GLOBAL

Making Perfume From the Rain

Indian villagers have found a way to bottle the fragrance of monsoons.

By Cynthia Barnett

Vivek Prakash/Reuters

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In India's state of Uttar Pradesh, the village of Kannauj lies a dusty four-hour drive east of the Taj Mahal, the white-marbled wonder built by the Mughal emperor Shah

Jahan in memory of his third and favorite wife. Empress Mumtaz Mahal died in 1631 giving birth to their 13th child. The Taj is Jahan's grand paean to lost love. But he also mourned his queen in much more personal ways. For one thing, Jahan never again wore perfume. Fragrant oils—known in India as *attars*—had been one of the couple's great shared passions.

Then and now, Kannauj was the place to fetch the fine scents—jasmine oils, rose waters, the roots of grasses called vetiver, with a bouquet cooling to the nose. Exactly when *attar*-making began there, no one is certain; archaeologists have unearthed clay distillation pots dating back thousands of years to the ancient Harappan civilization of the Indus Valley. But today, Kannauj is a hub of a historic perfumery that draws much of the town to the same pursuit. Most of the villagers there are connected to fragrance in one way or another—from sinewy craftsmen who steam petals over wood fires in hulking copper pots to mothers who roll incense sticks in the shade while their toddlers nap on colorful mats nearby.

Along with their ancient perfumery, the villagers of Kannauj have inherited a remarkable skill: They can capture the scent of rain.

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Every storm blows in on a scent, or leaves one behind. The metallic zing that can fill the air before a summer thunderstorm is from ozone, a molecule formed from the interaction of electrical discharges—in this case from lightning—with oxygen

molecules. Likewise, the familiar, musty odor that rises from streets and storm ponds during a deluge comes from a compound called geosmin. A byproduct of bacteria, geosmin is what gives beets their earthy flavor. Rain also picks up odors from the molecules it meets. So its essence can come off as differently as all the flowers on all the continents—rose-obvious, barely there like a carnation, fleeting as a whiff of orange blossom as your car speeds past the grove. It depends on the type of storm, the part of the world where it falls, and the subjective memory of the nose behind the sniff.

City rain smells of steaming asphalt, in contrast to the grassy sweetness of rain in the countryside. Ocean rain smells briny like Maine clam flats on a falling tide. In the desert of the southwestern United States, rare storms punch the atmosphere with creosote and sage. In the southeast, frequent squalls leave the damp freshness of a wet pine forest. “Clean but funky,” Thomas Wolfe called the exquisite scent of the American South.

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But nowhere is rain’s redolence more powerful than at the climatic extremes of the world—in India, Southeast Asia, West Africa, and parts of Australia—where great, dry swaths of desert are inundated with the most dramatic seasonal storms on Earth. In the otherwise dry places that depend on the downpours for most of their annual rainfall, monsoons shape everything from childhood to culture to commerce. And they arrive with a memory-searing scent. To Sanjiv Chopra, the Indian-American Harvard Medical School physician and author, the loamy smell of long-awaited rains soaking India’s dry soil is “the scent of life itself.” The earthy essence is strongest when

rain quenches dehydrated ground. The scent can so tantalize drought-stricken animals that it sets thirsting cattle walking in circles.

In the 1950s and 60s, a pair of Australian mineralogists, Isabel Joy Bear and Richard Grenfell Thomas, set out to discover the source of that piquant perfume. Ultimately, they linked the scent to organic compounds that build up in the atmosphere, including heady-smelling terpenes secreted by plants. The major components in turpentine and resin, terpenes also put the essence in essential oils. They are the freshness in pine, the cool in peppermint, the spice in ginger. Rocks and clay absorb terpenes and other molecules from the atmosphere like sponges, and during hot, dry stretches, desert-like places build up great stores of the compound. When the humidity shifts ahead of monsoons, moisture loosens the material from its rocky pores and sends its pungency adrift on the wind. The aroma is more powerful in the wake of drought because the essential oils have had more time to build in the layers of rock.

Publishing in the journal *Nature* in 1964, Bear and Thomas proposed a name for the scent brought on by rain. They called it "petrichor," a blend of the Greek words *petra,* rock, and *ikhor,* the blood of the gods in Greek mythology. But the scientists acknowledged that they were not the first to identify the stormy smell. They were not even the first to extract it. In fact, what they had dubbed petrichor was already a signature fragrance produced in Kannauj. Extracted from parched clay and distilled with ancient techniques, it is known as *mitti attar*—Earth's perfume.

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When I read the Australian scientists' paper, I doubted that Kannauj's villagers would still be crafting the rain perfume half a century later. But just in case, I tracked down Shakti Vinay Shulka, the director of India's Fragrance & Flavour Development Centre, a government agency that supports the local essential-oil industry. I was thrilled to learn that not only were the villagers still making the *mitti attar*, but I could see the process for myself if I could make it to Kannauj on the eve of the monsoons. After flying 8,000 miles to India and taking a train to rural north-central Uttar Pradesh, I found myself in an ancient city holding tightly to the past.

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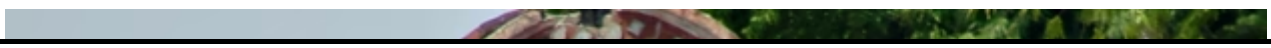
On its outskirts, fields planted with aromatic crops stretched for miles, interspersed with the chimneys of hundreds of small-scale brick kilns for which the region is also known. Like the *attars*, bricks are manufactured in Kannauj today like they were centuries ago—red-clay earth cut from topsoil, then stacked and fired by men whose fathers, grandfathers, and great-grandfathers cut, stacked, and fired bricks too.

In the crop rows, white jasmine flowers shaped like starfish bloomed in their ocean of waxy dark green. Twiggy trees called *gul-hina* were blooming too, their tiny flowers clustered into points of white flame. Ordinary on the tree, *gul-hina* leaves become the extraordinary henna that decorates women's hands and feet for special occasions, or tints dark hair a spicy red. The tree's flowers also make a delicate, sweet *attar*. It can take about 100 pounds of flower petals or herbs, infused into a pound of sandalwood oil—the ideal and purest base for essential oils—to make about one pound of pure *attar*. Extended families head out in the early mornings or cooler evenings to pick the fragile flowers. They pack their harvest in jute sacks, then rush, before the petals start to wilt, to one of two dozen steam distilleries in the town.

In modern times, Kannauj is also the name of a political district—a sprawling home to more than 1.5 million people. But the old city retains much of its aromatic history; an estimated 40,000 of its 70,000 residents are engaged in the fragrance industry in one way or another. When I arrived, I spotted small houses and perfume shops packed side-by-side on the streets. Colorful one-person Hindu temples were tucked here and there to honor gods. Cows wandered the road, and bicycles loaded perilously high with bundles of incense sticks wobbled by. Stretched across the main road, a brick archway announced the business of Kannauj in Hindi and Urdu: "Perfumes, Scented Tobaccos and Rose Waters."



Kannauj's brick archway, erected in 1944 (Cynthia Barnett)

Shukla, a man whom colleagues described as a supersmeller ("the nose of all noses," said one), served as my guide. He was trained in the European perfume industry and has been pained to watch his native country's *attar* industry lose market share to modernity. When India opened its economy to foreign trade in the early 1990s, brand-conscious young Indians began turning to French perfumes. For the past decade or so, the industry has survived in part on *attar*'s popularity as a fragrance for tobacco products. But with many Indian states calling for bans on the cancer-causing materials, reliance on this single market may not be possible in the future.

Beyond the archway and down a dirt road, we arrived at the home of the Siyaram family, who sell scented earth from a pit behind their house to local perfumers. Covered with rainwater during the monsoons, the pit had dried out in the pre-monsoon summer. The Siyarams—mother, father, and their grown children—used wooden sticks to break the parched earth, and water from a nearby pond drawn through a diesel pump to help them shape the earth into disks, which they then baked in a primitive kiln. Some of these disks, called *khapra*, ended up at a perfumer named Munna Lal Sons & Co., which we visited next after following narrow, winding roads back through the old city of Kannauj. There, I met the third-generation leader of the company, Akhilesh Pathak, and a member of the fourth generation—his daughter, Swapnil, a 24-year-old engineering graduate who grew up at boarding school and had just returned to Kannauj to learn the family's fragrant trade.

Each generation had built part of the eclectic complex where the extended family also lived in a row of well-appointed white houses. A content-looking herd of water buffalo lounged in the shade of a pair of massive Indian lilac trees that separated the homes from the perfume-making. Pathak told me his grandfather Munna Lal had made the rain fragrance ever since opening for business in 1911; Lal taught the techniques to Pathak's father, who taught them to him.

If Kannauj felt last-century, the distillery where the company brews its essential oils, including the rain fragrance, was more last-millennium. There was no artificial lighting, no industrial machinery, no trace of modernity. Through the roof and open sides, natural light streamed onto craftsmen tending fires under copper cauldrons, called *degs*, which poked up from long rows of brick stills like giant fossilized eggs.

The ancient, painstakingly slow distillation practiced in Kannauj is called *deg-bhapka*. Each still consisted of the copper *deg*—built atop its own oven and beside its own trough of water—and a bulbous condenser called a *bhapka* (receiver) that looked like a giant butternut squash. When a fresh supply of flowers comes in, the craftsmen put pounds of rose or jasmine or other petals into each *deg,* cover the *deg* with water, hammer a lid down on top, and seal it with mud. They light a wood or cow-dung fire underneath, then fill the receiver with sandalwood oil—which serves as a base for the

scents—and sink it into the trough. The *deg* and *bhapka* are connected with a hollow bamboo pipe that carries the fragrant vapors from the simmering pot into their sandalwood oil base.

The Munna Lal Sons & Co. perfumery in Kannauj (Cynthia Barnett)

Like the Siyaram and Pathak families, the distillery workers have inherited precise skills from fathers and grandfathers. They must closely monitor the fires so the heat under the cauldrons stays warm enough to evaporate the water inside to steam—but never so hot that it destroys the aroma. They must also keep the trough of water that holds the receiver cool enough for the vapors to turn back into a liquid, imbuing the sandalwood oil with their heady scent. Every few hours, they switch out the receiver,

cooling down the *deg* with wet cloths each time to stop the condensation. A typical 100-pound batch of petals takes six or seven hours to distill.

On the day I visited, though, the distillers were brewing the only *attar* that doesn't come from a plant, shoveling the Siyarams' clay disks into the copper pots before pouring in the water and hammering on the tops. It would take six to seven hours before all of the aroma steamed out of the clay. At that point, the men would drain the receivers from a hole in the bottom, siphoning off the water that had condensed in the vessel until only the rich, fragrant oil that had pooled on top remained.

The *mitti attar* is not finished until it is poured into a special leather bottle called a *kuppi* and sealed inside. *Attar* not stored in the *kuppi* "is essentially ruined," said Shukla, ever wary of modern manufacturing techniques, especially anything to do with plastic. "The moment you put it in the leather bottle is important, like the moment you put it on your skin. It allows the *attar* to release any remaining moisture and realize its true scent—in this case, the first rain on the ground."

Our last stop on the *mitti attar* trail was a retail perfumery owned by a three-thumbed shopkeeper named Raju Mehrotra. Also carrying on the business of his father and grandfather, Mehrotra sat at a soapstone counter, the metal shelves behind him jammed with glass bottles and tins of every size filled with oils and *attars* of every type: jasmine, champaca, rose, kewda, three kinds of lotus, ginger lily, gardenia, frangipani, lavender, rosemary, wintergreen, geranium, and many more I had never heard of.

The *mitti attar* was in an inch-tall glass bottle on the counter. I twisted off the little gold cap, closed my eyes, and breathed in the scent of the Indian rain. It smelled like the earth. It smelled like the parched clay doused with pond water in the Siyarams' backyard. The aroma was entirely different from the memory of rain I carried from my childhood and my part of the world—ozone-charged air, wet moss, Wolfe's "clean but funky" scent of the south. But it was entirely appealing: warm, organic, mineral-rich. It was the smell of waiting, paid off: 40 years or more for a sandalwood tree to grow its fragrant heartwood; four months of hot, dust-blown summer in northern India before the monsoons arrive in July; a day for terra-cotta to slow-fire in a kiln.

I asked Shukla, the supersmeller, to tell me what the scent brought to his mind. “It is the smell of India,” he said. “It reminds me of my country.”

This post has been adapted from Cynthia Barnett's book, Rain: A Natural and Cultural History.