CHAPTER 3

Desire: Intoxication

Plant: Marijuana

(Cannabis sativa x indica)

The forbidden plant and its temptations are older than Eden, go back further even than we do. So too the promise, or threat, that forbidden plants have always made to the creature who would taste them—the promise, that is, of knowledge and the threat of mortality. If it sounds as if I'm speaking metaphorically about forbidden plants and knowledge, I don't mean to. In fact, I'm no longer so sure the author of Genesis was, either.

Living things have always had to make their way in a wild garden of flowers and vines, of leaves and trees and fungi that hold out not only nourishing things to eat but deadly poisons, too. Nothing is more important to a creature's survival than knowing which is which, yet drawing a bright line through the middle of the garden, as the God of Genesis found, doesn't always work. The difficulty is that there are plants that do other, more curious things than simply sustain or extinguish life. Some heal; others rouse or
calm or quiet the body’s pain. But most remarkable of all, there are plants in the garden that manufacture molecules with the power to change the subjective experience of reality we call consciousness.

Why in the world should this be so—why should evolution yield plants possessing such magic? What makes these plants so irresistible to us (and to many other creatures), when the cost of using them can be so high? Just what is the knowledge held out by a plant such as cannabis—and why is it forbidden?


Start with the bright line, as all creatures must. How does one tell the dangerous plants from the ones that merely nourish? Taste is the first tip-off. Plants that don’t wish to be eaten often manufacture bitter-tasting alkaloids; by the same token, plants that do wish to be eaten—like the apple—often manufacture a superabundance of sugars in the flesh around their seeds. So as a general rule, sweet is good, bitter bad. Yet it turns out that it is some of the bitter, bad plants that contain the most powerful magic—that can answer our desire to alter the textures and even the contents of our consciousness. There it is, right in the middle of the word intoxication, hidden in plain sight: toxic. The bright line between food and poison might hold, but not the one between poison and desire.

The manifold and subtle dangers of the garden, to which a creature’s sense of taste offers only the crudest map, are mainly the fruits of strategies plants have devised to defend themselves from animals. Most of the ingenuity of plants—that is, most of the work of a billion years of evolutionary trial and error—has been applied to learning (or rather, inventing) the arts of biochemistry, at which plants excel beyond all human imagining. (Even now a large part of human knowledge about making medicines comes directly from plants.) While we animals were busy nailing down things like locomotion and consciousness, the plants, without ever lifting a finger or giving it a thought, acquired an array of extraordinary and occasionally diabolical powers by discovering how to synthesize remarkably complicated molecules. The most remarkable of these molecules (at least from our perspective) are the ones designed expressly to act on the brains of animals, sometimes to attract their attention (as in the scent of a flower) but more often to repel and sometimes even destroy them.

Some of these molecules are outright poisons, designed simply to kill. But one of the great lessons of coevolution (a lesson recently learned by designers of pesticides and antibiotics) is that the all-out victory of one species over another is often Pyrrhic. That’s because a powerful, death-dealing toxin can exert such a strong selective pressure for resistance in its target population that it is quickly rendered ineffective; a better strategy may be to repel, disable, or confound. This fact might explain the astounding inventiveness of plant poisons, the vast catalog of chemical curiosities and horrors that first flowered in Cretaceous times with the rise of the angiosperms. The same evolutionary watershed—Darwin’s “abominable mystery”—that ushered in the dazzling arts of floral attraction brought with it the darker arts of chemical warfare.

Some plant toxins, such as nicotine, paralyze or convulse the muscles of pests who ingest them. Others, such as caffeine, unhinge an insect’s nervous system and kill its appetite. Toxins in datura (and henbane and a great many other hallucinogens) drive a plant’s predators mad, stuffing their brains with visions distract-
ing or horrible enough to take the creatures’ mind off lunch. Compounds called flavonoids change the taste of plant flesh on the tongues of certain animals, rendering the sweetest fruit sour or the sourdest flesh sweet, depending on the plant’s designs. Photosensitizers present in species such as the wild parsnip cause the animals that eat it to burn in the sun; chromosomes exposed to these compounds spontaneously mutate when exposed to ultraviolet light. A molecule present in the sap of a certain tree prevents caterpillars that sample its leaves from ever growing into butterflies.

By trial and error animals figure out—sometimes over eons, sometimes over a single lifetime—which plants are safe to eat and which forbidden. Evolutionary counterstrategies arise too: digestive processes that detoxify, feeding strategies that minimize the dangers (like that of the goat, which nibbles harmless quantities of a great many different plants), or heightened powers of observation and memory. This last strategy, at which humans particularly excel, allows one creature to learn from the mistakes and successes of another.

The “mistakes” are, of course, especially instructive, as long as they’re not your own or, if they are, they prove less than fatal. For even some of the toxins that kill in large doses turn out in smaller increments to do interesting things—things that are interesting to animals as well as people. According to Ronald K. Siegel, a pharmacologist who has studied intoxication in animals, it is common for animals deliberately to experiment with plant toxins; when an intoxicant is found, the animal will return to the source repeatedly, sometimes with disastrous consequences. Cattle will develop a taste for locoweed that can prove fatal; bighorn sheep will grind their teeth to useless nubs scraping a hallucinogenic lichen off ledge rock. Siegel suggests that some of these adventurous animals served as our Virgils in the garden of psychoactive plants. Goats, who will try a little bit of anything, probably deserve credit for the discovery of coffee: Abyssinian herders in the tenth century observed that their animals would become particularly frisky after nibbling the shrub’s bright red berries. Pigeons spacing out on cannabis seeds (a favorite food of many birds) may have tipped off the ancient Chinese (or Aryans or Scythians) to that plant’s special properties. Peruvian legend has it that the puma discovered quinine: Indians observed that sick cats were often restored to health after eating the bark of the cinchona tree. Tukano Indians in the Amazon noticed that jaguars, not ordinarily herbivorous, would eat the bark of the yaje vine and hallucinate; the Indians who followed their lead say the yaje vine gives them “jaguar eyes.”

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Whenever I read something like this, I wonder, How do you tell when a jaguar is hallucinating? Then I think about Frank, my late, cranky old tomcat, who I became convinced used drug plants habitually in order to hallucinate. Every summer evening at around five, Frank would lumber into the vegetable garden for a happy-hour nip of *Nepeta cataria*, or catnip. He would first sniff, then tug at the leaves with his teeth and proceed to roll around in paroxysms of what looked to me like sexual ecstasy. His pupils would shrink to pinpricks and take on a slightly scary thousand-mile stare, preparatory to pouncing on unseen enemies or—who can say?—lovers. Frank would crash-land in the dirt, pick himself up, do a funny little sidestep, then pounce again until, exhausted, he’d go sleep it off in the shade of a tomato plant.

I learned later that catnip contains a chemical compound, called “nepetalactone,” which mimics the pheromone cats produce in their urine during courtship. This chemical key just hap-
pens to fit an aphrodisiac lock in a cat's brain and apparently no other. It was amusing to watch a plant derange my cat, but also unsettling; for that brief interlude, Frank would wobble through the garden as though he were literally beside himself. Yet he'd be back again the next day—though, curiously, never before five. Maybe he ritualized the practice to keep it under control; or maybe it took him the better part of the day to remember just where it was that the magic plant grew.

I'd planted the catnip strictly for Frank's pleasure, though looking back I sometimes wonder if the plant wasn't also in my garden as a substitute, or placeholder, for the forbidden plant I sometimes wished I could grow for myself. Cannabis, I mean. At once an intoxicant, a medicine, and a fiber (this last use, admittedly, of absolutely no interest to me), cannabis is one of the most powerful of the plants that will grow around here; it is also, as I write, the most dangerous plant I could grow in my garden. Frank's happy-hour ritual was a daily reminder that my garden was capable of producing much more than food or beauty, that it also could perform some rather remarkable feats of brain chemistry and by doing so answer other, more complicated desires.

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I sometimes think we've allowed our gardens to be bowdlerized, that the full range of their powers and possibilities has been sacrificed to a cult of plant prettiness that obscures more dubious truths about nature, our own included. It hasn't always been this way, and we may someday come to regard the contemporary garden of vegetables and flowers as a place almost Victorian in its repressions and elisions.

For most of their history, after all, gardens have been more concerned with the power of plants than with their beauty—with the power, that is, to change us in various ways, for good and for ill. In ancient times, people all over the world grew or gathered sacred plants (and fungi) with the power to inspire visions or conduct them on journeys to other worlds; some of these people, who are sometimes called shamans, returned with the kind of spiritual knowledge that underwrote whole religions. The medieval apothecary garden cared little for aesthetics, focusing instead on species that healed and intoxicated and occasionally poisoned. Witches and sorcerers cultivated plants with the power to "cast spells"—in our vocabulary, "psychoactive" plants. Their potion recipes called for such things as datura, opium poppies, bella-donna, hashish, fly-agaric mushrooms (Amanita muscaria), and the skins of toads (which can contain DMT, a powerful hallucinogen). These ingredients would be combined in a hemspseed-oil-based "flying ointment" that the witches would then administer vaginally using a special dildo. This was the "broomstick" by which these women were said to travel.

The medieval gardens of witches and alchemists were forcibly uprooted and forgotten (or at least euphemized beyond recognition), but even the comparatively benign ornamental gardens that came after them went out of their way to honor the darker, more mysterious face of nature. The Gothic gardens of England and Italy, for example, always made room for intimations of mortality—by including a dead tree, say, or a melancholy grotto—and the occasional frisson of horror. These gardens were interested in changing people's consciousness, too, though more in the way a horror movie does than a drug. It's only been in modern times, after industrial civilization concluded (somewhat prematurely) that nature's powers were no longer any match for its own, that our gardens became benign, sunny, and environmentally correct places from which the old horticultural dangers—and temptations—were expelled.

Or if not expelled, almost willfully forgotten. For even in
Grandmother’s garden you’re apt to find datura and morning glories (the seeds of which some Indians consume as a sacramental hallucinogen) and opium poppies—right there, the makings of a witch’s flying ointment or apothecary’s tonic. The knowledge that once attended these powerful plants, however, has all but vanished. And as soon as this plant knowledge is restored to consciousness—as soon as, say, one forms the intention of slitting the head of an opium poppy to release its narcotic sap—so too must be its taboo. Curiously, growing *Papaver somniferum* in America is legal—unless, that is, it is done in the knowledge that you are growing a drug, when, rather magically, the exact same physical act becomes the felony of “manufacturing a controlled substance.” Evidently the Old Testament and the criminal code both make a connection between forbidden plants and knowledge.

I once grew opium poppies in my garden—yes, with felonious intent. I also grew marijuana, back when that was no big deal. I still grow grapes and hops, both of which can be made into legal intoxicants (as long as I don’t sell them), and, in my herb garden, Saint-John’s-wort (an antidepressant), chamomile, and valerian (both mild sedatives).

I should probably explain my interest in these plants. At least in the beginning, this had less to do with my interest in using drugs, which was never more than mild, than with an impulse I think most gardeners share. In fact, by the time I planted a few cannabis seeds, in the early 1980s, I no longer smoked at all—pot, fairly reliably, rendered me paranoid and stupid. But I had just taken up gardening and was avid to try anything—the magic of a Bourbon rose or a beefsteak tomato seemed very much of a piece with the magic of a psychoactive plant. (I still feel this way.) So when my sister’s boyfriend asked if I might want to plant a few seeds he’d picked out of “some really amazing Maui,” I decided to give it a try—as much as anything, just to see if I could grow it.

To another gardener, this will not seem odd, for we gardeners are like that: eager to try the improbable (if only to harvest a good story), to see if we can’t grow an artichoke in zone five or brew homemade echinacea tea from the roots of our purple coneflowers. Deep down I suspect that many gardeners regard themselves as small-time alchemists, transforming the dross of compost (and water and sunlight) into substances of rare value and beauty and power. Maybe at some level we’re still in touch with the power of the old gardens. Also, one of the attractions of gardening is the independence it can confer—from the grocer, the florist, the pharmacist, and, for some, the drug dealer. One does not have to go all the way “back to the land” to experience the satisfaction of providing for yourself off the grid of the national economy. So, yes, I was curious to see if I could grow some “really amazing Maui” in my Connecticut garden. It seemed to me this would indeed represent a particularly impressive sort of alchemy. But as things turned out, my experiment in growing marijuana was a piece with my experience smoking it, paranoid and stupid being the operative terms.

It was in the spring of 1982, I believe, that I sprouted a handful of the Maui seeds on a moistened paper towel; within days two of them had germinated. As soon as the weather warmed, I planted the seedlings outdoors, not in the garden proper but behind the falling-down barn back behind the house, in a mound of ancient cow manure I had inherited from the dairy farmer whose place this used to be.

I more or less forgot about the plants until a few months
later, when I returned to find what looked like a pair of Christmas trees, eight feet tall at least, rising over the late-summer weeds—lush, leafy, emerald green shrubs growing avidly in the thinning September light. No one would ever claim marijuana is a great beauty, though a gardener can't help but admire the sheer green exuberance of this plant, a towering heap of leafy palms held up to the sun in an ecstatic frenzy of photosynthesis. The plant has the ardor of a weed.

Though frost was just around the corner (I've lost tomatoes here as early as September 15), the big plants gave no sign that they were even thinking of flowering. This I regarded as disappointing but hardly tragic, since in those days people still smoked cannabis leaves. (Nowadays, of course, only the unpollinated female flowers—called sinsemilla—are deemed worthwhile; growers simply throw the leaves and stems onto the compost pile.) Even so, I decided to hold off for a few more weeks to see if I couldn't harvest a few buds.

The plants continued to grow at an alarming rate, adding as much as a foot to their height and girth every week, so that by the end of September they'd made themselves conspicuous from just about any point on the property. There they were, a couple of jolly green giants lurking behind the barn—and I found myself in a state of almost perpetual anxiety and dread. I'd read in the papers that the state police sometimes did aerial reconnaissance to locate marijuana gardens, and anytime I heard the drone of a small plane overhead, I raced outside to see if its flight path would take it over my plants. The slowing down of any full-size American sedan on my road was enough to rattle me. Every day that fall I weighed the risks of detection, and a killing frost, against the potential reward of a few buds.

A close call ended my career as a marijuana farmer. I'd ordered a cord of wood from a man who'd posted a flyer in town. He showed up with the first half early on a Saturday morning, a compact block of a man with a pewter crew cut, and asked where I wanted it stacked. Though open to the elements on two sides, the ruined barn did at least have a tight roof, and we agreed it was far and away the best place to stack the wood. But before getting down to work, the man and I fell into conversation, leaning there on the warm hood of his truck, enjoying the crisp October morning. Making small talk, I asked if he sold cordwood for a living. No, he chuckled, firewood was just a sideline, that and plowing driveways in the winter.

"Nine to five, I'm chief of police of New Milford."

All at once the bones in my legs began to go soft. I found I could no longer form a sentence without specifically addressing the muscles in my lips. The barn, you see, was nothing more than a shell of boards, and no police officer standing in it could fail to spot the two green giants through the opening in the rear wall. But what else was I going to do? Dumping the wood anywhere but in the barn was ridiculous.

Unfortunately, no nonridiculous stratagem presented itself to my stupefied brain. I simply blurted out that, on second thought, I wanted the whole load dumped right here in the middle of the driveway, that'd be just fine, thanks.

"Don't be silly," the police chief said, turning to climb back into the truck's cab. "It's no trouble at all. I'll just back the load up to the barn."

"Uh . . . no!" I can only imagine how I must have sounded. "Right here, here is perfect. Near the house . . . burn it right away."

"Okay, maybe some of it, but not the whole cord." The truck's engine roared to life.

"Yes! The whole cord! Here!" I may have been shouting now. "This is exactly where I want it!" And before he could throw his
transmission into reverse, I jumped up onto the rear fender and started furiously to throw logs over my shoulder, onto the driveway and the lawn behind the truck, anywhere to block its path to the barn. The man got out, squinted at me in bewilderment, and then, finally, blessedly, shrugged his shoulders. The words “Suit yourself” have never sounded so sweet.

As soon as the wood was unloaded, the chief of police drove off to go get the second half of my cord, and I, temporarily reprieved but still in full panic, ransacked the toolshed in search of an ax. There would be no buds after all. I chopped down the two plants, the trunks of which were as thick around as my forearms, hacked off the branches, and stuffed the fragrant mass of foliage into a pair of heavy-duty trash bags, which I hauled up to a crawl space in the attic—all in about four minutes. My harvest, when dried, yielded a couple of pounds of leaves that smelled like old socks. Something happened when you smoked them, but the effect had less in common with a high than with a sinus headache.

As you can probably guess, I’ve told my marijuana-growing story more than a few times, after dinner with friends, say, and I can usually count on a few laughs. The happy ending is one reason, but the other reason the story qualifies as light comedy is that the suspense on which it hinges, while real enough, is not exactly a matter of life or death. If the police chief had spotted my plants, things would have gotten uncomfortable for me, but it was not as if I would have gone to jail. In 1982 a legal slap on the wrist, and perhaps a certain amount of personal embarrassment (What do I tell my parents? My boss?) was really about all a small-time marijuana grower had to fear. It hadn’t been many years before this misadventure, after all, that an American president—Jimmy Carter—had proposed that marijuana be decriminalized (his sons and even his drug czar smoked), and Bob Hope was telling benign jokes about doobies in prime time. Marijuana then was harmless, funny, and, it seemed to everyone, on the verge of social acceptance.

In the years since, there has been a sea change concerning cannabis in America. By the end of the decade the plant had suddenly acquired, or been endowed with, extraordinary new powers, which, among other things, rendered my story a period piece, quaint in its goofiness and not at all likely to be repeated. A couple of facts will illustrate the change: The minimum penalty for the cultivation of a kilogram of marijuana (the size of my harvest, more or less) in this state has, since 1988, been a mandatory five-year jail sentence. (Other states are harsher still: growing any amount of marijuana in Oklahoma qualifies a gardener for a life sentence.)

Jail time would not be my only worry were I so foolish as to reprise my experiment. If the New Milford police chief happened to find marijuana growing in my garden today, he would have the power to seize my house and land, regardless of whether I was ultimately convicted of a crime. That’s because, according to the somewhat magical reasoning of the federal asset-forfeiture laws, my garden can be found guilty of violating the drug laws even if I am not. The titles of proceedings brought under these laws sound rather less like exercises in American jurisprudence than medieval animism: United States v. One 1974 Cadillac Eldorado Sedan. If the police chief chose to bring such an action (The People of Connecticut v. Michael Pollan’s Garden), he’d simply have to prove that my land had been used in the commission of a crime for it to become the property of the New Milford Police Department, theirs
Historians of the future will decide for themselves exactly why marijuana, of all drugs, should have become the focus of the American drug war—why the bright line of prohibition was drawn around this particular plant, rather than coca or poppies. Did marijuana pose a grave threat to public health, or was marijuana the only illicit drug in wide enough use to justify waging so ambitious a war in the first place? Whatever the case, it’s hard to believe such a powerful new taboo against marijuana would have stuck if the plant hadn’t already been a powerful symbol. Certainly marijuana’s close identification with the counterculture made it an attractive target to a drug war that, whatever else it may have been, was part of a political and cultural reaction against the sixties. But whatever the reason, by the end of the twentieth century this plant and its taboo had appreciably changed American life not

*pose comitatus, which holds that the armed forces of the United States cannot be used to police U.S. territory, has been suspended during the war against marijuana, notably by President Reagan, who deployed troops to rout out growers in northern California. The First Amendment has suffered as well: magazines aimed at pot growers have been harassed and, in one case (Sinsemilla Tips), raided and closed down. In 1998 the federal government threatened to revoke the license of California doctors who exercised their First Amendment right to talk to patients about the medical benefits of marijuana. Also that year, Congress ordered the District of Columbia not to count the votes of its citizens in a referendum on medical marijuana. Arguably, the war against cannabis has also eroded the Sixth Amendment right to a jury trial (since drastic mandatory minimum sentences force most marijuana defendants to accept plea bargains) as well as the presumption of innocence (since asset forfeiture allows the government to seize assets without proving guilt).

*Remove the twenty million or so Americans who use marijuana, and we are left with a “drug abuse epidemic” involving roughly two million regular heroin and cocaine users—a public health problem, to be sure, but serious enough to justify spending $20 billion a year (or modifying the Bill of Rights)?

*More drug arrests are for crimes involving marijuana than any other drug: nearly 700,000 in 1998, 88 percent of them for possession. Marijuana cases account for most of the asset forfeitures that law enforcement budgets have come to rely on. Marijuana is the primary focus of drug prevention efforts in the schools, drug testing in the workplace, and public service advertising about drugs.

†What a dissenting Supreme Court justice in 1988 deposed as a new “drug exception to the Constitution” has been substantially based on marijuana cases. For example, in Illinois v. Gates (1983) the Supreme Court carved broad new exceptions to the Fourth Amendment right against unreasonable searches, as well as the Sixth Amendment right to confront one’s accusers. The venerable principle of
once but twice: the first time rather mildly, with marijuana’s widespread popularity beginning in the sixties, and then again, perhaps more profoundly, in its role as casus belli in the war against drugs.

There has been another dramatic change in the story of marijuana since my brief career as a grower, and that is the change in the plant itself. When the natural history of cannabis is written, the American drug war will loom as one of its most important chapters, on a par with the introduction of cannabis to the Americas by African slaves, say, or the ancient Scythians’ discovery that hemp could be smoked.* For the modern prohibition against marijuana led directly to a revolution in both the genetics and the culture of the plant. It stands as one of the richer ironies of the drug war that the creation of a powerful new taboo against marijuana led directly to the creation of a powerful new plant.

Marijuana’s recent natural history is much harder to reconstruct than its social history, since so much of it took place underground and in secret; this plant’s Johnny Appleseeds have tended to be far-flung and anonymous. But I was inspired to go looking for them a few years ago, after I learned (from a friend of a friend) just how sophisticated marijuana cultivation had become in the years since my feeble attempt and how much more potent American pot had grown. This fellow had once helped design and install a series of state-of-the-art “grow rooms.” As I listened to him talk about his work one evening, dilating on the relative benefits of sodium and metal halide lights, the optimal number of clones to plant per kilowatt, and the intricacies of hybridizing indicas and sativas, it dawned on me that this was what the best gardeners of my generation had been doing all these years: they had been underground, perfecting cannabis.

To a marijuana grower, Amsterdam in the 1990s was something like what Paris in the 1920s was to a writer: a place where alienated expatriates could go to practice their craft in peace and hook up with a community of kindred souls. Growing marijuana is not precisely legal in Holland, but several hundred “coffee shops” are licensed to sell it, and small-scale growing to supply those shops is officially tolerated. Beginning in the late 1980s, as the United States escalated its campaign against marijuana, American refugees from the drug war began moving to Amsterdam. Growers took with them their seeds and expertise, and this migration, matched with a Dutch genius for horticulture going back to the tulip craze, made Amsterdam, once again, the place to go if you cared deeply about one particular plant.

I went to Amsterdam to learn about the recent history of marijuana in America and to see—okay, and sample—what these gardeners had wrought in the years since my hasty retirement. I arrived in late November, at the time of the Cannabis Cup, an annual convention and harvest fair (sponsored by High Times magazine) that attracts many of the brighter lights in the field. American growers come to the Cup to do what gardeners always do when they gather in the off-season: swap seeds and stories and new techniques and show off their prize specimens. Some of the

*The practice of smoking as we know it wouldn’t come to Europe until Columbus brought it back from America, but the Scythians invented something like it around 700 B.C. According to Herodotus, they would put their heads into small tents designed to trap the fumes from cannabis buds placed on red-hot rocks—“until they rise up to dance and betake themselves to singing.”
pioneers of modern marijuana growing were on hand, and I found that if I approached them as a fellow gardener, they were more than happy to share their experiences and knowledge.

Within a few days I had begun to piece together the story of how American gardeners, operating in the shadow of a ferocious drug war without benefit of professional training, had managed to transform “homegrown”—a derisive 1970s term for third-rate domestic marijuana—into what is today the most prized and expensive flower in the world.* But while the ingenuity and resourcefulness of growers had much to do with this success story, so did the ingenuity and resourcefulness of the plant itself. From the plant’s perspective, the American drug war presented an opportunity to expand its range into North America, where it had never had much of a presence. (Except, that is, as hemp, a distinct, nonpsychoactive form of cannabis widely grown for its fibers before prohibition.) To succeed in North America, cannabis had to do two things: it had to prove it could gratify a human desire so brilliantly that people would take extraordinary risks to cultivate it, and it had to find the right combination of genes to adapt to a most peculiar and thoroughly artificial new environment. This is the story of how that happened.

Most of the marijuana smoked in America was grown in Mexico until the mid-1970s, when the Mexican government, at the behest of the United States, began spraying the crop with the herbicide paraquat. About the same time, the U.S. government began cracking down on pot smugglers. With foreign supplies contracting and the safety of Mexican marijuana in doubt, a large market for domestically grown marijuana suddenly opened up. In a sense, the rapid emergence of a domestic marijuana industry represents a triumph of protectionism.

In the beginning, domestic marijuana was grossly inferior to the imported product. Part of the problem was that most early growers did what I did: plant seeds picked out of pot that had been grown in tropical places. Invariably these were the seeds of Cannabis sativa, an equatorial species poorly adapted to life in the northern latitudes. Sativa can’t withstand frost and, as I discovered, usually won’t set flowers north of the thirtieth parallel. Working with such seeds, growers found it difficult to produce a high-quality domestic crop (and especially sinsemilla) outside places such as California and Hawaii.

The search was on for a type of marijuana that would flourish, and flower, farther north, and by the end of the decade, it had been found. American hippies traveling “the hashish trail” through Afghanistan returned with seeds of Cannabis indica, a stout, frost-tolerant species that had been grown for centuries by hashish producers in the mountains of central Asia. The species looks quite unlike the familiar marijuana plant (a distinct advantage to its early growers): it rarely grows taller than four or five feet (as compared to fifteen for the stateliest sativas), and its purplish green leaves are shorter and rounder than the long, slender fingers of sativa. Indica also proved to be exceptionally potent, although many people will tell you that its smoke is harsher and its high more physically debilitating than that of sativa. Even so, the introduction of indica to America proved a boon, since it allowed growers in all fifty states to cultivate sinsemilla for the first time. Some indicas will flower reliably as far north as Alaska.

Initially, indicas were grown by themselves. But enterpris-
ing growers soon discovered that by crossing the new species with *Cannabis sativa*, it was possible to produce vigorous hybrids that would combine the most desirable traits of each plant while downplaying its worst. The smoother taste and “clear, bell-like high” associated with the best equatorial sativas, for example, could be combined with the superior potency and hardiness of an *indica*. The result was what Robert Connell Clarke, a marijuana botanist I met in Amsterdam, calls “the great revolution” in cannabis genetics.*

In a wave of innovative breeding performed around 1980, most of it by amateurs working in California and the Pacific Northwest, the modern American marijuana plant was born. Even today the *sativa × indica* hybrids developed during this period—including Northern Lights, Skunk #1, Big Bud, and California Orange—are regarded as the benchmarks of modern marijuana breeding; they remain the principal genetic lines with which most subsequent breeders have worked. Nowadays American cannabis genetics are widely regarded as the world’s best; they are the basis of the thriving cannabis seed trade in Holland, as the American growers I met there were quick to point out. Yet without the Dutch to safeguard and disseminate these strains, the important genetic work done by American breeders would probably have been lost by now, scattered to the winds by the drug war.

Until the early 1980s, almost all the marijuana grown in America was grown outdoors: in the hills of California’s Humboldt County, in the cornfields of the farm belt (cannabis and corn thrive under similar conditions), in backyards just about everywhere—and a lot more of it than anybody realized. In 1982 the Reagan administration was chagrined to discover that the amount of domestic marijuana being seized was actually a third higher than its official estimate of the total American crop. Shortly thereafter, the administration launched an ambitious nationwide program—enlisting local law enforcement agencies and, for the first time, the armed forces—to crush the domestic marijuana industry.

Though the government’s campaign failed to eradicate marijuana farming, it did change the rules of the game, forcing both the plant and its growers to adapt: “The government pushed us all indoors,” a grower from Indiana told me. And it was there, under the blazing metal halide lights, that *Cannabis sativa × indica* attained a kind of perfection.

The early indoor gardeners had basically sought to bring outdoor conditions and practices inside, growing full-size plants in soil under a regimen of light and nutrients designed more or less to mimic those found in nature. Very soon, however, growers discovered that nature was, if anything, holding back this particular plant, retarding its full potential. By judiciously manipulating the five main environmental factors under their control—water, nutrients, light, carbon dioxide levels, and heat—as well as the genetics of the plant, growers found that the marijuana plant,
this remarkably obliging weed, could be made to perform wonders.

Most of the hybridizing needed to adapt cannabis to indoor conditions was done in the early 1980s by amateurs working in the Pacific Northwest. Cultivars with a high proportion of indica genes performed especially well indoors, it was found, and these were further bred and selected for small stature, high yield, early flowering, and increased potency. No one knew just what this plant was capable of, but by the end of the decade there were sativa × indica hybrids yielding flowers big as fists on dwarf plants no higher than your knee. During this period, cannabis genetics improved to the point where it was no longer unusual to find sinsemilla with concentrations of THC, marijuana’s principal psychoactive compound, as high as 15 percent. (Before the crackdown on marijuana growers, THC levels in ordinary marijuana ranged from 2 to 3 percent, according to the DEA; for sinsemilla, 5 to 8 percent.) Nowadays THC levels upward of 20 percent are not unheard of.

The plant had adapted more brilliantly to its strange new environment than anyone could have expected. For cannabis, the drug war is what global warming will be for much of the rest of the plant world, a cataclysm that some species will turn into a great opportunity to expand their range. Cannabis has thrived on its taboo the way another plant might thrive in a particularly acid soil.

Along with the progress in genetics came rapid advances in technique. “Indoors,” as one grower put it, “the gardener is Mother Nature, but even better.” Growth rates and yields made large strides through the 1980s as growers discovered they could speed photosynthesis by supplying plants with all the nutrients, carbon dioxide, and light they could handle—vast amounts, as it turned out. (Cannabis is, after all, a weed.) Gardeners found that their plants could absorb hundreds of thousands of lumens—a blinding amount of light—twenty-four hours a day. Later on, by abruptly slashing their diet of light to twelve hours daily (and changing from metal halide to sodium lights, the frequency of which more closely mimics the autumn sun), growers could shock their plants into flowering before they were eight weeks old. With the right equipment, an indoor grower could create a utopia for his plants, an artificial habitat more perfect than any in nature, and his happy, happy weeds would respond.

These sedulous attentions would be wasted on male plants, which are worse than useless in sinsemilla production. As long as a female marijuana plant remains unpollinated, it will continue to produce new calyces, steadily adding to the length of its flower. In this state of perpetual sexual frustration, the plant also continues to produce large quantities of THC-rich resins. But allow even a few grains of pollen to reach the plant’s flowers, and the process abruptly stops: bud and resin production shuts down, the plant commences producing seeds—and the sinsemilla is ruined.

Growers who start their plants from seed rogue out the males as soon as they declare their gender, but since this doesn’t happen until the plants mature, much time and space are wasted growing males. The solution was to plant clones instead of seeds—cuttings taken from established female “mother” plants. From the perspective of these fortunate females, the practice is an evolutionary boon: they get to multiply their genes without diluting them, as would be the case in sexual reproduction. (Whether cloning is such a boon for the species as a whole is, as the story of the apple suggests, much less certain.) Because these clones were genetically
identical, the plants were guaranteed to be female. They also turned out to be biologically mature from the start, which meant that even a six- or eight-inch plant could now be forced to flower.

By 1987 all these various advances and techniques had coalesced into a state-of-the-art indoor growing regimen that came to be known as the Sea of Green: dozens of closely spaced and genetically identical plants grown from clones under high-intensity light. A Sea of Green garden consisting of a hundred clones, grown under a pair of thousand-watt lights in a space no bigger than a pool table, will yield three pounds of sinsemilla in two months’ time.

Before I left Amsterdam I wanted to visit a modern marijuana garden, and on my last night an expatriate American grower I’d befriended agreed to show me his. For days I’d been fishing for an invitation, and I could see he was torn between the outlaw’s professional discretion and the gardener’s irrepressible desire to show off. In the end the gardener prevailed.

The garden was in a working-class suburb half an hour north of Amsterdam, and on the train the grower told me he’d chosen this particular town because it is home to a candy factory, a bakery, and a chemical plant. Marijuana plants, and *indicas* in particular, emit a strong, acrid odor; he was counting on the cacophony of smells produced by these three neighbors to cover the telltale stink of his plants.

When we came to the gardener’s house, he showed me upstairs. At the far end of a dark, narrow, cluttered corridor, he flung open a tightly sealed door and I was hit squarely in the face first by a blast of white, white light, then by a stink so powerful it felt like a punch. Sweaty, vegetal, and sulfurous, the place might have been a locker room in the Amazon.

After my eyes adjusted to the light, I stepped into a windowless chamber not much bigger than a walk-in closet, crammed with electrical equipment, snaked with cables and plastic tubing, and completely sealed off from the world. More than half the room was taken up by the gardener’s Sea of Green: a six-foot-square table invisible beneath a jungle of dark, serrated leaves oscillating gently in an artificial breeze. There were perhaps a hundred clones here, each barely a foot tall, yet already sending forth a thick finger of hairy calyces, casting about vainly for a few grains of airborne pollen. A network of narrow plastic pipes supplied the plants with water, a tank of CO₂ sweetened their air, a ceramic heater warmed their roots at night, and four 600-watt sodium fixtures bathed them in a blaze of light for twelve hours of every day. The other twelve, they were sealed in perfect darkness. The briefest lapse of light, the gardener informed me gravely, would ruin the whole crop.

There was nothing of beauty in this garden. Should legalization ever come, no one is going to grow cannabis for the prettiness of its flowers, those hairy, sweaty-smelling, dandruffed clumps. There was also something bizarrely anomalous about this totalitarian hothouse, with its strict monoculture of genetically identical plants growing in lockstep—such ferocious Apollonian control in a garden ostensibly devoted to Dionysus.

Yet to a gardener there was much in this claustrophobic chamber to admire. I don’t think I’ve ever seen plants that looked more enthusiastic, this despite the fact that they were being forced to grow in an utterly unnatural, even perverted manner: overbred, overfed, overstimulated, sped up, and pygmied all at once. “Happy to oblige!” the marijuana plants seemed to say, sucking up the CO₂, gorging themselves on the fertilizers, guzzling down the water, and throwing themselves at bulbs so hot and bright I finally had to look away. In exchange for a regimen of encouragement the
likes of which few plants have ever known, these hundred eager demonic dwarves would oblige their gardener with three pounds of dried buds before the month was out—some $13,000 worth of flowers.

It was all more than a little mad, and very soon I was counting the minutes before I could politely make my exit and draw an ordinary breath. On the train back to Amsterdam, I tried to make some sense of this particular madness. It had a rather notorious local precedent, of course, an episode of equally intense involvement with a particular plant. During the tulipomania that briefly bewitched this city—the last time flowers traded for such fortunes—gardeners would exert themselves with a similar obsessiveness, rigging their precious plants with burglar alarms, deploying mirrors to multiply their blooms, and utterly failing to notice as their world shrank to the dimensions of a fevered dream.

One could argue that the fevered dream was the same then as now, and certainly visions of wealth have underwritten both the seventeenth-century tulip and twenty-first-century marijuana flower. Yet in the case of the tulip, by the end there was nothing but wealth to fuel the madness, and that surely is not the case with these other, uglier flowers. (The buds are homely, turdlike things, spangly with resin.) Tulipomania may have had as its spring the human desire for exotic visual pleasure, for beauty, but that didn’t last. Beauty eventually gave way to status as the desire that drove otherwise rational people to navigate their lives by the polestar of this plant. And by the end pure financial speculation had hollowed out even that desire, so that no one noticed when the flowers were replaced by mere promises of themselves: the words on the paper of a futures contract.

The madness in the marijuana garden is of a different order. Though it too is abundantly watered by money, it remains deeply rooted in the human desire for pleasure—in whatever exactly it is that the chemicals produced in these flowers can do to a person’s conscious experience. This desire must be an exceptionally powerful one—the passion and the price this flower commands have proven as much, as perhaps does the force of its taboo. Yet, for my part, I realized I didn’t understand the first thing about that desire, not really. So what, exactly, is the knowledge held out by these plants, and why has it been so strenuously forbidden?

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With the solitary exception of the Eskimos, there isn’t a people on Earth who doesn’t use psychoactive plants to effect a change in consciousness, and there probably never has been. As for the Eskimos, their exception only proves the rule: historically, Eskimos didn’t use psychoactive plants because none of them will grow in the Arctic. (As soon as the white man introduced the Eskimo to fermented grain, he immediately joined the consciousness changers.) What this suggests is that the desire to alter one’s experience of consciousness may be universal.

Nor is the desire limited to adults. Andrew Weil, who has written two valuable books treating consciousness changing “as a basic human activity,” points out that even young children seek out altered states of awareness. They will spin until violently dizzy (thereby producing visual hallucinations), deliberately hyperventilate, throttle one another to the point of fainting, inhale any fumes they can find, and, on a daily basis, seek the rush of energy supplied by processed sugar (sugar being the child’s plant drug of choice).

As the examples from childhood suggest, using drugs is not the only way to achieve altered states of consciousness. Activities as
different as meditation, fasting, exercise, amusement park rides, horror movies, extreme sports, sensory or sleep deprivation, chanting, music, eating spicy foods, and taking extreme risks of all kinds have the power to change the texture of our mental experience to one degree or another. We may eventually discover that what psychoactive plants do to the brain closely resembles, at a biochemical level, the effects of these other activities.

Human cultures vary widely in the plants they use to gratify the desire for a change of mind, but all cultures (save the Eskimo) sanction at least one such plant and, just as invariably, strenuously forbid certain others. Along with the temptation seems to come the taboo. The reasons for drawing the bright line here and not there generally make more sense within the culture itself, rooted as they are in its values and traditions, than they do outside it. But the reasons cultures give for promoting one plant and forbidding another are remarkably fluid in both time and space; one culture’s panacea is often another culture’s panathogen (root of all evil); think of the traditional role of alcohol in the Christian West as compared to the Islamic East. Indeed, one culture’s panacea can, over time, transmogrify into that same culture’s panathogen, as happened to opiates in the West between the nineteenth and twentieth centuries.*

Historians can explain these shifts much better than scientists can, since they usually have less to do with the intrinsic nature of the various molecules involved than with the powers that cultures ascribe to them and the changing needs of those cultures. Cannabis in American culture has at various times held the power to foster violence (in the 1930s) and indolence (today): same molecule, opposite effect. Promoting certain plant drugs and forbidding others may just be something cultures do as a way of defining themselves or reinforcing their cohesion. It’s hardly surprising that something as magical as a plant with the power to alter people’s feelings and thoughts would inspire both fetishes and taboos.

What is harder to comprehend is why virtually all people, and more than a few animals, should have acquired such a desire in the first place. What good, from an evolutionary standpoint, could it do a creature to consume psychoactive plants? Possibly none at all: it’s a fallacy to assume that whatever is is that way for a good Darwinian reason. Just because a desire or practice is widespread or universal doesn’t necessarily mean it confers an evolutionary edge.

In fact, the human penchant for drugs may be the accidental by-product of two completely different adaptive behaviors. This at least is the theory Steven Pinker proposes in *How the Mind Works*. He points out that evolution has endowed the human brain with two (formerly) unrelated faculties: its superior problem-solving abilities and an internal system of chemical rewards, such that when a person does something especially useful or heroic the brain is washed in chemicals that make it feel good. Bring the first of these faculties to bear on the second, and you wind up with a creature who has figured out how to use plants to artificially trip the brain’s reward system.

But doing so is not necessarily good for us. Ronald Siegel, the animal intoxication expert, has shown that animals who get high on plants tend to be more accident prone, more vulnerable to predators, and less likely to attend to their offspring. Intoxication is dangerous. But this only deepens the mystery: Why does the de-

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*Tobacco smoking and coffee drinking were taboo in the West before the Industrial Revolution. The German historian Wolfgang Schivelbusch suggests that the two drugs became socially acceptable because they aided in industrialization’s “reorientation of the human organism to the primacy of mental labor.”*
sire to alter consciousness remain powerful in the face of these perils? Or, put another way, why hasn’t this desire simply died out, a casualty of Darwinian competition: the survival of the soberest?

The Greeks understood that the answer to most either/or questions about intoxicants (and a great many other of life’s mysteries) is “Both.” Dionysus’s wine is both a scourge and a blessing. Used with care and in the proper context, many drug plants do confer advantages on the creatures that consume them—fiddling with one’s brain chemistry can be very useful indeed. The relief of pain, a blessing of many psychoactive plants, is only the most obvious example. Plant stimulants, such as coffee, coca, and khat, help people to concentrate and work. Amazonian tribes take specific drugs to help them hunt, enhancing their endurance, eyesight, and strength. There are psychoactive plants that uncork inhibitions, quicken the sex drive, muffle or fire aggression, and smooth the waters of social life. Still others relieve stress, help people sleep or stay awake, and allow them to withstand misery or boredom. All these plants are, at least potentially, mental tools; people who know how to use them properly may be able to cope with everyday life better than those who don’t.

These are the easy cases, though, the plants that merely inflect the prose of everyday life without rewriting it. “Transparent” is a term used to characterize drugs whose effects on consciousness are too subtle to interfere with one’s ability to get through the day and fulfill one’s obligations. Drugs such as coffee, tea, and tobacco in our culture, or coca and khat leaves in others, leave the user’s spacetime coordinates untouched. But what about the more powerful plants, the ones that do alter the experience of space and time in such a way as to take users out of everyday life—out of, even, themselves?

Cultures tend to be more wary of these plants, and for good reason: they pose a threat to the smooth workings of the social order. This may be why most complex, modern, secular societies have seen fit to forbid them. Even the cultures that endorse these plants cloak them in elaborate rules and rituals as a way of containing or disciplining their powers. So what are these powers, and what commends them—not only to adventurous individuals in all societies but, in some cases, to their societies as well? For many cultures have held these plants to be sacred.

No one has yet written the natural history of world religion, but we have some idea of the story such a book would tell. Among other things, it would force us to rethink the relation of matter and spirit—specifically, plant matter and human spirituality. For it would tell of how a select group of psychoactive plants and fungi (among them the peyote cactus, the *Amanita muscaria* and psilocybin mushrooms, the ergot fungus, the fermented grape, ayahuasca, and cannabis) were present at the creation of several of the world’s religions. One of the world’s earliest known religions was the cult of Soma, practiced by the ancient Indo-Europeans of central Asia; according to its sacred text, the Rig Veda, Soma was an intoxicant with the powers of a god. People worshiped the drug itself—which ethnobotanists now think was *Amanita muscaria*, the mushroom sometimes called fly agaric—as a path to divine knowledge.

Much the same process took place again and again over the ancient world as people experimented, individually and in groups, with the power of plants to transcend the here and now and induce ecstasy—to take them elsewhere. What these peoples discovered was that certain plants or fungi (ethnobotanists call them “entheogens,” meaning “the god within”) opened a door onto
another world. The images and words brought back from these journeys—visits with the souls of the dead and unborn, visions of the afterlife, answers to life's questions—were powerful enough to compel belief in a spirit world and, in some cases, to serve as the foundation of whole religions. Of course, plant drugs are not the only technologies of religious ecstasy; fasting, meditation, and hypnotic trances can achieve similar results. But often these techniques have been used to explore spiritual territory first blazed by the entheogens.

What a natural history of religion would show is that the human experience of the divine has deep roots in psychoactive plants and fungi. (Karl Marx may have gotten it backward when he called religion the opiate of the people.) This is not to diminish anyone's religious beliefs; to the contrary, that certain plants summon spiritual knowledge is precisely what many religious people have believed, and who's to say that belief is wrong? Psychoactive plants are bridges between the worlds of matter and spirit or, to update the vocabulary, chemistry and consciousness.

What a trick this is for a plant, to produce a chemical so mysterious in its effects on human consciousness that the plant itself becomes a sacrament, deserving of humankind's worshipful care and dissemination. Such was the fate of Amanita muscaria among the Indo-Europeans, peyote among the American Indians, cannabis among the Hindus, Scythians, and Thracians, wine among the Greeks* and early Christians.

In the same way the human desire for beauty and sweetness introduced into the world a new survival strategy for the plants that could gratify it, the human hunger for transcendence created new opportunities for another group of plants. No entheogenic plant or fungus ever set out to make molecules for the express purpose of inspiring visions in humans—combating pests is the far more likely motive. But the moment humans discovered what these molecules could do for them, this wholly inadvertent magic, the plants that made them suddenly had a brilliant new way to prosper. And from that moment on this is exactly what the plants with the strongest magic did.

Our desire for some form of transcendence of ordinary experience expresses itself not only in religion but in other endeavors as well, and these too have probably been more deeply influenced by psychoactive plants than we like to think. Who knows, we may need a natural history of literature and philosophy, or of discovery and invention, to go on the shelf with our natural history of religion. Or maybe what we need is just a single volume: a natural history of the imagination.

Somewhere in that volume we would surely find a chapter on the place of the opium poppy and cannabis in the romantic imagination. It's well known that many English romantic poets used opium, and several of the French romantics experimented with hashish soon after Napoleon's troops brought it back with them from Egypt. What's harder to know is precisely what role these psychoactive plants may have played in the revolution in human sensibility we call romanticism. The literary critic David Lenson, for one, believes it was crucial. He argues that Samuel Taylor Coleridge's notion of the imagination as a mental faculty that “dis-

*Judging from their descriptions of its effects, the Greeks probably fortified their wine with various psychoactive herbs; there's reason to think they also made religious use of ergot and Amanita muscaria.
solves, diffuses, dissipates, in order to re-create," an idea whose reverberations in Western culture haven’t yet been stilled, simply cannot be understood without reference to the change in consciousness wrought by opium.

“This notion of secondary or transforming imagination established a model of artistic creativity in the West that lasted from 1815 until the fall of Saigon,” Lenson writes. “It is predicated on annihilating what Keats called ‘weariness, fever and fret’ (the world of fixed, dead objects) by just the sort of ‘dissolution, diffusion and dissipation’ that [moves the artist] toward the realms of accident, improvisation, and the unconscious.” Not just romantic poetry, but modernism, surrealism, cubism, and jazz have all been nourished by Coleridge’s idea of the transforming imagination—and that idea in turn was nourished by a psychoactive plant.

“However criticism has tried to sanitize this process,” Lenson writes, “we have to face the fact that some of our canonical poets and theorists, when apparently talking about imagination, are really talking about getting high.”

Curiously, the romantics at first believed it was their philosophical rather than poetical faculties that drugs would enhance. Thomas De Quincey felt that opium would give a philosopher “an inner eye and power of intuition for the vision and mysteries of our human nature.” The nineteenth-century American writer Fitz Hugh Ludlow reported an important encounter with a philosopher of antiquity while under the spell of hashish. All of which makes me wonder: Is it possible that some of the philosophers of antiquity themselves had important encounters with magic plants?

“This, at least, was my first thought upon learning that many of the important thinkers of classical Greece (including Plato, Aristotle, Socrates, Aeschylus, and Euripides) had participated in the ‘Mysteries of Eleusis.” Nominally a harvest festival in honor of Demeter, the goddess of cultivated grains, the Mysteries were an ecstatic ritual during which participants consumed a powerful hallucinogenic potion. The precise recipe remains part of the mystery, but scholars speculate that the active ingredient was probably ergot, an alkaloid produced by a fungus (Claviceps purpurea) that infects cultivated grains and that closely resembles LSD in its chemical makeup and effects. Under the influence of this drug potion, the lights of classical civilization participated in a communal shamanic ritual of such mystery and transformative power that all who took part in it were sworn never to describe it. There is no way to know what, if anything, a philosopher or poet might have brought back from such a journey. But is it outlandish to ask whether such an experience might have helped inspire Plato’s supernatural metaphysics—the belief that everything in our world has its true or ideal form in a second world beyond the reach of our senses?

One of the things certain drugs do to our perceptions is to distance or estrange the objects around us, aestheticizing the most commonplace things until they appear as ideal versions of themselves. Under the spell of cannabis “every object stands more clearly for all of its class,” as David Lenson writes in On Drugs. “A cup ‘looks like’ the Platonic Idea of a cup, a landscape looks like a landscape painting, a hamburger stands for all the trillions of hamburgers ever served, and so forth.” A psychoactive plant can open a door onto a world of archetypal forms, or so they can appear. Whether or not such a plant or fungus did this for Plato himself is of course impossible to ascertain, and somehow impious

*Sadie Plant, another literary critic, has argued that Coleridge’s notion of the “suspension of disbelief” can also be traced to his use of opium.