



## caffeine in culture

Whether the consumption of caffeine-bearing herbs is a virtue or vice has frequently been debated throughout history. In a 2009 article in the *Medial Herbalism* journal, arguing in defense of coffee, Paul Bergner [notes](#):

In the Ottoman Empire, religious debates raged about whether [coffee] was an intoxicant like alcohol or opium, or was otherwise 'legal' in Islamic law. The eventual edict was that although it was an intoxicant, it was similar to the "wine of Paradise" described in the Quran, "that will neither pain their heads nor cloud their reason" and it is not considered an intoxicant by Islamic scholars today. The criterion is that it does not impair judgment. European and North American Christian temperance movements militated against coffee and tea as well as alcohol; and the first version of the FDA regulation of opium and marijuana also proposed making coffee and caffeine into illegal or controlled substances.

In 1924, Louis Lewin in the Excitantia section of his book *Phantastica* relates a similar story of coffee in Egypt starting in 1511, and others in Europe in the 1700s. In all cases the initial suspicion and outlawry of coffee is ultimately overturned. From these examples, Lewin concludes that

substances which act on the brain mock at all obstacles which oppose their extension. Their attraction grows slowly, silently, but surely. Finally, even the authors of legal restrictions themselves become an easy prey to the fascination of these excitants. Coffee has fulfilled its destiny, and it may be that countless souls who enjoyed its influence on this earth yearn for it in the world to come.

Of caffeine-bearing herbs more generally, he writes:

We know in fact that man has attached himself tenaciously to the caffeine plants and their derivatives and daily satisfies the desire they have inspired in him. And this for good reasons. An abyss separates the properties and action of these plants from those of the other substances described in this work [e.g. opium, cocaine, cannabis, peyote, alcohol, tobacco, etc]. Consciousness is not obscured by a veil of dimness or darkness, the individual is not degraded by the destruction of his free will to animal instincts, and the soul and mental powers are not excited to the inward perception of phantasms. The caffeine plants exercise an exciting action on the brain without giving rise to any mentally or physically painful impressions. All these facts assign a particular place to these substances.



Such lyricism! Dale Pendell, who carried on Lewin's work in his notorious poison-path herbals known as the *Pharmako* trilogy, puts it somewhat differently: "The ally usurped morality. It set itself against alcoholic inebriation, called itself sobriety, and began its masquerade."

**The Vertue of the *COFFEE* Drink.**

First publicly made: and sold in England, by *Pasqua Rosée*.

**T**HE Grain or Berry called *Coffee*, groweth upon little Trees, only in the *Deserts of Arabia*.  
It is brought from thence, and drunk generally throughout all the Grand Seigniors Dominions.

It is a simple innocent thing, composed into a Drink, by being dried in an Oven, and ground to Powder, and boiled up with Spring water, and about half a pint of it to be drunk, fasting an hour before, and not Eating an hour after, and to be taken as hot as possibly can be endured; the which will never fetch the skin off the mouth, or raise any Blisters, by reason of that Heat.

The Turks drink at meals and other times, is usually *Water*, and their Dye: consist: much of *Fruit*; the *Crudities* whercof are very much corrected by this Drink.

The quality of this Drink is cold and Dry, and though it be a Dryer, yet it neither heats, nor inflames more then *hot Posset*.  
It doth close the Office of the Stomack, and fortifies the heat with- its very good to help digestion, and therefore of great use to be about 3 or 4 a Clock afternoon, as well as in the morning.  
It quickens the *Spirits*, and makes the Heart *Lightsome*.  
It is good against sore Eys, and the better if you hold your Head over it, and take in the Steem that way.

It suppresseth Fumes exceedingly, and therefore good against the *Head-ach*, and will very much stop any *Defluxion of Rheum*, that distil from the *Head* upon the *Stomack*, and so prevent and help *Consumptions*; and the *Cough of the Lungs*.

It is excellent to prevent and cure the *Dropsy*, *Gout*, and *Scurvy*.  
It is known by experience to be better then any other Drying Drink for *People in years*, or *Children* that have any *winning humors* upon them, as the *Kings Evil*. &c.

It is very good to prevent *Mis-carryings* in *Chill-bearing Women*.  
It is a most excellent Remedy against the *Spleen*, *Hypocondriack Winds*, or the like.

It will prevent *Drowsyness*, and make one fit for business, if one have occasion to *Watch*, and therefore you are not to Drink of it after *Supper*, unless you intend to be *watchful*, for it will hinder sleep for 3 or 4 hours.

It is observed that in *Turkey*, where this is generally drunk, that they are not troubled with the *Stone*, *Gout*, *Dropsie*, or *Scurvy*, and that their *Skins* are exceeding clear and white.

It is neither *Laxative* nor *Restraining*.

MADE AND SOLD IN ST. MICHAELS ALLEY IN CORNHILL, BY PASQUA ROSEE, AT THE SIGNE OF HIS OWN HEAD.

Figure 1: An advertisement for London's first coffee house, 1652. Note the inclusion of energetic qualities (cold and, in particular, dry), which would have been familiar to commoners of the age.



As Pendell and others have famously observed, coffee and the clock came to London in the same year – well, approximately. It seems that the first coffee house [opened in 1652](#) (figure 1), while the first minute-handed tower clock, at St Dunstan’s, began chiming in 1671. The point of drawing this connection is to highlight how the mentality induced by caffeine is, in fact, the very same mentality responsible for the industrialization of time. Tight focus, heightened intensity, stark contrast, inexhaustible energy – dreams of consumption unending, unsleeping, a permanent noon of the mind and the money-box. The development of capitalism and the use of caffeine grew apace in the Western world.

Yet let us not blame the plants for this confluence. Let us say instead that both caffeine and the clock shaped culture, and shaped each other – as any set, setting, and substance must always interplay. The expansionist, rationalist, industrialist Europeans found in caffeine herbs a phytotherapeutic shortcut to the state of spirit they revered and sought out, found it complemented and intensified by their awareness of the clock (just as another state is intensified by its absence, as when one goes woodwards for days or weeks, and finds wound-down wonders) – and which enabled them to pursue their single-minded work. Like other aspects of the monoculture, this too has gone global: no other “power plants” are as world-widely used as the caffeine herbs, and few have attained the degree of social acceptance they enjoy. Other potent plants in common use are generally seen as vices to be frowned upon, regardless of how widely they are partaken. Pendell says of coffee, “the ally has a remarkable ability to disguise its intoxication as ordinary, as the ground state”; studying its effects can illuminate aspects of a culture who adopts them as its norm.

When a shaman stirs snakes and secrets out of *Salvia*, this relationship can be mutually beneficial; in the chthonic cultures of the world, this was true too for the caffeine plants. Yet for coffee, tea, and cacao at least, the overwhelming desire of humans for the particular[ly] mental[igned] state they induce has led to abuse, both on the individual and ecological levels.

Wary of this, let’s investigate the mysteries of caffeine and its cohorts, and try better to understand its effects on our bodies and minds, so that we can better appreciate its place in our lives of this time.

## caffeine in plants

Whenever possible, it is best to consider plant chemistry from the plant’s point of view first. In the case of caffeine, it serves its green hosts as a defense mechanism or, if you prefer, a “toxin” – inhibiting the growth of mycotoxin-producing molds, repelling rapacious herbivores. From the plant’s point of view, then, caffeine is protective.



In these plants, the amino acid compound methylxanthine is metabolized first into theobromine, then into caffeine. Together, this family of constituents is called the *xanthine alkaloids*. They are most soluble in hot water, less so in cold water, and poorly extracted in high-proof alcohol or in fixed oils. You will not find traditional societies making tinctures of their caffeine herbs, though I have experimented with low-alcohol tinctures to good success.

## caffeine in humans

All of the xanthine alkaloids are potent stimulants to the central nervous system. Chemical activity in the living body is a matter of geometry: structure determines function. The xanthines bear some structural similarity to the human's endogenous adrenaline (figures 2-5).

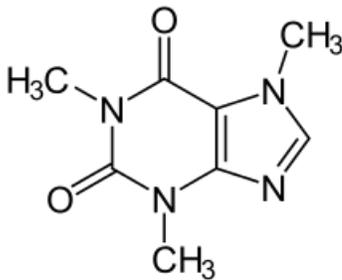


Figure 2: caffeine.

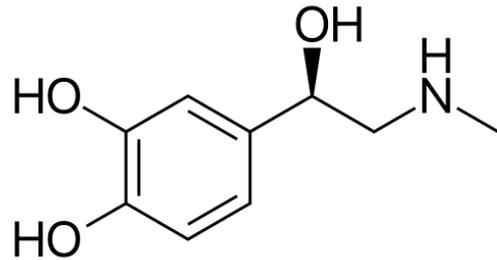


Figure 4: adrenaline.

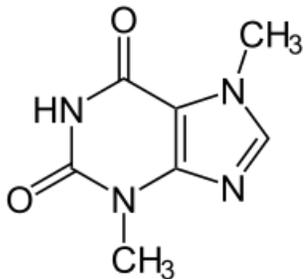


Figure 3: theobromine.

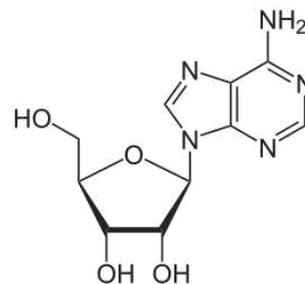


Figure 5: adenosine.

Caffeine's primary action is to bind to the receptors for a neurotransmitter called *adenosine*, blocking its effects. Adenosine is an inhibitory/sedative agent in the brain – the gradual accumulation of adenosine is one of the reasons you feel sleepier the longer you've been awake. By binding to the receptors without conveying the same signal, caffeine allows you to remain wakeful for a longer period of time.



Caffeine also increases the activity of the feel-good neurotransmitter dopamine, by augmenting its signaling, and increases the activity of glutamate, another stimulant. In addition, it slows down clearance of adrenaline, amphetamine, ephedrine, and other stimulants, while increasing cellular levels of cAMP (cyclic adenosine monophosphate). A “second messenger” molecule, derived from the common energy currency ATP (adenosine triphosphate), cAMP is involved in the regulation of blood sugars and lipids. As you can see, there are multiple pathways at play here, but they all add up to an increase in stimulation, activity, fuel release, and excitation of the nervous system.

Levels of caffeine in the bloodstream peak one hour after consumption, more or less. Its half-life, the time it takes your body to reduce the amount by half, is three to four hours in “healthy adults” (i.e. the majority of research subjects, most likely undergraduate-age white males) – but can be five to ten hours in women taking the birth control pill, and as long as nine to eleven hours in pregnancy. (We’ll discuss other factors that can impact caffeine metabolism below.)

The net effect of caffeine consumption is stimulation of the central nervous system (CNS), as well as the cardiac and respiratory systems. Empirically and clinically, it is also found to have a variety of other effects, including:

- **diuretic** – increases elimination of carcinogens & other wastes, reduces formation of kidney stones;
- **cerebral vasoconstrictor** – particularly helpful for headaches due to stagnation of blood in the cerebral vessels;
- **“ergogenic”** – caffeine is converted in the liver to paraxanthine, which increases lipolysis, the breakdown of fats; this frees up more fatty acids and glycerol into the blood plasma, where they can be used as fuel for exertion; improved power output is notable during anaerobic exercise (strength training);
- **recovery aid** – post-workout, caffeine taken with carbohydrates accelerates glycogen replenishment;
- **anti-obesity** – promotes fat oxidation and increases thermogenesis (the generation of heat at rest, baseline metabolism);
- **focus aid** – increases mental acuity and alertness for focus tasks and detail work, delays deteriorations in reaction time that would result from exhaustion or boredom;
- **“antidepressant”** – population-level studies indicate that the more caffeine one drinks, the less likely they are to develop depression;
- **digestive** – increases stomach acid secretion and intestinal motility; and
- **antioxidant** – though not as strong in this action as some of its cohort constituents, caffeine serves as an antioxidant in its own right.



Clearly, many of these actions are highly desirable and some seem downright miraculous, so what accounts for the bad rap caffeine has gotten among alternative healers? Near-Puritanical exhortations to eliminate it entirely from one's life, if one wishes to be healthy, are commonplace among herbalists and related practitioners, but why?

It is an inherently human trait to overindulge. In a subsistence environment, coming across a bushfull of berries or a hive golden with honey was rare enough and rewarding enough that our internal chemistry howled at us to take all we could hold. Couple this ancestral drive with an environment of manufactured overabundance, and a culture that pressures one to do MORE BETTER FASTER NOW, and it is unsurprising that so many take indulgence to excesses. The dose makes the poison, so telling the difference between boon and bane is our work.

## caffeine excess

### sensitivity is relative :: excess is relative

Caffeine is cleared from the system in the liver, in a biotransformation (or “detoxification”) system called the cytochrome P-450, along its 1A2 pathway – CYP1A2, for short. Not every body is equally adept at performing these detoxification functions, and this is the major determinant of sensitivity to caffeine. The faster you move caffeine along this pathway, the sooner its effects fade from your experience.

Many things impact the activity of this pathway. Nicotine and insulin, for instance, are two substances known to *enhance* activity of the CYP1A2, therefore smokers and insulin-resistant or hyperinsulinemic humans can actually drink more caffeine and experience less stimulation. (That doesn't necessarily make it good for them!)

Caffeine is not the only substance which is broken down in this system – others include steroid hormones like cortisol and estrogen, as well as alcohol. Excessive caffeine consumption can promote hyperestrogenism by competing for liver clearance – it is as if all the liver's resources are used up in dealing with the caffeine, and little is left over for the estrogens, so they remain in play. This, along with direct stimulation of the sensitive tissue, aggravates the pain of endometrial tissue in endometriosis. (At our clinic we've had great success in resolving endo for a number of clients, with herbs playing a supportive role, but the keystone strategy is removal of all gluten, dairy, soy, and caffeine, along with excesses of sugar.) Caffeine can also aggravate fibrocystic breast tissue, and removing it from the diet is an important intervention there. On the other hand, caffeine consumption seems mildly protective against the development of breast



cancer, but that is probably due to the high antioxidant content found in caffeine-bearing plants, rather than to the caffeine itself.

It is prudent to limit caffeine consumption while pregnant: though its association with miscarriage has been inconclusive, lowered fetal growth has been observed with daily intakes of 200 mg per day or more. (200 mg is considered the average American per capita daily dose.)

A strong sensitivity to caffeine may indicate sluggish liver function or impaired detoxification, especially if one is also sensitive to dietary fat and alcohol, or presents with hormone imbalances (e.g. elevated levels of cortisol, estrogen, or histamine). In these cases, providing the materials required to operate these pathways in the body – including magnesium, B vitamins, zinc, and abundant dietary protein – in combination with gentle herbal liver stimulants (e.g. dandelion, burdock, blessed thistle), is a first-line strategy.

Caffeine has an additive or even multiplicative effect with other stimulants. You may have heard of the case of *Ephedra sinica*, the herb that was banned from commerce after some cardiac arrest deaths were associated with use of a concentrated extract of one of its constituents, ephedrine. The “diet” or “performance” pills in question (far, far from traditional herbalists’ use) also contained caffeine, which inhibited the ephedrine’s breakdown and threw its own fuel on the fire.

A standard claim among caffeine’s detractors is to assert that it “drains the adrenals” or “stimulates an adrenaline surge” even at normal levels of use. The truth is somewhat more complex: in normal doses, caffeine reduces adrenaline *clearance*, rather than stimulating adrenaline *secretion*. It takes a dose over 300 mg to cause an uptick in levels of circulating adrenaline or other stress hormones, and even then this may be small and short-lived. However, if one is using caffeine herbs to enable poor sleep habits, digging oneself ever deeper into sleep debt and all the endocrine disruptions which come with it – as is quite common – this habit *will* degrade adrenal function with time.

Here we come to a seeming paradox: it is best to avoid use of caffeine when one is in a state of depletion or high stress – when overworked, when underslept, when ill – and yet this is the time when we are most habituated and acculturated to turn to a cup of coffee, a red-eye chai, or (gods forbid) a neon-nitro “energy shot”. We need to learn to value truly restorative practices and recognize depletion for what it is: not a bodily betrayal to be overborne by beating and blaring and bulling our way through, but a cry for rest, renewal, retreat, reprieve. Eat when hungry, sleep when tired.



## caffeinism

[King's American Dispensatory](#), a Physiomedicalist text from 1898, describes a syndrome known as “caffeinism”. Its symptoms include headache, insomnia, anxiety, nervous irritability, tremors, heart palpitations, muscular weakness, and fatigue. It was known at the time that this was highly subject to individual variation: a few cups a day could be sufficient to induce symptoms in some people, while others could take coffee by the liter and suffer none of these effects.

The known [neurological and psychiatric consequences](#) of exceeding one’s personal tolerance for caffeine today hew closely to the caffeinism symptom list. Anxiety disorders are strongly implicated, and indeed the DSM-IV included “caffeine-induced anxiety disorder” in its list of maladies. Caffeine can precipitate panic attacks in those who are already susceptible. Heightened levels of impatience and aggression occur with higher caffeine intakes. Bergner cites one study indicating a direct correlation between caffeine intake and anxiety levels, and another in which caffeine elimination completely relieved anxiety symptoms for 5 out of 6 participants.

In the case of insomnia, it seems obvious to avoid stimulants like caffeine, but many don’t recognize it as a potential causative factor. Complete tolerance to the wakefulness-inducing effects isn’t usually attained from normal consumption, and the more obvious subjective effects of caffeine fade away long before its adenosine blockade has ended. People simply don’t recognize that they might drink a cup of coffee at 3:00pm and still be subject to its effects at midnight, but this is not at all uncommon.

Potassium depletion due to the diuretic effects of caffeine is a primary cause of some caffeinism symptoms, including fatigue, heart palpitations, nervousness, brain fog, and muscular weakness. Heavy drinkers of caffeine should take care to consume high-potassium foods, such as apricots, avocado, beet greens, coconut, prunes, pumpkin seeds, and tomatoes.

## alternatives to caffeine

If you or a client decide you need to reduce your caffeine consumption after considering the factors noted above, there are many ways [herbs can help](#) make the withdrawal process go more smoothly. In the United States, reducing caffeine is almost always only difficult when it comes to coffee – people here generally don’t have strong habits with other caffeine herbs, and the forms in which they are most often available are not as high in caffeine as is good old drip coffee. (This may be different in other countries – it’s certainly conceivable that an Argentinian giving up mate could develop withdrawal symptoms.)



Careful titration is necessary to avoid the dreaded withdrawal headache and other common symptoms: fatigue, depression, drowsiness, brain fog, irritability. These withdrawal symptoms come from the state of relative adenosine excess present in the caffeine-adapted and caffeine-deprived brain, which has upregulated its expression of adenosine receptors in response to chronic caffeine use, and is now flooded with its sedative signal. In two to ten days, the body will rebalance itself and these symptoms will fade away. Full reversal of tolerance may take longer, however – it's wise to try a thirty-day reset and see how you respond, especially if you are a heavy caffeine user or have any of the caffeinism symptoms.

Primary herbal interventions during coffee/caffeine withdrawal include:

- **Bitters** – Many people are unconsciously dependent on coffee for its effects on digestive secretions, as it is in many cases the only bitter food or drink they consume. Replacing the missing bitter with reishi, dandelion root, centaury, or indeed any bitter herb is an important intervention when digestive troubles arise after abstinence.
- **Yellow dock** – Likewise, many coffee drinkers are dependent on its laxative effects, and may develop constipation when it is removed from their morning routine. Yellow dock is an effective laxative which yet does not induce dependence (as may happen with senna, aloe, or cascara sagrada); generally one or two droppersful of tincture is sufficient.
- **Cerebral circulatory stimulants** – Rosemary, ginkgo, sage, tulsi, and even valerian may be useful for the headaches which accompany caffeine withdrawal.
- **Adaptogens** – More directly stimulating herbs such as Asian ginseng, eleuthero, and rhodiola can provide a lift in energy levels when they are flagging. Gentler restorative adaptogens like codonopsis, ashwagandha, gynostemma, or nettle seed will help to repair the endocrine disruptions due to chronic high use of caffeine, or use that was enabling sleep debt.
- **Cayenne** – Tincture of cayenne will absolutely perk you up, if you're looking for a "jolt" of energy and alertness. Start with one drop only!
- **"Coffee replacers"** – Decoctions of roasted dandelion, chicory, and burdock roots are commonly recommended as replacements for coffee, but 99.72% of fictitiously-pollled active coffee-drinkers agree that anyone saying so is clearly delusional, hates fun, or probably isn't even a real human anyway. If you insist on attempting to formulate a replacement blend, chaga is perhaps the most similar in flavor, and should constitute 50% or more of your mix. However, what we've found most palatable is simply to switch someone to decaf coffee and mix it with appropriate herbs – even two tablespoons of decaf in a gallon decoction will handily overwhelm the taste of any burdock, chicory, eleuthero, etc which you may mix in.



As a long term strategy, and especially if you're interested in [some of caffeine's more enjoyable effects](#) – euphoria, motivation, improved focus – it's best to keep your consumption below twice per week, because tolerance robs you of the dopamine/adrenaline-augmentation effects while still retaining the anti-sleep effect. Caffeine [tolerance is insurmountable](#) through increased consumption – taking more, after you become tolerant, won't overcome it.

## other interesting constituents

The constituents of herbs act synergistically: the soul is more than the hum of its parts. This is pronouncedly true in the caffeine herbs, in which attendant molecules may ameliorate the negative effects and enhance the positive effects of caffeine.

### methyloxanthines: theobromine & theophylline

Both of these constituents are diuretic, and have CNS-stimulant activity.

**Theobromine** is found most abundantly in cacao, though it's also found at relevant levels in guarana, kola, mate, and guayusa. Indeed, traces of it will be found in any caffeine herb, since it's a precursor to caffeine. In its own right, it acts as a cardiac stimulant, vasodilator, and smooth muscle *relaxant*. Theobromine has a six- to ten-hour half-life. This is the constituent specifically toxic to dogs, which accounts for why you shouldn't give dogs chocolate. (Incidentally, there is no theobromine in carob – that's why “chocolate” dog treats use this for flavoring.)

**Theophylline** is found primarily in tea leaves; there are traces in cacao, guarana, and mate. It's a smooth muscle *relaxant*, and an effective bronchodilator – it has been used medically, in isolated form, to treat spasmodic lung conditions (asthma, emphysema, COPD, bronchial spasm, etc).

### phenylpropanoids: chlorogenic acid & caffeic acid

Compounds in this class are antioxidant, anti-inflammatory, and help with blood sugar regulation.

**Chlorogenic acid**, though it's widely distributed in plants, is found in notably high levels in coffee, and also in mate to a lesser extent. This compound has a number of actions that add up to an “antidiabetic” effect. It slows the absorption of glucose at the intestines, lowers post-meal blood sugar levels in those who are insulin-resistant, decreases the liver's output of glucose, and strengthens beta cells in the pancreas – those are the ones which produce insulin. Its high



chlorogenic acid content is probably a major contributor to the inverse epidemiological relationship observed between coffee consumption and the risk of type 2 diabetes – that is, the more coffee you drink, the less likely you are to develop diabetes. This is found independent of whether the coffee is caffeinated or not.

**Caffeic acid**, a derivative of chlorogenic acid, is found in coffee and cacao – and of non-caffeine-bearing herbs, also in red sage root and echinacea. A further derivative found in echinacea, known as caffeic acid phenethyl ester or CAPE, inhibits NF- $\kappa$ B activation. (You may be thinking: *Um, great! . . . What?* Well, the net effect is to stimulate immune activity, reduce inflammation, and inhibit the growth of tumors. It's mainly of interest, for our purposes here, simply as an exercise in tracing out the relationships between some potent plant chemicals.) Caffeic acid is a phenolic antioxidant – all our caffeine herbs are high in these – which, in addition to its anti-inflammatory activities, is antimicrobial in topical applications, and protective of heart tissue when metabolized internally.

### flavonoids: catechins & OPCs

These two are in the *polyphenol* class of chemicals. Polyphenols in plants serve as protectors – against UV radiation, predation by herbivores, infection by microbes – or as chemical messengers. In humans, many polyphenols are antioxidant, anti-inflammatory, “anti-aging”, anti-cancer, cardioprotective, and so on. They're also known to enhance iron absorption when consumed along with iron-rich foods, and may increase absorption of other metal ions as well – which isn't a good thing if there's lead or aluminum in the soil, and therefore the plant tissues, coming from contaminated fields. Source your herbs carefully!

Tea is the best source of the **catechin flavanol** compounds: catechin, epicatechin, epigallocatechin (EGC), epigallocatechin gallate (EGCG, particularly active), epigallocatechin digallate (EGCDG), and so on. These are all strong antioxidants, and have some specific [cancer-fighting capabilities](#): they prevent the tumor from growing new blood vessels into itself, thereby starving it of fuel and nutrients, and they encourage *apoptosis* or “programmed cell death”, the call to which cancer cells will otherwise try to ignore. The catechins are protective of the cardiovascular system, too: they inhibit atherosclerosis, lower blood pressure, and prevent the oxidation of lipoproteins. (Those are the *L* at the end of LDL or HDL, the low- or high-density lipoproteins, molecules which shuttle cholesterol around the body – when they get oxidized, they can trigger the development of plaques). Finally, the catechins can help diabetics by lowering blood sugar and triglyceride levels, while improving the utilization of fat as a fuel source.



The catechins are mildly astringent, and are soluble in hot water. You may have noticed the progressive lengthening of the names for these compounds, earlier: that reflects the structure of the chemical itself – as the molecule gets longer, so does its name. As the plants continue to build past EGCDG and beyond, they cross over into a new category, **oligomeric proanthocyanidins (OPCs)**. These are large, heavily astringent molecules, more so the larger the polymer – go even larger and they become “condensed tannins”, suitable for tanning leather. The larger catechin derivatives take more time to extract into the water, which is why a long-steeped tea becomes more astringent. For this reason, many tea connoisseurs argue for specific steep times for each tea variety, to prevent the astringency from overwhelming the other flavors.

OPCs are found in tea, as well as hawthorn berries, grape skins, pine bark, and a variety of other sources in the plant world. Like their precursors, they are antioxidant, anti-inflammatory, and cardioprotective.

### amino acids & amines: L-theanine & PEA

These two compounds are psychoactive in interesting ways.

**L-theanine** is an amino acid found in tea leaves, as well as guayusa. A building block of some neuroactive amines (amino acid compounds), theanine can cross the blood-brain barrier. It primes the response of certain immune cells which are prevalent in the gut lymphatic tissues and mucous membranes, but can respond to many types of alarm or infection. L-theanine thereby enhance immune surveillance against microbes, as well as tumor cells. It is a useful agent for reducing cold and flu symptoms. As it alters concentrations of some key neurotransmitters (e.g. dopamine and GABA), it has a relaxant effect which reduces both physical and psychological expressions of stress (e.g. high blood pressure and anxiety). Its action is anxiolytic – that is, it calms without being sedative. In the caffeine-containing herbs in which it's found, L-theanine mitigates some of the stimulation of the caffeine and gives the “up” a different quality – more focused, less prone to over-excitation.

**PEA ( $\beta$ -phenylethylamine)** is an amine found in cacao. It mimics amphetamine to some degree, and may act as a neurotransmitter, stimulating dopamine release in the pleasure centers. PEA has also been found to be much [more prevalent in carnivores](#) than herbivores, and is one of the key components that causes rodents to avoid the urine marks of their predators. It's structurally similar to catecholamine hormones like adrenaline, as well as stimulants like methamphetamine, ephedrine, and the asthma drug albuterol, not to mention cathinone (from the stimulant herb khat) and mescaline (from peyote). However, PEA is rapidly metabolized when taken orally, and is only present in cacao in very small amounts to begin with.



## the caffeine herbs

As we examine these herbs and their individual qualities, look at the range of plants here: we find eight species from five plant families, with representatives from Africa, East Asia, and both Americas. Each one a medicine and libation of great regard in its homeland, and most have been imported and naturalized on at least one other continent. Humans truly do love these herbs, and have regarded them as friends for ages.



Figure 6: Thé et café (tea and coffee), from [The Flowers Personified](#) by J.J. Grandville, 1847.

The **energetics** of all the caffeine plants are similar: they are universally drying (due to their diuretic effects) and usually tonifying (due to their frequent astringency). Whether to categorize them as warming or cooling has vexed practitioners at least as far back as Avicenna: he considered coffee to be warming in the first degree, but noted that others considered it cooling. Today, we'd describe it and the other caffeine herbs as being both stimulating and anti-



inflammatory; whether you regard them as warm or cool depends largely on which of those attributes you emphasize.

### coffee (*Coffea arabica*, *C. robusta*)

*Taste:* bitter, aromatic.

*C. robusta* has greater caffeine content, but lacks the flavorful aromatic compounds found in Arabica beans.

*Family:* Rubiaceae, the coffee/bedstraw family, which is distributed worldwide and includes cinchona, cleavers, and cat's claw (and presumably, also some herbs whose names start with letters other than c).

Coffee is considered to originate in Ethiopia, where its beans are chewed or pounded down and made into cakes. Legend says a goatherd there observed his goats eating the leaves and berries, and their subsequent friskiness, and brought some home to try it out for himself.

*Medicinal parts:* seeds ("beans"), leaves.

The leaves can be infused like tea; you can, in fact, find them available in internet commerce.

*Constituents:* caffeine (1-3% by dry weight), chlorogenic acid, caffeic acid.

Old-fashioned drip coffee has *roughly* 100mg of caffeine per 8oz cup. The relatively high chlorogenic acid content, in addition to its pronounced impacts on blood sugar regulation, also speeds absorption of caffeine and slows its elimination. This accounts, in part, for the strong difference between coffee's "rush" and the gentler onset of effect found with other caffeine plants.

*Actions:* circulatory & nervous stimulant, cholagogue, diuretic, cardioprotective, antioxidant / anti-inflammatory, hypoglycemic (blood-sugar-lowering), bronchodilator, migraine-relieving.

*Affinities:* nervous, circulatory, and digestive systems.

*Applications:* With its bitterness and stimulating nature, coffee dispels stagnation in the liver and gallbladder, stirring them to action and relieving stuck flow. It warms the core of the body, and improves blood flow to the periphery. Through its complex of circulating and draining actions, it relieves "damp heat", a pattern in which stagnant fluids build up pressure and generate inflammation. Unchecked, this develops into the classic "bad blood" pattern of the Western herbal tradition.



Paul Bergner, a staunch defender of coffee if ever there was one, writes, “Cup for cup, in epidemiological trials, the more you drink, the longer you live, the fewer heart attacks you have, and the less diabetes you have, up to about 6 cups a day. This is found in every population studied on 3 different continents.” He also notes that it is the single greatest source of antioxidants in the diets of North Americans today. For this reason, it’s not a great idea to insist that people eliminate coffee when they’re trying to make healthier choices, especially when their current diet is phytonutrient-poor. The difficulty of withdrawal coupled with the loss of a key source of antioxidant plant compounds can actually end up reducing one’s level of vitality, rather than heightening it. Coffee should only be restricted if one is experiencing the negative effects of caffeine excess, as described earlier.

You may have heard that coffee can raise cholesterol levels, and it’s true – technically. This effect is tremendously reduced if one’s coffee is filtered through paper, though: this will capture and sequester the diterpene compounds kahweol and cafestol, which are primarily responsible. However, those are also bitter principles, which stimulate the flow of bile from the liver and gallbladder, and so help prevent the formation of gallstones. They also combat mycotoxins in the plant itself, or in beans during shipment and storage.

Since systemic inflammation and blood sugar dysregulation can result in a broad array of disease states, the anti-inflammatory and insulin-sensitizing actions of coffee help protect against, or reduce the severity of, a wide variety of chronic illnesses. More prosaically, its diuretic effect reduces the risk of kidney stones – more through-flow means less chance for stones to form.

*Considerations:* Always differentiate *coffee* from *coffee-based-beverages*: a cup of black coffee is an entirely different proposition, phytochemically and physiologically, from a mocha-frappa-caramel-chino (with whipped cream and sprinkles, no doubt). One improves insulin sensitivity, the other has enough sugar to put a diabetic in a coma; one has a bracing bitterness and primes digestive fire, the other is so sweet it cloys your kettle just looking at it.

Conventional coffee is one of the most heavily treated commercial crops. Now, up to 85% of the pesticide residues are degraded in the course of the roasting process – but still, who wants that last 15%? The environmental consequences of conventional coffee farming are vast, and the social impacts are no picnic either. Workers on these plantations are paid minimal wages, and child labor laws are very weak in many coffee-producing countries, and unions are nonexistent. Insist on organic and fair-trade. It’s worth the expense.



The chemical agents used in conventional decaffeination are carcinogenic, and some residues may remain on the finished beans. Water-process decaffeination is preferable for this reason. Also, poor-quality coffee can have notable levels of mycotoxins, health-damaging compounds produced by opportunistic fungi. These are found in greatest concentration in chemically-decaffeinated coffee, less so in water-process decaf, and even less in full-caf – because caffeine itself helps keep fungal growth in check.

### tea (*Camellia sinensis*)

*Taste:* astringent, bitter, earthy, sometimes aromatic.

*Family:* Theaceae, the tea family, which is mostly made up of other *Camellia* species. Tea oil, derived from the seeds of *C. oleifera*, is a major cooking oil in southern China.

*Medicinal parts:* leaves.

*Constituents:* caffeine ½-8% (most commercial tea hovers around 3%), theobromine, theophylline, catechins, OPCs, L-theanine.

The caffeine & theanine pair is a good match for mental alertness and improved information processing, much better for these purposes than coffee. Writing in *King's American Dispensatory*, Felter and Lloyd notes that “While their [caffeine] principles are thus identical, it is equally true that coffee and tea differ considerably in their effects and, of the two, the latter is more apt to harm the nervous system. Both tea and coffee induce wakefulness, but that of the former may partake of the character of a distressing insomnia, while the latter induces a pleasant, dreamy wakefulness.” Caffeine is reputed to bind with tea’s polyphenols during steeping, leading to slower uptake.

*Actions:* stimulant, astringent, diuretic, diaphoretic, bronchodilator, neuroprotective, anxiolytic, nootropic, antioxidant, immune stimulant, antimicrobial, anti-tumor.

*Affinities:* nervous and circulatory systems.

*Applications:* Tea can be drunk regularly as a health-promoting infusion. In a [2015 meta-analysis](#), researchers concluded: “The dose-response analysis indicated that one cup per day increment of green tea consumption was associated with 5% lower risk of [cardiovascular disease] mortality and with 4% lower risk of all-cause mortality. Green tea consumption was significantly inversely associated with CVD and all-cause mortality, whereas black tea consumption was significantly inversely associated with all cancer and all-cause mortality.”



Researchers have also observed an inhibitory effect of green tea on *Helicobacter pylori* infection and on the influenza virus, as well as antifungal activity against *Candida albicans*.

*Considerations:* All commercial teas – black, green, white, and so on – come from the same species. Green tea becomes black tea in a “fermentation” (actually, oxidation) process, in which *polyphenol oxidase* converts catechins & OPCs into theaflavins & thearubigins. This is also what makes apples turn brown when they’ve been sliced. Theaflavins are, like their precursors, antioxidant and antimicrobial; thearubigins are similar, but less active. All told, green tea is more strongly antioxidant than black. Oolong tea, partially fermented, is the middle ground.

Caffeine levels vary widely: tea from buds and young leaves will have greater concentrations than old leaves, Assam tea has more caffeine than Chinese, clonal plants have more than those grown from seedlings, and a fast growing season and nitrogen-rich soil both boost caffeine content. After those primary influences (and contrary to what you might expect), *if taken from the same bush* a white tea would have higher caffeine content, and black lower, than a green – tea is “withered” (which raises caffeine) and then “fermented” (which lowers it) to become black, only “withered” if white, and neither for green; however, these changes are on the order of only a few tenths of a percent. Practically speaking, because of varietal and ecological factors – fast-grown African or Assam varieties are more often used for black tea, for instance – the breakdown is usually *black > white > green*.

Tea is generally decaffeinated by either a chemical wash in ethyl acetate or a supercritical carbon dioxide process. The latter doesn’t remove the other beneficial compounds as much as chemical decaffeination does – over 80% of the polyphenols can be lost in an ethyl-acetate-processed tea, while only a tenth that much is lost during CO<sub>2</sub> decaffeination. And contrary to what you might have heard, you can’t effectively decaffeinate your tea at home by pre-steeping for 30 seconds.

### cacao (*Theobroma cacao*)

*Taste:* bitter, aromatic, earthy, divine.

*Family:* Malvaceae, the mallow family, along with kola, marshmallow, hibiscus, and linden.

*Theobroma* means “food of the gods”. The name *cacao* was used for the herb in Mesoamerican languages. Archaeological evidence exists for its use from as early as 1900 BCE, though it could easily have been known to the ancient Mayans far earlier than that.



*Medicinal parts:* beans (seeds), dried and fermented, from which the solids (“nibs”) and cacao butter are separated. Chocolate is what you get when you recombine them

*Constituents:* caffeine (in fairly low concentrations: [Duke’s database](#) puts the range at .05-1.29%), theobromine 2-10%, theophylline, caffeic acid, PEA ~0.7%, minor oxalate content, magnesium.

An ounce of dark chocolate has about 12 mg of caffeine, so says the USDA, but that may be in reference to the more popular commercial “darks”, which are often only 45% cacao. If you’re getting some serious 75-90% dark chocolate, that’ll be a touch higher.

Sometimes a chocolate craving is actually a magnesium craving: your body can’t talk to you in words, so it uses an “image” (flavor-memory) of the food with the greatest associated content for the nutrient in question. Cacao clocks in at about 5 mg of Mg per gram, which might not sound like much, but it’s higher than a lot of foods, comparing favorably with pumpkin seeds.

*Actions:* stimulant, relaxant, cardiac tonic, vasodilator, anxiolytic, exhilarant.

*Affinities:* cardiovascular, respiratory, and nervous systems.

*Applications:* Cacao nibs may be consumed ad libitum. Cacao butter is an excellent base for salves. Dark chocolate isn’t going to cure your congestive heart failure, but it’s not going to make it worse, either – and as vices go, it’s about as benign as it gets.

*Considerations:* Just as we differentiated coffee from coffee-flavored-sugar-bombs, let’s consider the differences between cacao and cheap common chocolate. The added sugar and milk will decimate or eliminate any beneficial effects from the native cacao compounds. The “Dutch” alkali process to which cacao powders are sometimes subjected will degrade their polyphenols. Overall, darker chocolate is better (it has more theobromine, for one thing). As with coffee, make sure to get organic and fair-trade.

Despite the low caffeine content, some folks do feel noticeable stimulation when they overindulge on dark chocolate or even cacao nib decoctions.

Place three tablespoons of cacao nibs and one dried cayenne pepper into a bottle of bold red wine and macerate for two weeks. Strain by the glass and enjoy with someone you love.

### kola (*Cola acuminata*, *C. nitida*)

*Taste:* earthy, bitter, astringent.



Kola is of course widely used to flavor soft drinks, or indeed, not-so-soft: kola was included for both flavoring and effect alongside coca leaves in Coca-cola from 1892 until 1903, when they began using “spent” coca leaves; today they still use a coca extract, but it’s certified cocaine-free.

*Family:* Malvaceae, mallows.

Kola is of West African origin, where it is used in divination & ritual. Students of ours from Ghana report its traditional and contemporary use in a naming ceremony, where it serves as a representative of the bitter aspects of life, and conveys protection from them.

*Medicinal parts:* nut.

*Constituents:* caffeine 2-3.5%, theobromine 1-2.5%, epicatechin.

A can of cola usually contains around 35 mg of caffeine, which almost seems quaint in an era of “energy drinks” and “energy shots”, which can get up into the 100 – 200 mg range, per item.

*Actions:* stimulant, tonic, vasodilator, bronchodilator, diuretic, anti-inflammatory.

*Affinities:* circulatory, respiratory, and nervous systems.

*Applications:* Kola nut is not often used in modern Western herbal practice, with the notable exception of “zoom balls”: morsels comprised of nut butter mixed with powdered herbs. Kola’s role is to provide the zoom.

### guarana (*Paullinia cupana*, *P. sorbilis*)

*Taste:* bitter, astringent.

*Family:* Sapindaceae, the soapberry family. Members include maple, horse chestnut, lychee, rambutan.

Guarana comes from the Amazon, modern Paraguay, where a tribe known as the Guaraní give it a pride of place in their culture and myth.

*Medicinal parts:* seeds.

*Constituents:* caffeine 2-6%, theophylline, minor amounts of theobromine, catechins.

*Actions:* cardiac stimulant, bronchodilator, vasodilator, anti-inflammatory, anti-tumor.



*Affinities:* circulatory, nervous systems.

*Applications:* As it is in some ways a “purer” bearer of caffeine, guarana may have fewer “side effects” than coffee when these are at play in the digestive system – coffee’s bitters make strong overtures to the organs of digestion, while these are largely absent from guarana’s effects.

Guarana is used as an abundant and relatively uncomplicated source of caffeine in a number of modern beverages.

*Considerations:* The Eclectics and Physiomedicalists were precise in their use of this remedy for headaches: it was not for headaches of all types, but only those associated with deficient cerebral circulation. William Cook, writing in *A Compendium of the New Materia Medica* (1896), notes that guarana “increases the cerebral circulation, causing the face to flush, brain to feel full, and the mind to be first excited and afterwards drowsy. [...] Its influence in sick headache [migraine] is promptly stimulating toward the brain; and as that influence is frequently needed in the condition of *cerebral anaemia* present in some attacks of this malady, guarana gives much relief in such cases, but is of no use in cases having a gastric or an hepatic origin, and where the face is already flushed with dilated vessels.” If someone’s face is red or their migraine was preceded by indigestion, guarana is not the remedy for them.

#### the caffeine hollies:

yerba mate (*Ilex paraguariensis*), guayusa (*Ilex guayusa*),  
and yaupon (*Ilex vomitoria*)

*Taste:* bitter, astringent\*.

\* There is minimal or no tannin content in guayusa, so it has no astringency.

*Family:* Aquifoliaceae, the holly family – *Ilex* is the only genus in this family.

Yerba mate comes from central & south America. Its name means “the gourd herb”, as it’s traditionally drunk from a hollowed gourd using a metal strainer-straw called a bombilla. (By the way: there is no need to put an accent on the e, as in “mate” – that’s an error of overcorrection, not necessary in the Spanish orthography.)

Guayusa, an Amazon rainforest native, has been on the commercial scene in the US for a few years now, and has started to show up in the catalogs of major herb suppliers. Its major claim to fame, aside from the mystique of the rainforest, is its lack of tannins, which allows it to be steeped indefinitely without developing astringency.



Yaupon is North America's only native caffeine-bearing herb. It seems there are a few industrious souls making it available commercially, only on a regional scale or via internet commerce for now. Its Latin name, *Ilex vomitoria*, is something of a misnomer: the herb is not emetic. It was used, however, in a native ceremonial beverage along with other herbs, some of which *did* cause vomiting; at the time the name was assigned, this distinction wasn't acknowledged.

*Constituents:* In yerba mate, we find caffeine ½-2%, theobromine, theophylline, chlorogenic acid, polyphenols, potassium, magnesium. In guayusa: caffeine 3%, theobromine, L-theanine, essential amino acids. Lewin asserts .3-1.6% caffeine in yaupon.

*Medicinal parts:* leaves.

*Actions:* stimulant, vasodilator, relaxant, bronchodilator, anti-inflammatory, “anti-obesity”, hypoglycemic (mate), anxiolytic & nootropic (guayusa).

*Affinities:* circulatory, respiratory, and nervous systems.

*Applications:* A [2012 study](#) of mate consumption showed improved bone density in postmenopausal women who drank mate habitually – and *liberally*; their “mate drinkers” group was comprised of women who were consuming at least a liter of mate per day! (Similar results have been seen with *Camellia*.) A [2015 review](#) noted its proven effects, including “antioxidant activity, protective effects against induced DNA damage, vasodilation activity, inhibition of glycation and atherosclerosis, improvement in glucose tolerance, anti-inflammatory effects, chemopreventive properties, thermogenic effects, amelioration of insulin resistance and anti-obesity effects”. The same review goes on to say that mate “suppresses body weight gain and visceral fat accumulation and decreases serum levels of cholesterol, triglycerides, LDL cholesterol, glucose, insulin, pancreatic lipase and leptin”.

*Considerations:* Yaupon has not yet been extensively investigated. (What an opportunity!)

It is unlikely we'll see another major caffeine plant emerge from anywhere in the world: they are so vigorously sought-after and elevated upon discovery, it is very likely we've already found all there are to find. (Though I'd be more than happy to eat my words.)

That said, we're certainly not done exploring the caffeine herbs. We can deepen our understanding of them, meet them on their own terms, investigate traditional methods of



preparation (e.g. chai), and devise elegant pairings and formulations to include them. For instance: mate and guayusa both pair extraordinarily well with the adaptogen gynostemma, producing an alert-calm-aware-centered state which is maintained for several hours and has no sharp crash.

So fear not: there's plenty yet to do with these uniquely captivating herbs – and working with them as our allies, we'll not be lacking in motivation and determination as we face the long journeys ahead.

Ryn Midura

June 2016