL

A mission of destruction. The target: a shipment of drugs. A mind-altering chemical with a mysterious connection to the origins of life on Earth...A link that can only be revealed by Big History. We think of history as a timeline — a series of events stretching a few thousand years into the past. It's time to think bigger. Instead of a line, imagine a web of infinite connections interacting over billions of years, linked together to create everything we've ever known: our Universe, our planet, and us. When we consider our most epic moments through the lens of science, we unleash a revolutionary new idea. The movement of atoms steer the movements of men, civilizations, galaxies. History as we know it is about to get big.

This is America's first drug bust. But these aren't cops. And this drug isn't illegal. It's tea. Under cover of darkness, a band of American rebels dumps nearly 50 tons of tea into Boston harbor...A shipment worth as much as \$3 million today. Traditional history tells us that the Boston tea party is an act of American resistance against a British tax. But Big History reveals that it's one link in a chain of global events that begins with the chemistry of a single molecule...Caffeine...A drug that gives our brains a boost.

1:16–2:24

THE BOSTON
TEA PARTY

It essentially gives you an adrenaline release, right? It's an extraordinary sort of rush. It's well-named "the rush."

2:24–3:22

AN ADRENALINE
RUSH

Because people everywhere are hooked on this rush, they're hooked on tea. To reveal how powerful this addiction is, Big History turns to geography.

In the 1700s, tea only grows in one place: China. The British control a vast network of trade designed to move that tea around the world. It's a massive undertaking. Just one round-trip from England to China, then back to England and across to America is a voyage of 37,000 miles.

Think of it as being something like a Moon shot. You have to marshal significant forces to do it, and they have to bring back something that people will pay a premium for. Because they're addictive, people feel pangs if they don't have them. They crave them.

3:22–4:03

LAUNCH OF
GLOBAL TRADE

Our addiction to drugs like tobacco and the caffeine in tea and coffee launches an era of unprecedented global trade. It's a modern way to satisfy an ancient need. Ever since we first fermented fruits and grains into primitive alcohol, we've had a craving for mind-altering chemicals.

4:03–4:37 We ingest food not just to give ourselves energy but because occasionally, some foods do weird things to our brain that we like.
TEMPEST
IN A TEAPOT

Tea isn't the only source of caffeine in the colonial era. Thousands of coffeehouses spring up across Europe and in America, where men go for something they can't get in a pub or tavern.

4:37–5:09 You're down at the pub having a drink. Well, in its long-term effects, alcohol is a depressant. On the other hand, what is it about caffeine? It drives you to greater activity.
COFFEEHOUSES

Coffeehouses appear that become hotbeds of political discourse. Unlike alcohol, which tends to dull the senses and help relax you, here you've got people's minds being very sharp, very clear, and working very quickly, discussing the very real political problems of their day.

Why is this drug so different? Big History zooms in to the microscopic chemistry of caffeine. Each molecule is made of four common elements: carbon, hydrogen, oxygen, and nitrogen. Caffeine's atomic structure is very similar to adenosine, the brain chemical that tells us when we're tired. As we knock back cup after cup, caffeine takes its place, blocking the space in our brains where the sleep chemical should go. Caffeine isn't really keeping us awake. It just stops our brains from telling us it's time to sleep.

And this is stunning because it wasn't until I began to get into Big History that I actually knew the effect. I thought that, you know, caffeine was like an amphetamine. It just created a — it caused me to speed up. But actually what it did was it prevented me from slowing down.

By blocking the sleep signal, caffeine tricks our brains, and that triggers the body to release the extra boost of energy we need to keep us going. Adrenaline, sugar, and dopamine — the key to the brain's reward centers. Hyped up on caffeine instead of dragged down by alcohol, we have the energy to think big.

People in the coffeehouses were being stimulated by this product and then starting to think about questions of social justice.

5:09–6:00

CHEMISTRY OF
CAFFEINE

6:01–6:41

A SOURCE
OF ENERGY

6:41–7:41

REVOLUTIONS

Big History shows us that their ideas start revolutions...In Paris at the Cafe Procope, the coffeehouse where French revolutionaries make their plans... And at the Green Dragon, which a US senator will call “the headquarters of the American revolution,” where a group of rebels plans the Boston Tea Party. So the chemistry of caffeine alters the chemistry of our brains. But how can a plant change a human?

7:41–9:00

THE FAMILY TREE

If there’s a chemical that alters how the brain works, it’s almost certainly the case that the brain already has a chemical inside it that it uses for some sort of similar purpose.

Big History links our caffeine addiction to the origins of life. This is Earth, 1.6 billion years ago — a time when the planet has one huge ocean. It’s filled with life, including a single-celled creature that is the ancestor of every plant and every animal, including us. While we share over 90% of our DNA with chimpanzees, we also share half of our DNA with coffee and tea. That’s why the chemicals in plants affect our brains. Because if you go back far enough, we’re related.

9:00–9:53

A COSMIC COLLISION

From a Big History perspective, we all really evolved from the same one-celled creatures that lived in the ocean and became all of the life around us.

But the link between man and caffeine doesn’t just reach back to the first tiny forms of life. Big History reveals that it all connects to something even bigger: a cosmic collision that shakes the Earth to its core.

Big History is a new way to see the world. It reveals a surprising connection between our founding fathers and a revolutionary drug — a chemical link that ties back to the common ancestor of all animals and plants. A link we still experience every day. This drug has the power to change the world. But why did it evolve in some places and not others? Big History connects this tiny caffeine molecule...To a massive cosmic event. This enormous ball of fire is Earth 4.5 billion years ago. While the planet is still forming, it collides with something about the size of Mars. The impact throws off 81 quintillion tons of debris. That gravity pulls together to form the Moon.

Alone, the Earth’s movement is chaotic...[thunder] and the climate is volatile. But the Moon brings order. Its gravitational pull slows down Earth’s rotation, which calms Earth’s winds and weather, creating a consistent environment, where life on the surface can evolve. The same impact that creates the Moon also knocks Earth sideways, giving our planet a permanent tilt. Because of the tilt, places like Europe and North America get varying amounts of light and heat and seasons that change throughout the year. But in the band that stretches around the center of the Earth, steady amounts of light and heat create a unique environment. Welcome to the tropics — rich soil, plenty of moisture, lots of sun all year round. Plants thrive...But so do the animals that eat plants. If plants are to survive, they’ll need to fight back.

9:53–11:19

FORMS THE MOON

11:19–12:45

THE MOON BRINGS ORDER

12:45–13:37 If you're a plant, you sit still. You can't run and hide. So you need other forms of protection. Thorns are one, but poisons are another.

PICK YOUR POISON

49 million years ago, some tropical plants evolve a deadly new poison. It protects those plants from harmful insects, even weeds and rival plants. It's called caffeine. But one creature's poison is another's pleasure. The same dose of caffeine that can kill a bug just gives us a boost.

13:37–14:37 Humans eventually discovered that these things that are poisons for some potential predators are actually rather nice to use.

POISON TO MORNING
PICK-ME-UP

So caffeine is a natural pesticide that evolves in the Earth's Sunbelt...Which is born in the collision that made the Moon. But how does a poison become your morning pick-me-up? Big History connects forward...To the 17th century...When a booming caffeine trade transports tea and coffee all over the world, to the empires of Europe and their colonies in the new world.

14:37–15:06 Trade in those days is slow, so you can't carry perishable stuff. You can't carry lettuce or things like that that are gonna rot. Whereas coffee, where you have these dried beans, is actually pretty good in this regard. And it's something that you can take for a long way. And then people grind it up, they drink it, they get a buzz, they're happy, and they'll pay you for it. So addictive substances are really good trade items, because your customers not only like it, they have to have it.

ADDICTIVE
SUBSTANCES

Like any ambitious drug dealers, the European traders look for an opportunity to make more money by growing their own supply. The countries that grow tea and coffee sell dried leaves and roasted beans. But in order to keep control over their product, they don't trade its source — live coffee and tea plants. The plants are like state secrets. So the European traders become drug smugglers. They steal live coffee plants and beans. But because Europe is in the north, it's far too cold for a plant from the tropics to survive. Europe's caffeine addicts will have to figure out another plan. Their solution will shake up the balance of power around the world.

Big History uses science to see the world in a new way. It shows how caffeine gives our brains a jolt, blocking the chemicals that tell us to feel tired... That our need for this jolt turns Europeans into drug smugglers. But their efforts fail, because the Earth's tilt prevents tropical plants from growing in the cold. As we've seen, caffeine has a powerful pull. So if they can't bring the plant to Europe, they'll bring Europe to places where the plant can grow.

So is the existence of these addictive substances and the fact that they can only grow in certain environments a kind of spur to colonialism and predatory mercantile activities? I think the answer's certainly yes.

15:06–16:22

CHANGING
WORLD POWERS

16:22–17:17

SEEDS OF
COLONIALISM

17:17–18:10

PLANT THE FLAG

European powers in search of a caffeine fix claim and colonize tropical parts of the world, building farms to feed their habit. They enslave native peoples across the tropics to work the vast plantations where caffeine-making plants spread like wildfire.

So here's the human being, serving, like, almost the bee that's pollinating plants. So the human being now becomes an animal that is going to spread the coffee plant into places that it was not native.

18:10–19:21

COFFEE FROM
CARIBBEAN
PLANTATIONS

The Big History perspective reveals that something as simple as coffee can trigger an epic transformation in human history — that colonies are built on caffeine. And with coffee-growing plantations spread all across the tropics, American revolutionaries can toss their tea overboard and kick their tea-drinking habit forever, because they can get the same rush from coffee grown closer to home on plantations in the Caribbean. Tea quickly becomes un-American. But across the Atlantic, this steadfast symbol of Britain kick-starts yet another revolution. Big History reveals how our caffeine addiction transforms the modern world.

19:21–19:56

THE BIGGEST
TEA-DRINKING NATION

We are now in Britain in 1850, where the population has boomed to 22 million, up from just 5 million a century and a half before. And the secret driving the surge could be tea. The British start drinking tea around 1700. By 1800, Britain is the biggest tea-drinking nation in the world. It's a habit that saves lives because of the way tea is made.

You can only infuse this substance if you add boiling water. And of course, boiling water is going to kill many of the waterborne pathogens that were otherwise killing people.

After Britain starts drinking tea, deaths from waterborne illnesses fall by 50%. Because caffeine is addictive, the British drink a lot of tea. And that means they're drinking a lot more boiled water. So they live longer and have more children, giving Britain enough manpower to fuel a mass production machine that launches the modern age...An age where people down 5.9 billion cups of tea and 2.2 billion cups of coffee every day.

Why has caffeine been so successful as a global mind-altering substance? It provides a sort of cheap and quick fuel. It can help you operate better in a complex society.

And it all connects back to the Moon that slows down our planet...Giving us the molecule that speeds up our world. But the story of caffeine is just the beginning. There's a much bigger puzzle hidden in Big History. Each episode unlocks a clue. Everyday things like beef, the sun, and water hold the key. Watch them all, and you'll see this grand mystery revealed — the Big History of time, of space, the Big History of us.

19:56–20:48

TEA LAUNCHES
A NATION

20:48–21:55

A CHEAP & QUICK
FUEL IN A
COMPLEX WORLD