THE POISON STREAM

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By Matt Power

The months leading up to the monsoon in Kerala are drawn-out, hot, and dusty; thirst seems to become the base condition of all living things. Menace permeates casual interactions; the bartering session for an auto ricksha or a bag of tomatoes is dreaded, seething. Stray dogs, their distended udders slack, lie as if melted next to their unconscious litters, the puppies too hot even to touch one another. Whole villages retract into the vast circles of shade cast by the absurdly pink-blossomed acacia trees, and young coconuts, hacked open with sickles and drained of milk, pile up like the severed heads of a vanquished army outside the chai stalls.

It is to this season that I arrive in Kasargod, the northernmost district of India's southwesternmost state, so close to the border with Karnataka that most of the residents speak a dialect of Kannada instead of Kerala's official Malayalam. It was a forty-eight-hour journey south from Delhi, through half a dozen climactic zones and a hundred languages. An old Muslim man, prostrate across the aisle, sent evening prayers west toward Mecca. By the grass shacks of Uttar Pradesh, handmade dung-cakes were stacked in geometric perfection, drying for fuel. In the Rajasthani desert, children brought lines of cattle home along dusty roads, and women balanced water pots on their heads as bright saris billowed behind them, their camels laden with watermelons. Everywhere games of cricket were improvised: an old tire for a wicket, a ball made of scrap cloth hit with a bat pried from a fence. From a platform in Agra, an ad promoting cell phones obscured the Taj Mahal.

From the open door of the train I had seen the vast *jugghis* that spread out from the cities: jerry-built shacks of hammered-flat oil barrels, tattered plastic tarps, salvaged mud-bricks, and liberated billboards advertising ThumsUp or Fair & Lovely, which occupy every available inch of space for miles along the tracks. On the station platforms, mothers with full-blown AIDS reached through the bars of the second-class carriages begging alms. Old men squatted, shitting by the tracks as the train racketed by. Children salvaged scrap aluminum and plastic mineral-water bottles from rivers of sewage. Here were formerly rural people who had fallen beneath the wheels of economic progress, shut out of the "Shining India" promised them in the government's advertisements. They had fled a host of plagues to come to the cities, where at least they would not starve.

The Kasargod station platform greets me like a blast furnace. A goat walking along between tracks stoops to eat a banana peel from a stream of raw sewage. A cow, splattered with the hot-pink dye that celebrates Holi, the Hindu festival of spring, stands nearby and slowly chews a cardboard box.

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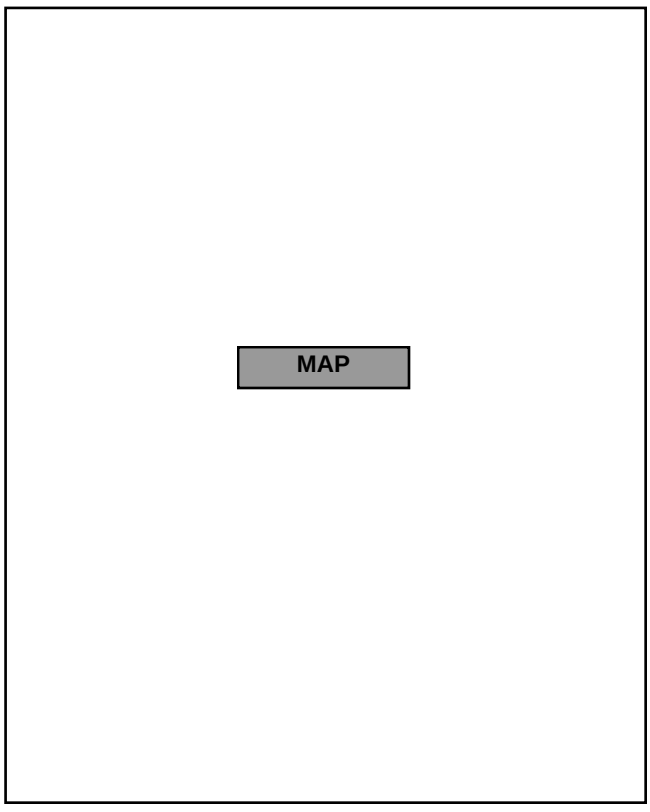
Even the red-shirted coolies, smoking *bidis* on a heap of onion sacks, do not jump up to offer their services. The English papers on the newsstand are full of weird, violent tales: opposition rioters in the state capital, Thiruvananthapuram, have firebombed twelve government vehicles; an entire family of elephants have been hit by a train and are to be cremated on the spot using a crude napalm of gasoline and sugar; five people were killed after drinking bootleg palm liquor spiked with pesticide. Five years of drought are followed by killing floods. Fifty perish in a bus "mishap." In a country that often seems constructed out of bizarre occurrences and unimaginable sorrows, it is difficult to shock the conscience. Many stories slip through the cracks. If I had happened to pick up a paper here in 1982, perhaps I would have come across the strange story that ultimately led to my journey twenty years later: CALVES BORN WITH WARPED LIMBS.

I have come 1,500 miles from Delhi to visit the tiny, remote hill village of Vaninagar, a place that has been devastated by a spate of mysterious illnesses over the last two decades: rare cancers, birth defects, mental retardation, miscarriages, suicides. Babies that were carried to term were sometimes born blind, or epileptic, or with deformed limbs. Children shriveled and died from leukemia, and old women were covered with lesions that wouldn't heal. In a culture bound by notions of karmic retribution, people naturally assumed it was a curse, that they had angered their *theyyams*, or guardian spirits.

The villagers, along with a growing number of scientists, doctors, and environmental groups, have blamed the 4,500-hectare state-owned cashew plantation, which for twenty years conducted aerial spraying of the organochlorine pesticide endosulfan over its cashew crops. The plantation borders dozens of villages and drains into the drinking water of thousands of rural people. The pesticide companies, the plantation management, and the state government have so far refused to accept any responsibility, and the matter has been swallowed up in India's infamous bureaucracy for more than two years. The argument over what has caused these diseases, and who is responsible, has divided Kerala politically and has pitted the purported economic interests of the state's corporations against the health of the state's citizens.

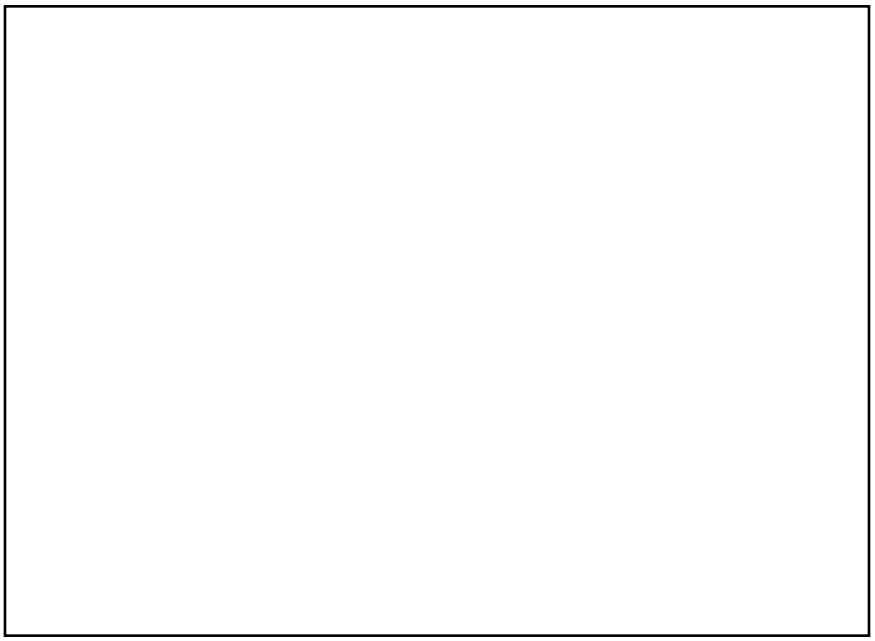
India exists in many centuries simultaneously. The glittering software capital of Bangalore is ringed with medieval slums, and blind beggars bearing smallpox scars seek alms next to Bollywood film shoots. India is home to the largest slums in Asia, and by some estimates 100 million people have been displaced by drought, hydroelectric schemes, deforestation, and sectarian violence since Independence. The vast outpouring of relief following the death of 20,000 in an earthquake in Gujarat in 2001 was followed a year later in the same state by the mass slaughter of Muslims in pogroms tacitly encouraged by the government. In Bihar "witches" are still burned to death, and Rajasthani farmers starve on grass seed, while behind barbed wire the Food Corporation of India's godowns are bursting with 60 million tons of surplus grain.



At the station I am met by my friend Vinod, a journalist and native Keralite who has agreed to serve as a translator and guide into the hill country east of here. We negotiate a driver and Ambassador car, the ubiquitous Indian remake of a 1954 British Morris. I feel a bit like a holdover from the Raj, a mid-level bureaucrat come to inspect the coconut plantation. On the dashboard is a plastic shrine to Kali-Ma, the black goddess, tongue stuck out, wearing a necklace of severed heads. When the brakes are applied, her eyes light up red. Vinod chatters away with the driver in Malayalam, a language so rounded and elided as to sound, to a foreign ear, like the same word repeated over and over again. I watch out the window as we wind up into the hills, the temperature easing slightly from the oppressiveness of the narrow coastal plain. The parched red earth along the roadside shows the warp of the last monsoon, weathered and smooth as scar tissue.

The state of Kerala runs like a long, green snake between the cool heights of the Western Ghats and the depths of the Lakshadweep Sea on India's southwest coast. Its peculiar geography, blocked by the spine of the mountains from India's central plains and exposed to the sea along a 500-mile coastline, has set it apart from the rest of the subcontinent for millennia. Kerala was a trading stop for the Phoenicians when Bombay and Calcutta were mere fishing villages. Pepper and ivory arrived in ancient Rome via its shores. It was the point from which Chinese ideas and goods first spread west and marked landfall for Da Gama's opening of south Asia to almost five centuries of European control. Cardamom, ginger, turmeric,

pepper—all brought trade here from far-off empires, which in turn introduced coffee, rubber, cocoa. And cashew. The lateritic, semiarid hills of northern Kerala are one of the best cashew-growing areas in the world.



Kerala's unique culture and its isolation have led to some striking social and political developments. Poverty is low and the literacy rate is 90 percent. In 1957 it voted in the world's first freely elected communist government. Political activism continues, and the state is frequently disrupted by general strikes, called *hartals*, led by whichever party happens to be in opposition. Now Kerala's chief industry is tourism. "God's Own Country" tout the brochures, luring Israeli backpackers and British package-tourists to the hypnotically swaying palm trees of its beaches. But there is a dark aspect, evident not only in the political violence that erupts periodically across the state but in the institutionalized corruption that governs almost every official interaction, from traffic tickets to the registration and use of pesticides.

We stop at a chai shop an hour up into the hills, a wooden shack with a broken table and a few wobbly benches. A group of local men stare as we walk in and order tea and kesari, a sweet, primary-yellow wheat pudding. A cricket game blares on a transistor radio, and I stare at Technicolor posters of Shiva and the romance of Krishna and Radha. The proprietor chats to Vinod while performing acrobatic stunts with the chai, pouring it from one container to another at full arm's length to cool it off. He tips his head toward me, asks a question. In the flow of their conversation, which has shifted to the equally unintelligible Kannada, a word I recognize pops up: endosulfan. The man quickly pours the tea, glaring at me, and turns to the other customers. Vinod just smiles and blows on his chai.

The ancient gearbox of the Ambassador protests on the rockier sections of the rutted dirt road. We pass through plantations of tall, thin areca palms, from which the dark red betel nut chewed in the mildly narcotic *paan* is harvested. To harvest areca the pickers will bind their feet with a loop of cloth called a *thorth*, pressing their soles against the slim trunk as they inch forty feet into the air. They keep a sprig of *thulasi*, a sacred native medicinal plant, pressed behind their ears to maintain balance. Having cut all the areca from a given tree, they shift their weight and bend the entire palm over until they can grab on to the next one, working their way down the rows without returning to the ground.

I get my first glimpse of a ripe, lipstick-red bunch of cashews hanging directly over the road, the gray seed pods hanging disembodied, like question marks, below the bulging, vaguely obscene fruit. An old woman, stooped below a huge load of firewood, stops without straightening or looking as we pass. Glancing back, I see her head tilt to the side, and a bloodred gout of *paan* spit arcs into the red dust. We pull up to the low, tree-shaded house of Sree Padre, a local farmer and activist who was one of the first to bring attention to the strange illnesses in the district. As we walk up to the shade of the porch, the stout, mustachioed Padre comes outside and extends his hand. "I got your message," he says, smiling. "I was hoping you wouldn't come."

We sit on the porch, and Padre serves us a plate of *kokum*, a fruit endemic to southwestern India that I've never seen before. It has a thick peel, which stains the fingers an indelible magenta, and inside segments of intensely tart white pulp surround large seeds. In the sun-scorched courtyard, spread-out piles of cashew, areca, and turmeric cure. I ask about the maladies that have been affecting the locals.

The first clues came in the early 1980s. Some calves in a nearby village were born with deformed limbs. Most died quickly, but one survived, and Padre wrote an article about it for a local newspaper. Other effects were slow to manifest themselves: fish, frogs, insects, honeybees, even crows vanished from the area. Then people came down with strange illnesses: warped limbs, weeping sores, cancer. The locals thought only that they were cursed, that Jatadhari, a regional deity, had been displeased with their worship. Witch doctors were hired to perform ritual purifications by many villagers with diseased children.

Padre suspected some sort of chemical poisoning, but it took years to connect the dots: the cows had grazed in the cashew plantation, and drank out of the stream below it. For more than twenty years the Plantation Corporation of Kerala had used helicopters to spray endosulfan, two or three times a season. The cashew orchards were mostly on the hilltops, and the land was so undulating that the helicopters sprayed from far too high, causing a drift of pesticide that reached far beyond the plantation's boundaries. Five

thousand people live within a stone's throw of the plantation. Disease reports have come in from twenty villages, with the majority of the victims under twenty-five. "No one knows how many have died," Padre says.

In the late 1990s, Padre and the only local doctor, Mohan Kumar, began getting a clear picture of the health catastrophe that was visiting the region, and focused on endosulfan as the probable cause. When they made enough noise about the spraying in the local press, and pictures of deformed children were broadcast across the country, the slow beast of government was stirred into action. After a great deal of legal wrangling, a hold was placed on aerial spraying. Today the pesticide has been temporarily banned by Kerala's High Court, pending the release of a governmental committee's decision on its health risks. India's $850-million-a-year pesticide industry has taken great interest in the verdict.

Endosulfan is most dangerous to agricultural workers who have direct contact with it, and in the United States the Environmental Protection Agency mandates extensive protective measures: respirators, goggles, the covering of all exposed skin. In India, as with most of the developing world, such measures are almost never put into practice. As Sathish Chandra Nair, an Indian ecologist I spoke to, put it: "If you want to make a horror movie, some sort of Frankenstein or Hitchcock, come spend a few hours in Kerala. That emulsion from the spray coming down, people collecting in the evening water from the stream, carrying it home, cooking with it, bathing their babies, and using it for every domestic job. Nobody reads the skull and crossbones on the label, in five languages."

It is a tragedy that is played out in the remotest corners of the developing world, where many of the trappings of Western luxury are grown. From the flower fields of Colombia to the cocoa plantations of Ivory Coast, traditional rural populations are coming into conflict with a host of organic molecules promoted for the betterment of humanity, and the double helix wound between progress and tradition is undergoing nightmarish mutations. The World Health Organization estimates that 3 million people a year, largely in the agricultural Third World, suffer the effects of pesticide poisoning, and that it causes 220,000 deaths. Two boys in South Africa died last year after touching goats that had been treated with endosulfan; a few years ago there were thirty-seven deaths recorded in Benin among farmers who used the pesticide on their crops with no protection. Vaninagar is just one of a thousand villages around the world haunted by the specter of slow poisoning, what came to be known among Indian environmentalists as "Silent Bhopals."*

In a show of bureaucratic force, the central government has sent eight committees to the area to assess the situation in Kasargod. Now Padre is weary of seeing no lasting results, weary of people coming and leaving without doing anything to help. The web of government interests in the matter is almost impossible to unravel: endosulfan's largest manufacturer, Hindustan Insecticides, Ltd., is owned by the government. The government's Central Insecticides Board is in charge of registering and approving all pesticides. The state-owned Plantation Corporation of Kerala conducted the spraying. An "expert committee" has been formed by the government to put a final verdict on endosulfan, but its capacity for objectivity has been met with deep skepticism by locals.

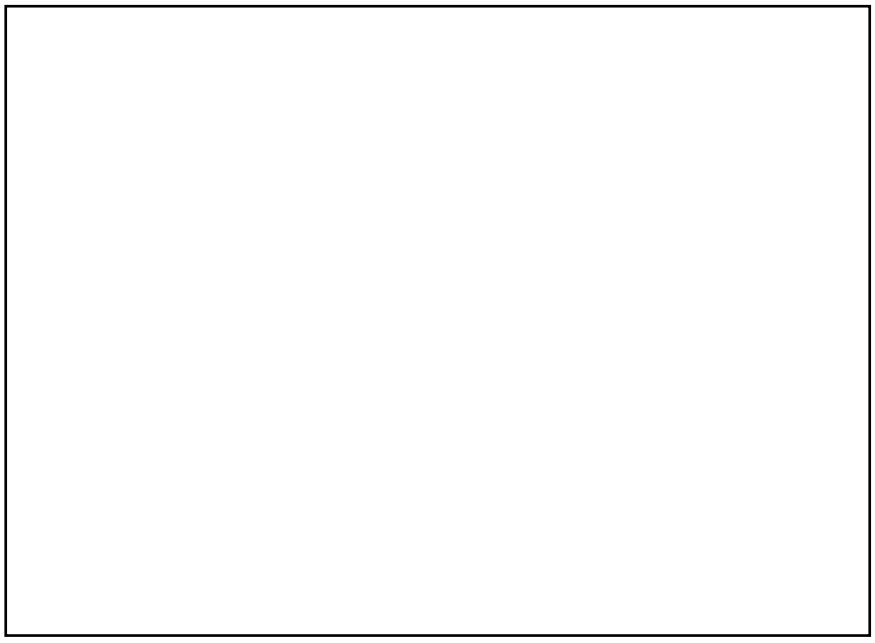
One of the few independent organizations to study the issue, a New Delhi–based NGO, the Centre for Science and Environment, visited the foothills in January 2001. They collected dozens of samples including well water, soil, cow's milk, and human blood, and tested them for the presence of endosulfan residues. What they found were levels in water 50 times the MRL (maximum safe residue limit, set by the U.S. EPA), levels in soil 390 times the MRL, and levels in human blood (for which there is no MRL) up to 900 times the MRL for water. "The values were alarming," said a CSE researcher at the time. "It can hardly be doubted that this has something to do with the high incidence of disorders of the central nervous system in the village." To all appearances, this was the smoking gun: if not direct proof, then a clear indication of the cause of the health catastrophe visiting the plantation's surrounding areas.

Dr. O. P. Dubey, assistant director general of the Indian Council on Agricultural Research and a member of the Central Insecticides Board, heads the committee that will decide the fate of endosulfan. Dr. Dubey, in his cluttered office in a warren of hallways in one of the countless ministry buildings in New Delhi, derides the CSE study as flawed. "I think the CSE's results are wrong, totally wrong. You have to prove a link, and no link has been proven. The cases there reflect a political agenda, nothing else. This Kumar and Padre, they want charity, that's why they make an issue of this. Padre, with his rosy cheeks, looks as healthy as an American." Despite being appointed head of a committee to evaluate the safety of a pesticide he himself has approved and promoted, Dubey does not perceive a conflict of interest. It is a healthy sign of bureaucratic transparency. When asked for an alternative theory of the illnesses in Vaninagar, he shrugs. "I think it is because these people are not taking nutritious food." This is a retreat from his earlier claim, widely reported in the Indian press, that the cause of the diseases in Kasargod district was inbreeding and the chewing of betel nut.

Dubey is fond of metaphors and uses them vigorously to defend the

* *The train had pulled me through there, too. The platform of Bhopal station at 4 A.M. swirled with ghosts like the rush of air before an oncoming train. It was just after midnight, December 13, 1984, when an explosion at a Union Carbide pesticide plant adjacent to the station sent a cloud of vaporized methyl isocyanate, heavier than air, billowing across this very platform. Hundreds died within the station, hundreds more on an express that had pulled in to meet the cloud. Rescuers found them piled like trees felled by a hurricane: porters splayed amid mounds of luggage, chai boys next to spilled tiffins, a still-living infant suckling at its dead mother's breast. Fifteen thousand were left dead, half a million blind, mad, crippled. It was biblical; the angel of death on pesach, but there was no way to signal one's right to be spared. The lives lost and ruined at Bhopal were casualties in the inexorable march of progress that would bring India kicking into modernity.*

use of pesticides. "It is like if a train wrecks, you are compensated, people with broken limbs go to hospital, we take corrective measures. Do we stop the train running?" When it is pointed out that his committee will appear to undo "corrective measures" by recommending the endosulfan ban be lifted, he tries another metaphor. "Think of it like aspirin. Aspirin you take for a headache. If you take ten tablets, you will collapse." As Dubey sees it, it is a simple calculus: 35 percent of crop loss is due to pests. Without chemicals, India would be unable to feed itself. India is home to more than a billion people, a vast number of whom live on less than a dollar a day, and 700 million of them depend on agriculture to survive. When he released his report in August, he recommended that endosulfan be exonerated.



Endosulfan is a neurotoxin developed in the 1950s by the German chemical giant Hoechst. It is used in the Third World as a cheap replacement for persistent organic pollutants like DDT, Heptachlor, and Dieldrin, which are widely banned. Endosulfan itself is banned or severely restricted in some thirty-one countries, from environmental progressives such as Germany, the U.K., the Netherlands, and Sweden to developing tropical countries like Belize, Sri Lanka, Colombia, and Cambodia. The EPA classifies it as highly hazardous, due to its acute toxicity. The chemical absorbs easily through the skin, lungs, and stomach, and studies have shown that long-term exposure, even at low levels, causes damage particularly to the central nervous system, kidneys, liver, and the developing fetus. It is also suspected to be an endocrine disrupter, a molecule that by its shape mimics estrogen in the body, bringing with it a host of reproductive problems, from sterility and infertility to testicular and prostate cancer.

From the window of the Ambassador I see the village of Vaninagar spread out beneath in a bowl of red earth. The low hills wallow to the horizon, a dusty green and undulating topography. Our driver pulls up in front of a low wooden shed, screened off in the front. A hand-painted white sign with a red cross advertises Y. Mohana Kumar, M.D. The doctor is in, attending a child, so we sit in folding chairs by the doorway. His patient is a tiny girl, perhaps five, with dark eyes. She has a wool hat on, despite the heat. Kumar listens to the child's breathing through a stethoscope, his hand spanning the width of her shoulder blades as the other presses the resonator to her chest. Everything is still for several seconds, only the faint whir of the ceiling fan and the distant pulse of insects. The doctor says a few words to the father in Tulu, a local dialect, and he takes the girl's hand as they walk off. "*Thulasi* and honey, I recommended. Excellent for colds."

He sits at his desk, which is cluttered with handwritten patients' records and medical books. Behind him is a glass cabinet of prescription medicines, and a refrigerator stocked with antibiotics and insulin hums next to it. Kumar is handsome, with a neatly trimmed mustache and a weary grin. "Three years of stress has done this," he says, tousling his graying hair. I ask him about his practice. Out of a village of 4,000, he knows perhaps half by name. He is the first doctor ever to have been born and raised in this village, and certainly no one is as familiar with the locals. While we talk a woman comes in. She has a worried, sun-creased face and speaks to him in hushed tones. He opens the cabinet, pulls out a bottle of pills, and drops a few into a piece of newspaper, which he folds into a neat packet. She hands him a weathered 10-rupee note from a fold in her sari. She leaves, and Kumar turns to me. "Her son has epilepsy and cerebral palsy. She comes in for pills when his condition deteriorates."

It is a scene that repeats itself throughout the afternoon: villager after villager comes to the doctor's screen door displaying a catalogue of afflictions. A woman with precancerous lesions in her mouth, a mother who has two sons with mental retardation, a man with skin cancer. A pretty young woman comes in and talks to the doctor, leaves without meeting my eyes. "Issueless," he says, wobbling his head in the Indian fashion, which can mean almost anything. In this case, Kumar means she has been married a decade and has no children.

Dr. Kumar began to notice disease rates climbing in the village more than a decade ago, especially among villagers living along two streams that run through the area, the Kodenkiri and the Swarga. Swarga means "heaven" in Kannada. The streams are the lifelines of the village. People drink, bathe, and use them for cooking. In many parts of the hill country, they are the only available source of water. Unable to fly at the prescribed 2-me-

ter height above the trees, the helicopters had sprayed from much higher, and the endosulfan settled across a wide, populated area. "The law states that before aerial spraying, the PCK must cover all water sources that can be affected by the pesticide drift. You tell me," Kumar demanded, "how can you cover a stream?"

The remoteness of the area has stymied any comprehensive gathering of population and health statistics. "Nobody has done proper research, these people are spread out all over the countryside, there's no census, people don't know someone a mile away," he tells me. People in the countryside build funeral pyres for their dead on their own land. Some lives, particularly miscarriages, are never accounted for. As the only doctor in the village, he was in the best, perhaps the only, position to observe and catalogue the maladies that had descended upon the population. There were multiple cases of cancer, retardation, epilepsy, and birth defects. A six-year-old died of blood cancer. Kumar holds his hands out, as if describing the swell of a pregnant woman's belly, to show how a fifty-year-old teacher in the village had been bloated before he died of liver cancer a few months earlier.

Miscarriage and infertility are rife, which in a village culture that values women foremost as procreators can mean ostracism of the victims and isolation of the village by unafflicted communities. They are afraid more than anything that it will create "matrimonial problems," as Kumar puts it, a curse whose social impact cannot be overstated in India, where 98 percent of marriages are still arranged. A woman even thought to be infertile is unmarriageable. Even though dowry is proscribed by law, any health problem in a woman will make her family unable to afford a groom's demands. Depression and suicide have also been epidemic. Kumar had tracked at least nine suicides in the village in the past several years and suspects that clinical depression is another unstudied side effect of chronic exposure to endosulfan. I ask him what the most common means of committing suicide is in his experience. "Hanging, most often. After that, drinking the pesticide itself. It's cheap and widely available."

The villagers, he says, are more terrified of the stigma of disease than of the disease itself, deeply wary of outsiders, suspicious of anyone from the government. "They have stopped the spraying, at least temporarily, but even today they will not admit that the endosulfan caused this. They say it is from eating areca. Can you imagine? Children and pregnant women eating areca nut? They say that endosulfan is safe under laboratory conditions. But it is not used in labs; it is used in fields."

Tests of long-term endosulfan exposure on rats have shown a wide array of physiological aftereffects, from reproductive damage and abnormal bone development to mutagenicity (a permanent change in genetic structure that can cause cancer and developmental disorders in subsequent generations). Mortality rates were so high in testing to determine whether it was a carcinogen that they proved inconclusive. That is, endosulfan is so toxic that it killed the rats outright before it could give them cancer. The EPA's reregistration documents, while approving the continued use of the pesticide in the United States, recommended a host of studies to determine the long-term effects of endosulfan exposure and outlined the degree to which many of these effects remain unknown.

The EPA's position highlights one of the fundamental flaws in the laboratory testing process that leads to the registration of toxic chemicals. The exposure studies done on rats were conducted over two years. The exposure at Vaninagar was over a period of decades, with unmeasurable dosages administered to unquantified people. It is a Sisyphean task even to gather census data, let alone meaningful health statistics in rural India. And the conditions under which a chemical is deemed safe in the lab often don't apply in the field. Interaction with other chemicals is not measured. Under laboratory conditions, a molecule of endosulfan has a half-life in water of one week. But in the earth, bound to soil particles, or held anaerobically in the rot of leaf litter in a streambed, unable to oxidize, it can last for years.

The government owns the cashew plantation and Hindustan Insecticides Limited, and controls all regulatory bodies for both industries. The PCK and HIL were both criticized last fall in a Greenpeace report on global toxic hot spots, but as far as Kumar can see, whether due to outright corruption or bureaucratic ineptitude, they will never admit that endosulfan has caused all these diseases. And they will never compensate the victims.

"Not that anything could really help," he adds. "For most, the damage is done."

He hands over a packet of photographs. Snapshot after snapshot of children with congenital abnormalities: a hand with fingers the size of pencil erasers, a young girl with a leg drawn up and twisted like a chicken's wing, a retarded boy propped against his mother, a boy with leukemia lying prostrate and withered on a bed. The worst is of a hydrocephalic infant girl, wailing, her hands clenched into fists. The head is enormous, larger than the rest of the body, inflated like a balloon about to burst. Flies crawl in the squeezed-shut corners of her eyes. "She lived for six weeks," says Kumar, shaking his head.

India is a country where the absence of a social safety net is so total that for millions of the chronically ill or physically handicapped begging is the only means of survival, and they must promote themselves in the cities like freelance circus freaks. Nowhere is this phenomenon more striking than in Bombay, along the causeway to Haji Ali's tomb. The tomb is built several hundred yards out into the Arabian Sea, and along the paved stone jetty that reaches it lies an encyclopedia of medical horrors. Leprous stumps of hands, elephantiasis, smallpox blindness, flippers for arms, polio victims with legs like broom handles, tertiary syphilis, gigantism, goiters like tire tubes, cretinism, chemical burns. A young man smokes a cigarette casually, and through a silver-dollar-size hole in his ribcage a purplish lung is visible, pulsing behind the fogged window of his pleura. A young boy holds out his hands, chanting in English, "One rupee, one chapati, one chocolate. No mammi, no pappi." He has a black hole surrounded by pink scar tissue where his left ear was. A child muti-

lated in this way by his own parents functions as a retirement plan. All have laid before them a scattering of 5-paise coins, a thousand to the dollar, tossed as Zakat by the Muslims returning from evening prayers.

Outside Kumar's office a group of schoolboys have abandoned their cricket match to examine the curiosity of my presence. They stand in a clutch, dust covered, staring, and, as is customary in India, send forth an emissary who is to report back to the group. The boys all wear *lunghis* and collared shirts, a strange combination of Indian peasant and British public-school lad. Vinod talks to one, and he turns and reports back. Peppered in a slew of Kannada, I hear again, endosulfan, endosulfan. The boys repeat to one another, endosulfan, endosulfan. It is a visitation by the outside world, which has never taken any interest in Vaninagar until the great misfortune of its slow poisoning. Endosulfan is the name of a new deity, which, whether or not it is guilty of visiting a plague upon this village, has become for them the incarnation of the modern age, and of the unfathomable mysteries of chemistry and economics that have forever altered rural life in India. And I, as an outsider, am its avatar.

We walk down the hill, led by the group of boys. The village is quiet in the late afternoon, dusty men heading home from the brick quarry, women carrying water up from the valley bottom in metal cans. Everyone stares as I walk past, trailing a swarm of ragged boys. Along the steep path, I stop to look at a cashew apple dangling over the trail. The fruit is yellow, swollen, and the nut hangs beneath it like a strange organ, or an eight-week-old fetus. I reach out and heft it, prompting one of the boys to push my hand away. It is swarming with a beneficial species of ants that according to Padre had been wiped out during the spraying. It occurs to me that India hangs just as tenuously from the vast bough of Asia, like a fruit to which a sixth of humanity clings.

Down a steep ravine, we arrive at a smooth, dry cow-dung patio where areca and pepper are spread out to dry. An ancient woman crouches on the ground, a sickle clenched beneath her splayed toes. She draws sections of dried areca leaf across the blade, slicing them up for fodder, and does not look up once. Thanoji Appe steps out from the low, thatch-roofed house to meet us. He wears a *lunghi* and a checked shirt, smiles warmly with missing teeth. The woman, his grandmother, is ninety-eight years old. She was born here, on this same land, a few years after the death of Queen Victoria. As I talk to Appe, she continues her work, and the pile of areca strips grows beside her. Pepper, areca, and cashew dry on the smooth cow-dung-and-clay courtyard.

Behind him, through the wooden slats of the front porch, a little girl, almond-shaped eyes bright and curious, stares out at me. Her name is Sruthi, and he calls to her, tells her to come outside and say hello. She steps out shyly from the shaded porch into the afternoon sun, revealing a prosthetic leg below her school uniform, and musters all her grace to come down the steps to the courtyard. The knee is a steel hinge, the calf plastic, and the foot a brown rubber, scuffed from barefoot walking around the red-dirt paths of the village. Around the rubber ankle is a silver bangle to match the one on her other foot, and, smiling, she sits down next to us, folding her metal knee with a child's studied elegance. Her hands are like the antlers of a deer, bifurcated above the wrist into two branches, each branch with two fingers. They are shaped as popular imagination draws the hands of aliens, mutated yet somehow intelligent, capable. She sits singing quietly to herself as I talk to her father through Vinod. They speak Kannada, though Vinod is a Malayalam speaker and Appe's native language is Tulu, a regional dialect that has no written expression.

Through layers of language, Appe relates a catalogue of the sorrows his family has endured. He remembers the spraying, the helicopter passing right over the house, and the choking, headaches, and itching that followed for days after. They didn't know what the spray was. The Malayalam word for pesticide, *marunnu*, means medicine. That was all the explanation they were offered. It was medicine for the cashew trees. When Sruthi was born she had an atrophied, warped leg corkscrewed like a polio victim's. The doctor had shown me a faded news clipping. Her father, before the operation, had carried her 200 yards up the hill to school every day. The 80,000-rupee operation (an amount few families make in two years) had been financed by donations from the community and a group of German documentarians who had visited the village the previous year. Now she could walk alone, was an ace student, loved school. When she was young, there was no question of an operation: her mother had stomach cancer, and her radiation treatments in Mangalore used up all the family's resources. It wasn't until she died four years ago that treatment for the girl could be considered.

Appe works as a day laborer in the plantations and farms around the village. The going rate for an eight-hour day harvesting areca or pepper, with lunch included, is about 60 rupees. It is lucky to be paid that much for a day's work, he says. They live with his new wife and their baby, who crawls around naked on the dirt, laughing, with a silver chain around his waist. The sun sinks, a dusty orange light suffuses the forest. Sruthi's stepmother carries a pail to the cow stall, and the light of a hurricane lamp casts through the slats and falls across the courtyard. It is so still I can hear jets of milk echo in the hollow of the pail like a pulse of blood into the chamber of a heart.

Thanoji Appe has a sorrow in his eyes, red from work. He does not want to be sad, he whispers, that she is a girl-child, that she won't be able to be married off. When her mother was sick they prayed to Jatadhari, offered money at the temple. Sruthi swings her leg, sings. She'll need a new leg when she grows, her father says. I ask her a few questions. She loves Kannada, loves playing *jibly*, a local variant of hopscotch. Loves peacocks and elephants. She wasn't afraid when she went to get her leg cut off. "She was asking when it would be for months," her father says. I want to ask about her mother, if she remembers her, if she was big enough to put a stick of sandalwood in her pyre. If she is angry

that she was born like this, that she was dealt such a blow from the start. But she is happy, smiles brightly, and I won't ask anything to shake her out of it. What's the use? Vinod and I walk back up in the dark under the heady scent of the overhanging man goes, through the lamplit village to the waiting car.

Vaninagar is not the only affected area. Kumar and Padre estimate that perhaps a thousand people who live near the vast and fragmented plantation have been exposed to endosulfan. A few days later, we visit another side of the plantation, where several families of Adivasis live. These are the original inhabitants of south India, tribal forest dwellers who have been systematically relieved of their lands over the last two centuries. They are *ati sudra*, below the untouchable castes, at the bottom of the ladder by every standard. As we pull up, a group of small, intensely dark boys are playing cricket with a hand-carved bat and a coconut. The wicket is a tipped-over wheelbarrow. Seeing us, they drop their game and run off toward a low, mud-brick house. The area is flat and completely surrounded by the cashew trees of the Plantation Corporation of Kerala. A boy puts on his shirt and runs from the water pump, where a trickle peters out into a dark spot on the ground. We walk to their hut, built of bricks quarried on the site, which makes it appear like a natural extension of the red earth, thatched with palm fronds. A bright green banana plant splits the red soil. A group of men stand around with sickles tucked into their *lunghis*, arms crossed, skin almost black from the sun. On the shaded porch, a woman holds a baby wrapped up in a cloth. Vinod talks to her, talks to the men. They had thought I was a doctor. They are Mavilans, worshipers of Karinjamundi, the black fertility goddess. Their presence predates the arrival of Hinduism here by millennia. The children have never seen a white person before.

The mother's name is Sharada, and the fat little baby is named Anju. Her eyes are wide and black, emphasized by the lining of dark kohl her mother has drawn under them. Sharada moves aside the cloth covering the baby's lower half and reveals her secret. Dangling between Anju's legs, like a horrible ripe fruit, is the baby's bladder. She was born with it on the outside. A series of eight operations, none of which the family can afford or the government is willing to pay for, are necessary if the child is to survive. They remember the bad air from the helicopters, have been told that the cause might be the "medicine" that the PCK sprayed on the cashews. But the PCK had sent men to tell them that their baby's disease, and the mentally retarded infant in the house next door, were not caused by endosulfan. The swollen sun drops through the cashew trees. Some have faintly aromatic blossoms just beginning to wilt, some have fruit already swelling, strangely lobed, almost sexual in color and shape. They are sorry they have no chairs for us. I say it is no trouble. The guest is a god, they tell Vinod.

Mr. Pradeep Dave, president of the Pesticide Manufacturers and Formulators Association of India, shares Dr. Dubey's views on pesticides. He offers a number of novel theories. First, that the diseases in Kasargod are in fact caused by radioactive minerals that are naturally in the soil there, and from uranium and thorium mining that has gone on nearby. Second, that this radiation poisoning is compounded by intermarriage. Third, that the NGOs that are campaigning against certain pesticides are in fact being sponsored by rival pesticide manufacturers to surreptitiously promote their product. Pesticides are profoundly good, he insists, citing the millions saved in the Second World War by DDT's eradication of the Anopheles mosquito, and the fact that despite five years of drought there are 60 million tons of surplus grain in India. His metaphors are strikingly similar to Dubey's, as though they have debriefed each other: "Some farmers are using too much pesticide. It is like eating too much, or like a medicine that you take too much of. Maybe the doctor says take one tablet, and you take more and more, and instead of making you better it makes you sick." The demonization of endosulfan is just greed, Dave insists. "Fifty million liters of endosulfan are used in India every year. Why is this one village complaining? We will fight to protect our molecules. They are our babies."

In Badiadika, the nearest town of any size, we stop for lunch at a chai stall, a mountain of rice and white-hot curry served on a banana leaf. I sip chai, soaked in sweat even in the acacia shade, watching the circus of Keralite street life: near collisions of three-wheeled auto rickshas, bright orange trucks decorated with mirrors and Christmas lights like rolling shrines, magicians waving drug-addled cobras at their marks, elephants hauling logs, a fistfight as sudden as a cloudburst, chattering monkeys fleeing from lathi-wielding policemen. Cyclones of dust and newspaper eddy behind passing buses. Vinod disappears after lunch for half an hour, then returns, excitedly slamming a newspaper-wrapped parcel on the table.

"There is your endosulfan!" he cries, terribly pleased with himself. I unwrap the paper and look at a 100-ml bottle marked POISON in block letters. Vinod had bought it at a local farm-supply store, where the owner keeps it in the back, out of sight, because of the environmentalists and journalists. DDT was also available.

When Vinod asked if the endosulfan was dangerous, the man had said, "Don't worry, just get your workers to mix it for you."

The black market for banned pesticides in India is not measurable, but anecdotal evidence (and Vinod's foray to the farm-supply store) suggests that DDT is as easy to procure as powdered milk. "There are lots of laws in India," Vinod says, "but very little enforcement." Vast quantities are produced and supposedly severely regulated, only to be used in limited circumstances to control disease vectors. When a pneumonic-plague outbreak occurred in Gujarat in 1994, tons of DDT were shipped to control the rat flea that spread the disease. After the epidemic was brought under control, many of those stocks were sold on the black market, often repackaged as ant killer, if they were labeled at all. With endosulfan, the black market is even simpler; since it is banned only in Kerala, sell-

ers easily can procure it in other states.

I stare at the bottle. I have no idea what to do with it.

The Plantation Corporation of Kerala's Cashew Project is a massive shed in the middle of a sun-blasted, grassless expanse at the edge of the cashew groves. Men in *lunghis* hang around in the shade, boiling chai over a portable gas stove. They grumble that they have not been paid in four months, despite the fact that the plantation is supposedly turning a profit. They take Vinod and me for agricultural grad students, though we do not offer this information. More chai, and Mr. Roguthaman, the plantation administrator, happily launches into a lengthy discourse in Malayalam about the minutiae of plantation economics: hectares of trees planted, profits realized, laborers employed, the commodity rate per kilo of cashew, and crop losses from the twin scourges of stem borers and tea mosquitoes, the latter of which endosulfan is meant to eradicate. It seems that despite the moratorium on spraying, the plantation has had two bumper crops in a row, though Roguthaman finds this neither remarkable nor a justification for a permanent ban.

The cashew, indigenous to northern Brazil, was brought to India in the late sixteenth century by the Portuguese, who introduced it to all their tropical colonies. The fruit was originally considered the valuable crop, and an alcoholic beverage called fenny was fermented (and still is today) from the juice of the bulbous, fibrous, astringent cashew-apple. It wasn't until the end of World War II and the rise of the cocktail-hour leisure economy that snack nuts became widely popular as a global commodity, and today cashews are second only to almonds in economic importance. The crop generates $400 million in revenue for India every year, and PCK, which was funded by the World Bank in 1978 as a rehabilitation project, produces more than any other plantation in the country.

Roguthaman walks us out in the blinding sunlight to point out an infestation of stem borers. The cashew trees are the only green things in the landscape. Under the canopy of a large old cashew, Roguthaman peels away a slab of bark like a scab, revealing a clicking, scurrying group of enormous borers. The tree will be dead in a year. DDT or BHC, both of which are banned, are really the only thing that will take care of these, he says, so for now they are absorbing their losses. As for endosulfan, he defends its use. The final verdict on the pesticide, in the form of Dubey's report, has not been returned, and he thinks that endosulfan is the cheapest and safest of the available chemicals. An alternative chemical suggested by the Ministry of Agriculture is sevin, the very same pesticide that was manufactured at the Union Carbide plant in Bhopal before it exploded.

But what of the people who claim to have been sickened by the spray? He shrugs. Who knows? There is no proof that it's endosulfan. His workers would stir the chemical with their hands, wiping it off with grass. They would stand in the plantation during spraying with only a handkerchief over their mouths. They sprayed 3,000 liters a year. None of his laborers has become sick. He pounds his chest to demonstrate his imperviousness to a chemical, a teaspoon of which would kill an elephant. Endosulfan is fine. They have barrels of the stuff in storage. Would I like to see?

My eyes adjust slowly to the darkness of the storage shed as Roguthaman slides the door open. A pile of cashews have spilled from a burlap sack across the floor. To one side are four dust-covered barrels, each containing 200 liters of endosulfan. I smell one, and there is a faint but distinct acridity coming off the barrel, something like turpentine. There is enough poison in these containers to kill 80,000 people. But of course it is not the acute poisoning that is the problem. It is the microdose, a few molecules at a time, the chronic exposure to the communities around the plantation over twenty years that has visited upon them the wrath of a new and vengeful god. I rap my knuckles against the lid, with its skull-and-crossbones label, a dull echo. The rusting barrels in the shed are as inert as mothballed cluster-bombs, waiting only for the inconvenient ban to be lifted.

In Vaninagar I visit another small farm, 100 yards along the hillside from Appe's house, which belongs to Surender Shetty. In their front yard, under the spreading shade of a large cashew tree, they have a *thulasi* plant surrounded by a cage of thorns to keep the goats away. He crushes the leaves under my nose; it gives off a sharp, lemony smell. *Thulasi* cures fever and sore throats, and every house in the village has one growing in its courtyard, a sacramental medicine cabinet. Shetty's twelve-year-old son, Udayan, an epileptic with cerebral palsy, sits drooling on his faded Chicago Bulls T-shirt, scabby knees bent under him awkwardly. He smiles attentively, and just as quickly a spasmodic shadow crosses his face and his mind wanders elsewhere. Shetty brings chairs; they want first to know what we need, if we've had anything to drink. He brings coconuts, lopped opened with a sickle, and tells me the plantation's helicopter pilot refused to drink coconuts from Vaninagar and insisted on bringing his own.

Shetty's wife rolls *bidis*. She sits cross-legged holding in her lap a bamboo tray with a neat stack of *tendu* leaves, a pile of shredded tobacco, and thread and scissors. She cuts the leaves, rolls the tobacco, and ties them off with string. It is an unconscious process, a slavery measured out in heartbeats, but she can talk and look after her son while working. Working nonstop for a day, a good roller can make over 1,000, for which she will be paid 46 rupees. This is an economics to which millions of women in Indian are subjected. She says it would be nice if we could speak the same language, says she is blessed to have visitors. Taking care of Udayan, who frequently collapses in seizures, she can make only three or four hundred *bidis* a day. They buy Western medicines for his epilepsy from the doctor, though they use traditional cures for most things. She is the same woman who came into Kumar's office to buy epilepsy medicine with a dog-eared 10-rupee note. Her daughter, with the same aquiline features, same sorrowful eyes, collarbones as prominent as tree branches over which a sari has been hung to dry, stands beside her. I ask the mother if she is angry at what has happened to

her son and her village. "What can I say? It is my fate."

Shetty works whitewashing houses, when there is work. He smells like moonshine, the country liquor also known as "sky juice" because of the custom of hanging it in jugs from the palm tops. He tells Vinod he is a competitive player of Kabadi, a local game like capture-the-flag that involves saying "kabadikabadikabadikabadi" over and over when you cross into enemy territory. Twice he has made a 100-kilometer pilgrimage to a temple to shave his head as an offering to the *theyyam* Manjunatha, praying for his boy to be healed. He has prayed and made offerings to Jatadhari as well. There are more than 400 deities within the two northern districts of Kerala, and perhaps 3 million fill the vast Hindu pantheon across the subcontinent. They offer rupees, liquor, coconuts, chickens. In old times they sacrificed elephants, even humans. These tributes were meant to ward off evil, cure diseases, secure blessings. Anything to influence the arbitrary wrath of the divine.

The British called these rituals black magic, but really it was the organic evolution of belief. The gods that ruled this place were natural extensions of the landscape, grew here along with the people, and followed the rhythms of plantings and monsoons, birth and death. Religion dropped roots like a banyan. The plantation economy and industrialized agriculture disrupted the pulse of life here: the monsoon grew capricious, and the jungles fell to the axe and the bulldozer. The cultivation of cash monocrops disrupted human life as completely as it upset the tropical ecology that had achieved a balance, despite Kerala's huge population density, over the course of centuries. The insatiable logic of a tropical empire created a new cycle to replace the indigenous one: deforestation in the highlands caused flooding in the plains, displacing a population that in turn knocked hungrily at the plantation gates, or fled to the huge slums that now grow around every city in south Asia. The web of beneficial insects that held ecological disaster in check was unraveled by vast plantings of coffee, tea, banana, and cashew. The sorcerers' apprentices concocted a host of chemicals to restore order. Consequences have been meted out over lifetimes, generations. The water was poisoned. No government committee can measure the result.

Shetty shows me his water source, a black-mouthed tunnel, called a *thuranga*, dug into the hillside. The cashew trees of the plantation are on the hill above. It is the height and shape of a man, a giant birth canal into the living earth. Stepping over the trickle of water that comes out of its mouth and collects in a pool, I walk far back into it, out of the bright tropical light and heat. A few paces and I am in almost total darkness, the entrance behind me, ringed with foliage, a window on the outer world. In the *thuranga* it is cool, the walls are covered with moss and tiny ferns, there is the sound of dripping water, and a little stream of clear water runs along the sandy floor of the cave's base. It goes 40 meters deep into the hillside, beyond the reach of light. Vinod says to be careful, some of these fork off and you'll get lost in the dark. The flashlight they've given me, dim as a lightning bug, is useless in the blackness. The *thuranga* seems haunted by restive ghosts. I imagine the endosulfan molecules, bound to soil particles, percolating down through the loamy earth, infusing the trickle of water that Shetty comes to fetch for his family, that they share with the neighbors. Incremental, tiny doses, an experiment more complicated than any ever devised in a laboratory, and more comprehensive: x factors of rain, variables of oxygen. No one to record the results, draw conclusions.

I can feel the weight of all the earth above me, the cashew roots curling like warped fingers through the soil, and the cool cave walls seem to gather closer, the moss to reach out tendrils, the ferns at the distant cave-mouth to stiffen like a dog's hackles. I turn and scramble out, a diver going up for air, clouding the stream in my panic.

Outside the *thuranga*'s mouth we squat on our haunches, Indian-style, Shetty and Vinod and I and some local boys, as the sun drops in the red western sky over the ghats. We sit smoking *bidis*, making small talk. I don't know what to say. It is a slow disaster in a land full of disasters, where fact and myth obscure each other, where the old gods have been rendered obsolete, where millions suffer worse than this, where the chains of fate and blame are bound irrevocably around each new life.

I ask Shetty what he thinks of all these strangers coming to Vaninagar. "What can I say? These doctors come, these foreigners come, they look at Udayan like a specimen. Politicians come and say they'll consider, scientists come and draw blood, journalists come and take pictures, I parade my boy in front of them all. Nothing changes." There is quiet between us, wound through the burning-leaf smell of the *bidis* his wife has rolled and the sound of dripping water.

Vinod and I walk down a dirt path through the village to the Kodenkiri, watched by eyes from every doorway, followed by curious children. The stream runs sluggishly down from the plantation in the April heat before the arrival of the June monsoon. I watch out for cobras in the leaf litter. Upstream, women with their saris hitched up slap laundry rhythmically against the rocks, throwing off sprays of mist as they spin it in the air. Some of the stones are worn smooth from centuries of washing. A tribal boy, Ravi, red as the earth from a dollar-a-ton day in the brick quarry, washes himself, the water running out behind him like blood. He has lived here all his life. He does not know the name of the stream in which we both stand knee-deep but raises his hand above his head to show the monsoon height of the waters. He stoops and cups water to his mouth. It is the stream, he laughs, why should he know its name?

A *thumbi*, an iridescent red-eyed dragonfly, lands on a branch, wings dappled from sunlight reflecting on the water. Tiny minnows have returned, at least for now. Wild mangoes, the remnants of the vanished monsoon jungle spared for their utility, hang gnarled and enormous over the creek. Floating leaves cast amoebic shapes on the creek till, a shadow-play of mitosis. There is something primal in these expressions, an affirmation: let alone, lived with, the water will clear, the land will return. ■