

# BODIES AT REST AND IN MOTION

*The puzzle was not that my father was dying. It was that he was still alive.*

BY SIDDHARTHA MUKHERJEE



The call came at three in the morning. My mother, in New Delhi, was in tears. My father, she said, had fallen again, and he was speaking nonsense. She turned the handset toward him. He was muttering a slow, meaningless string of words in an unrecognizable high-pitched nasal tone. He kept repeating his nickname, Shibu, and the name of his childhood village, Dehergoti. He sounded as if he were reading his own last rites.

“Take him to the hospital,” I urged her, from New York. “I’ll catch the next flight home.”

“No, no, just wait,” my mother said.

“He might get better on his own.” In her day, buying an international ticket on short notice was an unforgivable act of extravagance, reserved for transcontinental gangsters and film stars. No one that she knew had arrived “early” for a parent’s death. The frugality of her generation had congealed into frank superstition: if I caught a flight now, I might *dare* the disaster into being.

“Just sleep on it,” she said, her anxiety mounting. I put the phone down and e-mailed my travel agent, asking her to put me on the next available Air India flight.

My father, eighty-three, had been declining for several weeks. The late-night phone calls had tightened in frequency and enlarged in amplitude, like waves ahead of a gathering storm: accidents were becoming more common, and their consequences more severe. This was not his first fall that year. A few months earlier, my mother had found him lying on the balcony floor with his arm broken and folded underneath him. She had taken a pair of scissors and cut his shirt off while he had howled in double agony—the pain of having to pull the remnants over his head compounded by the horror of seeing a perfectly intact piece of clothing sliced up before his eyes. It was, I knew, an ancient quarrel: *his* mother, who had ferried her five boys across a border to Calcutta during Partition and never had enough clothes to split among them, would have found a way to spare that shirt.

Then, too, my mother had tried to play it down. “*Kicchui na*,” she had said: Look, it’s nothing. It was a phrase that she, the family’s stabilizing counterweight, often clung to. “We’ll manage,” she’d said, and I took her word for it. This time, I wasn’t so sure.

Twenty hours after my mother’s phone call, I landed in sweltering, smog-choked Delhi. I went to the family home from the airport, flung my bags across the bed, and took a taxi to the neuro-I.C.U. The unit was arranged in four pods around an atrium. Part of the floor was being repaired—the polished terrazzo had a gash like a busted lip that exposed the building’s pipes and electrical conduits, and pieces of jagged concrete were strewn across the corridor. If you tripped and bashed your head on the floor, I noted, a neurologist would be waiting conveniently for you around the corner.

My father was densely sedated. I called his name and, for a moment, I thought he swung his head toward me in recognition. I felt a burst of joy—until I saw him swing his head back and forth again, and realized I was seeing an automatic movement, repetitive, rhythmic, patterned. His brain seemed to be slipping down some evolutionary chain, through a series of phylogenetic trapdoors—*thud-thud-thud*—toward a primitive, reptilian

*Homeostasis holds complex systems together invisibly; we notice only its failures.*

consciousness. Over time, I began to regard that vacant, circular motion as a semaphore that you might send up from the lower reaches of Hell.

A neurosurgery resident came to see me. He knew that I was a physician; he extended his hand and called me Dr. Mukherjee. He looked about thirty-five, with a pale face, large ears, and an air of confidence. I took an instant, irrational dislike to him.

"Your father had extensive bleeding into his brain," he told me. "And with his underlying dementia I'm not sure how much of a recovery we can expect." He added that my father's sodium had fallen to 128—critically low, yet another sign of severe damage to the brain tissue.

My anger had the quality of undergraduate indignation: I wanted to tell him that I knew how to read a CT scan and understood what a low-sodium reading was, but I bit my tongue.

"We've got everything under control," he assured me. "You be the son, and let us be the doctors." Then he hurried off to see other patients.

A few minutes into my visit, I noticed that my father's heart rate on the monitor was alarmingly high. I fumbled under the sheets until I found a pulse in his swollen wrist. The rate was normal; the machine had almost doubled it. I called the nurse. She was a small woman with an expressive face, her white coat buttoned over a blue sari.

"Oh, that monitor? It never works," she said, waving it away casually, as if it were a toy with a snagging wheel. And then, as I watched, aghast, she switched it off. The machine stopped beeping. My father was now officially pulseless. Well, thankfully *that* problem's been solved, she seemed to suggest, triumphantly, and moved on to the next bed.

An hour later, she came to clean my father up. A little pool of spittle, the color and consistency of pond scum, had formed in his half-open mouth. She removed it with a suction catheter. The vacuum pump to which the catheter was connected made a brief humming sound, then collapsed with a loud whoosh, like an elephant sagging to its death. I stood up to look: one of the rubber gaskets that held the tube to the pump had cracked.

The nurse shrugged in apology. She looked around perfunctorily for a replacement gasket, but we both knew there would be none.

I left the hospital at eleven that night. A few miles from my house, a motorcycle had overturned on the highway, catapulting a helmetless young man into space. Someone had lit a string of flares around the accident to divert traffic. The windows of my cab had been sandblasted into a sea-glass dullness by the city's famously abrasive winds, and the scene outside looked weirdly like some kind of celebration—a festival or a wedding party—shot through a foggy video camera. The inversion almost made me want to laugh. Delhi had landed upside down. The city was broken. This hospital was broken. My father was broken.

There's a glassy transparency to things around us that work, made visible only when the glass is cracked and fissured. *Look, it's nothing.* To dwell inside a well-functioning machine is to be largely unaware of its functioning. That's its gift, and we accept it thoughtlessly, ungratefully, unknowingly. Years ago, as a young doctor trying to make some extra cash, I moonlighted in a walk-in clinic in a down-and-out neighborhood a few miles from Boston. I worked on Saturdays from ten until eight, and rounded off the day, exhausted, with the gordita-and-beer special at a local joint.

The clinic was run, with cutthroat efficiency on a shoestring budget, by a sixtysomething nurse who had worked there most of her life. One morning, confused about daylight-saving time, I arrived for my shift an hour early. I watched the nurse as she prepped for the day. She stacked the sterile plastic tubing for the oxygen masks by the side of each bed. She reviewed the contents of the "crash cart," where the emergency equipment and medications were stored. Her final act that morning might have scaled a new peak of obsessive absurdity: she moved from one unoccupied cubicle to the next, smoothed the sheets down, and then, crouching awkwardly in the thin space between the head of the bed

and the wall, oiled the knobs for the wall-mounted valves that brought oxygen into the room.

I didn't make much of this quiet whirr of morning activity until later that week, when a middle-aged woman was brought to the clinic, wild-eyed and blue-lipped for lack of breath, evidently in the throes of a life-threatening asthma flare. Moving her from the ambulance stretcher to the bed took less than a minute—but only because the sheets had been slicked and tucked in, and her thrashing body slid easily onto the bed. The knob of the oxygen turned effortlessly—who would have noticed that it had just been oiled?—and, when I reached for an I.V. line, a butterfly needle, just the right size and calibre, appeared exactly when I needed it so that I could keep my eyes trained on the thin purplish vein in the crook of the elbow.

By then, the nurse had opened the crash cart. I asked for epinephrine. It had already been drawn into a syringe.

"Would you like to intubate her?" she asked. It sounded more like a command than like a suggestion.

I had no such desire. In a confessional moment, I might have admitted that I wasn't a particularly good "intubator"; the few times I had tried, the textbook vision of the vocal cords, glistening tantalizingly beyond the epiglottis, like some V-shaped promised land, had somehow evaded me. But I had no choice. I pulled the woman's mouth wide open. "Dentures," the nurse said sharply, in the nick of time—and I took them out. I pushed the laryngoscope past the substantial fold of her tongue until I could see the orifice, and asked for the tube. I did not notice that it had been slicked at its end with a barely there dab of lubricant. The scope glided in. Had the lubricant not been applied, it could have been a disaster.

We called an ambulance to move the woman to a hospital I.C.U. My shift had ended, and, when I looked around, I saw that, in my rush to stabilize the patient, I had spilled a hurricane of debris on the floor: plastic tubes, the casing of the laryngoscope, needle sheaths. Dentures. But by the next morning, I knew, order would have been restored. The sheets would

be smoothed, the crash cart restocked, the valves oiled.

In the late nineteen-twenties, the physiologist Walter Cannon coined the term “homeostasis”—joining together the Greek *homoios* (similar) and *stasis* (stillness). The capacity to sustain internal constancy was an essential feature of an organism, he argued. His work was rooted in his experiences working with Allied troops during the First World War, as he studied the physiological complications of traumatic shock. But it was also inspired by the work of predecessors such as the nineteenth-century French physiologist Claude Bernard, who wrote, famously, “*La fixité du milieu intérieur est la condition de la vie libre, indépendante*”: the constancy of the interior environment is the condition of free and independent life.

What is true of a well-functioning institution may also be true of the bodies that staff it. Consider temperature: the normal human body maintains an extraordinarily narrow range—somewhere between ninety-seven and ninety-nine degrees—despite enormous, often unpredictable variations in the environment. I boarded my Air India flight on a chilly autumn day in New York and was hurtled in an aluminum tube into unseasonably warm Delhi, but my core temperature, had I measured it, would have changed not one degree. And emperor penguins put human thermoregulation to shame. As the ambient temperature is lowered by a staggering hundred and ten degrees, from seventy above zero to forty below, a penguin chick’s core temperature changes by only a couple of degrees.

The level of sodium in your blood is tightly regulated between 135 and 145 milliequivalents per litre—a number controlled by exquisite sensors in the brain coupled with an equally accurate mechanism that retains or dispenses salt and water in the kidneys. “Constancy in an open system, such as our bodies represent, requires mechanisms that act to maintain this constancy,” Cannon wrote. “Homeostasis does not occur by chance, but is the result of organized self-government.”

Cannon’s insight inverted long-established logic. Physiologists, for generations, had described animals as

assemblages of machines—as sums of dynamic parts. Muscles were motors; the heart a pump; the nerves electrical conduits. Pulsing, swivelling, pumping, sparking; the emphasis was on movement, on actions, on work—*Don’t just stand there, do something*. In shifting physiology’s focus from action to the maintenance of fixity, Cannon (and Bernard) had fundamentally changed our conception of how the human body works. A major point of physiological “activity,” paradoxically, was to enable stasis. *Don’t just do something, stand there*.

All around Cannon, theorists were thrilling to the idea of self-righting systems, resistant to the buffeting forces of change. The English botanist Arthur Tansley coined the word “ecosystem” in 1935; the maintenance of stability would soon be described as one of the cardinal properties of ecologies. Soon economists were relating homeostasis to self-correcting markets; Norbert Wiener, the mathematician, saw that machines and creatures might be governed by autonomous control systems stabilized by “feedback” loops. Cells, cities, societies, even political institutions—all had the capacity to steady their states through the actions of self-regulated and counterpoised forces. And Lewis Carroll’s Red Queen was their symbolic monarch. The world is spinning so fast under her feet, she tells Alice, that “it takes all the running *you* can do to keep in the same place.”

Yet I doubt that even Cannon, who died in 1945, his career bracketed by two world wars, realized the sheer amount of physiological effort needed to maintain “organized self-government.” The effort is continual and system-wide—and unnoticeable. The valves must be oiled; the sheets tucked; carts stocked; the trash dispensed. Heating and ventilation have to pulse and thrum, unnoticed. Breathe in. Breathe out. Repeat.

I had versed myself in the reasons that my father had ended up in the hospital. It took me longer to ask the opposite question: What had kept my father, for so long, from acute decline? I had to reimagine the fall—the blow, the bleed, the delirium, the coma—and try to understand why such disas-

ters hadn’t occurred earlier, as his brain had inched, woozily, inexorably, unrecognizably, toward dementia.

What was he like, at rest and in motion? He loved to travel—nearly as much as my mother loathed to. In the early days of every summer, while I was growing up, he would come home one evening with four tickets and a visa form, and announce that we would be decamping, in a fortnight or so, to some unfamiliar foreign location—Cairo, Addis Ababa, Bangkok, pre-glasnost Moscow, post-Shah Tehran—while my mother stewed privately about what to pack, whom to ask for advice, and what to feed the children during the trip. It’s tempting to psychologize this—he was the boy who had been forced to flee his home—but sometimes, as he liked to point out, a ticket across a border was just a ticket across a border.

Oh, and he loved markets. Malls, particularly American ones, depressed him: to shop without confrontation was to die without a battle. When signs reading “FIXED PRICE” began to appear in Delhi’s shopping arcades—mainly to fend off inveterate bargain hounds like him—he saw it as a symbol of the impending end of civilization. But he never met a man with a pushcart whom he didn’t give his heart to. Perhaps it was fated, then, that the first of his falls, more than a year earlier, occurred as he made his way back from the neighborhood market with a bag of onions in each hand; that the first responders were fruit and vegetable vendors who knew him by name and knew exactly where he lived; that they brought him home, like slightly banged-up royalty, on a repurposed fruit cart.

He told us that he had tripped on a loose stone, and, for a while, things seemed to settle at home. But the world had already begun to shift around him. His sense of balance worsened daily. My mother hired a physical therapist and a daytime nurse. A carpenter came to attach firm wooden rails to the bed that he’d always slept in. When I went to see him, late that summer, it seemed as if a Biblical punishment had rained down on him: the man who wanted to be constantly on the move was

confined to his bed, his shoes confiscated, his cane hidden in a closet so that he would not find it and be tempted to roam. One night, when he was particularly delirious, we tied him to the bed railings with pajama strings to keep him from falling off. I woke up in the half-light of dawn and saw him crying softly into his bound hands.

And then, quietly, a new kind of physiology started to coalesce around him. The fruit and vegetable sellers began to turn up at home. The daytime nurse—a scraggly young man nicknamed Bishnu: the god, among other things, of maintenance and preservation—made a habit of propping him up in his rocking chair on the balcony every morning, and having the various venders congregate below like a worshipful throng. My father was delighted to be back among the believers. He would banter with them from above—a king under house arrest, but a king nonetheless—berating them about their prices; protesting the abysmal quality of the eggplants; asking why he, at his age, must suffer the sins of their bruised cauliflowers; and why the fish was never quite fresh. It was a small miracle: Mr. Mukherjee could no longer go to the market, and so the market came to Mr. Mukherjee.

In retrospect, I understood that this, too, was homeostasis of a sort. The little rituals saved him. They staved off another fall; they restored his dignity, his need for constancy. “At death you break up,” Philip Larkin wrote:

the bits that were you  
Start speeding away from each other for  
ever  
With no one to see.

But for a while my experience of my father’s dying was not his breaking up into cometary bits. It was the opposite: his being held together by an infinitude of minute forces. He knew that he was losing the cosmic bargain, but the onion seller, at least, would still cut him a good deal.

And then things fell apart in a Hemingway sort of way—gradually, at first, and then all at once. Bishnu had to go home to his village because his hepatitis had apparently flared. A new

attendant was recruited to replace him, but the daily routine devolved into chaos. One afternoon, when my father should have been safely positioned on the balcony, the attendant left him alone. Within a few minutes, my father had squirmed out of the chair, eased his feet into his slippers, and tottered his way to the kitchen. He touched my mother’s right shoulder—a gesture so familiar to her from his normal days that she neglected to turn around and question why he was standing in the kitchen beside her. By the time she had spun around, he was beginning to tumble sideways. He hit his head on the richly veined marble countertop that he was so proud of—“Calacatta, not Calcutta,” he would say, to remind people how far he’d come in life—and then landed with a dull thud on the floor.

A blow to the brain is a good way to eject someone from the equilibrium of free and independent life. Of all organs, the brain, ironically, has the least room to expand; the skull is a fixed space. Elsewhere in the body, blood will eventually flow out. But blood in the skull can stay in like a festering secret, forming a clot and then pressing down on the squishy neural tissue. The clot can grow, further increasing the pressure and progressively crippling brain function, in a cascading process beyond the reach of homeostasis. Indeed, once self-



regulation fails, complex systems of all kinds can be claimed by a version of this process, sometimes called a failure cascade. A storm-battered tree takes down a transmission line; the increased load causes another network component to fail, further increasing the load, turning a local outage into a regional blackout. The failure of one division in one bank can trigger a global cataclysm. That’s a failure cascade.

Such is the power of homeostasis that it’s hard to see a failure cascade coming; everything returns to normal, until normality gives way. About two hours after his fall in the kitchen, my father seemed fine, except for a bruise that had ripened on his forehead. He asked for some water, and then sat in his chair, glowering about his disrupted morning. The venders had left. About four hours in, he said that he felt uncomfortable. His neurons, under pressure, were sending him mixed messages: he was warm one minute and cold the next. He stripped his shirt off, sweating profusely. Then he wanted a blanket. He ate lunch like a sullen Goldilocks—the chapatis were too hot, the dal not spicy enough—and then was overwhelmed with the need to sleep. He woke up an hour later, arms flailing, delirious. My mother had phoned me soon afterward.

The speed of the unravelling was, well, breathtaking. In that I.C.U. ward, his sodium kept dropping precipitously—131 . . . 128 . . . 122. His coma deepened from the imbalance of salts. Then his breathing dulled from the coma. Carbon dioxide, an acid when mixed in water, accumulated in his blood. His heart began to behave bizarrely—the muscle sluggish, the rhythms erratic—from the strange cocktail of acids, bases, and salts circulating in his blood. Then his kidneys started to fail. And, *because* his kidneys were failing, his brain function worsened, refuelling the cycle of decay.

But he would not just accept death; he had to be bargained into it. His body fitfully rallied, hanging on to the final constancies of life with a kind of primordial cunning, as if my father knew, down in his blood and in his bones, that sometimes the market turns against you, that sometimes you must settle for the best among bad deals, and that a miserable equilibrium is still an equilibrium. A sodium of 125? He would take it, but with some cross-subsidy: he would shut down sectors of his brain as long as he could keep his heart.

In those weeks, too, my feelings toward the I.C.U. neurosurgeon and nurse shifted from anger to something akin to admiration. They themselves

LOVE POEM WITHOUT A DROP  
OF HYPERBOLE IN IT

I love you like ladybugs love windowsills, love you like sperm whales love squid. There's no depth I wouldn't follow you through. I love you like the pawns in chess love aristocratic horses. I'll throw myself in front of a bishop or a queen for you. Even a sentient castle. My love is crazy like that. I like that sweet little hothouse mouth you have. I like to kiss you with tongue, with gusto, with socks still on. I love you like a vulture loves the careless deer at the roadside. I want to get all up in you. I love you like Isis loved Osiris, but her devotion came up a few inches short. I'd train my breath and learn to read sonar until I retrieved every lost blood vessel of you. I swear this love is ungodly, not an ounce of suffering in it. Like salmon and its upstream itch, I'll dodge grizzlies for you. Like hawks and skyscraper rooftops, I'll keep coming back. Maddened. A little hopeless. Embarrassingly in love. And that's why I'm on the couch kissing pictures on my phone instead of calling you in from the kitchen where you are undoubtedly making dinner too spicy, but when you hold the spoon to my lips and ask if it's ready I'll say it is, always, but never, there is never enough.

—Traci Brimhall

had had to settle for a miserable equilibrium. Amid scraps and gaps and shortages, they had managed to stabilize him. Yes, my clinic in that down-trodden neighborhood outside Boston was a small marvel of homeostatic industry, but its minuscule budget was, by comparison, a luxury economy. When a vial of epinephrine was used up, there was more to replace it; the oil for the valves didn't run out. In the Delhi ward, the most ordinary procedure was an occasion for triage and improvisation. To keep this hospital running required workarounds—countless, inglorious, and constant.

On the twelfth day after my father's fall, he recovered a thready pulse of consciousness. The doctors pulled out the breathing tube, leaving a plastic face mask to deliver oxygen. The hospital called me to say that I should come see him.

He was out of his coma, but barely, his eyes still closed. The surgeon came

in, trailing an armada of nurses. "We need to move him to the geriatric ward," he said. "There's nothing more that we're going to be able to do for him here."

I looked at the surgeon as if he were mad. The geriatric ward was in another hospital, about two miles away. How could we move this barely conscious man, draped with lines and tubes, to the other ward?

The surgeon stood his ground. Every bed in the I.C.U., I knew, had a waiting list that extended into the dozens of patients. "Your father's sodium has normalized," he said, almost accusingly; normalcy meant that he no longer belonged in this unit. The overhead intercom crackled: there was an urgent call to an adjacent room.

An hour later, the intravenous lines and feeding tubes had been disconnected from their hanging bags and dangled loosely around my father. A thin man in a white uniform came into the room with a metal crank. "There's

an ambulance waiting downstairs," he said. "The driver can stay for ten minutes." He began to crank the pulley of the bed in order to lower it. One of the wheels was broken, and he folded a damp towel under the leg so that it could slide on the floor.

The nurse appeared. "The gown," she said. "You can't take it with you. Hospital property." I was horrified. Stripping this drool-spattered gown off my father, keeping his lines and tubes intact and inserted, seemed impossible.

"I'll pay you for it," I said.

"No payment—hospital policy," she said firmly, and disappeared again.

In a fit of desperate rage, I took a pair of hospital scissors, cut the gown off, and left it hanging on the monitors. Shredding clothes, it seemed, was turning into a family custom. I swaddled my father in a thin Rajasthan blanket that my mother had sent from home, and the orderly and I took off down the corridor in a half-run. The bed teetered to one side, with the towel under the leg tracing the arc of our path along the corridor.

The "ambulance" waiting downstairs was a makeshift delivery van with a wooden plank for a bed. We positioned the hospital bed at the foot of the back door, and turned the crank again to raise my father to the level of the van's floor. It turned a few times, then got stuck, making an ominous creaking sound. We lowered him and tried again, and once more the bed lifted up to a point but then was suspended in some hideous limbo. There was a gap of about two feet between the bed and the floor of the van.

"What happens now?" I asked the man.

"We will just have to lift him up," he said. "Over the gap."

"Two feet?" I asked.

He looked at me as if we were locked in a mortal duel. I rolled the blanket around my father and got up onto my haunches in the van. "I'll pull him in if you lift his legs," I said. About fifty people and a few stray dogs were watching us idly in the parking lot. A woman in a nurse's uniform walked by; she must have just ended her shift. I fished two hundred



*"1/5/2018. Journal entry six. Morale is low. It's been three days and I'm beginning to doubt the rumors of uptown service."*

rupees out of my pocket. Could she hold the lines and the end of the feeding tube while we hoisted my father up?

She took the money and climbed above my father on her hands and knees. I pulled, and my father let out a moan: he was suspended between the van and the stretcher, his spine arched backward. His torso was slipping down gracelessly, trailing I.V. lines and nasogastric tubes, like some botched Indian knockoff of an ecstatic Bernini—"The Descent from the Makeshift Ambulance." My heart sank. The woman held his lines in a clenched fist while I pulled with all my strength. Another five minutes of jostling and pulling, and we had brought him in. His head was lolling to the side. For a long moment, I thought we had killed him, but his breathing resumed.

The van took off through the traffic. Cars were roaring at the lights like restrained animals, and we moved forward sluggishly. I shook my head in disbelief. I had spent the last hour

moving my father, like a sandbag, across a two-foot crack in a system of care.

**I**f you leave a thing alone you leave it to a torrent of change," G. K. Chesterton wrote in 1908. "If you leave a white post alone it will soon be a black post. If you particularly want it to be white you must be always painting it again; that is, you must be always having a revolution. . . . An almost unnatural vigilance is really required of the citizen because of the horrible rapidity with which human institutions grow old."

My father knew something about the rapidity of decline: he had watched it befall not one but two cities. He had been forced to leave Calcutta, the capital of the state of West Bengal, in the late nineteen-sixties, having seen it plunge into chaos, its love spent, its reserves exhausted. Glutted with migrants after Partition, the city had grown precipitously in the matter of a few months. ("Partition broke Bengal's heart," as he liked to put it, "but then

it broke Calcutta's spine.") Every system had frayed and snapped: housing, transportation, governance.

But it was the second fissuring—of Delhi, the city that he had then moved to—that broke *his* spine and heart. For a brief interlude in the mid-seventies, Delhi had seemed like a functioning capital. It was the newest old metropolis of the world. The air was breathable; the sewers worked; yellow-and-green buses ferried people through its broad, gulmohar-lined boulevards. It was the pull of perceived prosperity, as much as the push of desperation, that brought millions of men and women flooding in. For a while, it seemed as if the city would soak up this influx, absorb blow after blow, and swell into a barrel-chested mega-metropolis. Nothing mattered, until, suddenly, everything did—until people looked around, choking on the smog, reeling at a failing sewage system, watching sexual and communal violence spilling out on those buses and tree-lined streets, and tried to figure out what on earth had happened. *The horrible rapidity with which human institutions grow old.*

Not long after I'd moved my father to the geriatric ward, I read Walter Cannon's great opus "The Wisdom of the Body." Cannon had published his book in 1932, after he'd begun studying autoregulatory mechanisms in his Boston lab. It took some time for the world to grasp the broad significance of what he was arguing. Homeostasis, the capacity to maintain a functional equilibrium, would turn out to be one of the cardinal principles of all organisms; it's often described as one of the defining principles of life. If a sulfur-metabolizing ectoplasmic alien were to be found in the vicinity of Alpha Centauri, say, there's a good chance that it, too, would possess autoregulatory loops for resisting changes in its bodily functions. And the basic principle applies to most complex systems. Their apparent stasis is an illusion—the Red Queen's seeming immobility in space.

**O**bjects at rest, Newton told us, remain at rest until acted on by outside forces. Newton's universe was governed by inertia and motion, a clockwork cosmos run by inviolable

laws. Bodies put into motion streaked toward oblivion, until acted on by other forces that would make them stop their motion.

But living beings, Cannon realized, were not Newtonian abstractions. To make warm biology out of cold physics, organisms had to evolve their own laws to counter the inevitabilities of inertia and decay. In the long run, Cannon knew, we'll all turn into objects at rest. The Red Queen will stop running and be hurtled away; the chilled penguin will eventually cool its heels to zero. The standing body will fall down, fall ill. Yet we keep saying, *Look, it's nothing*, until we become nothing. It's as if nature were built to defy the most natural of all laws: that all of us, in the end, will cool, die, diffuse, dissipate.

Yet maintenance defies measurement; it's the glass pane that's visible only when it cracks. In the several months of my father's decline, hospitalization, and death, we recorded the values of hundreds of things in his body: potassium, temperature, breathing rate, creatinine, bicarbonate, chloride, the oxygen saturation of his blood, the output of his urine. What we didn't measure—couldn't measure—was how hard his body was working to bestill these values, how much “unnatural vigilance” was required to keep things steady, and how deeply his physiology must have collapsed when the numbers finally dipped into abnormalcy. We had, in short, no real measure of homeostatic resilience, of physiological reserve.

*Look*, I wanted to shout each day that I tended to my father in the hospital, *it's really something*. These conserving, self-correcting, decay-resisting forces that contend invisibly within us—in our bodies, our cities, our planetary ecosystem, even—are the opposite of nothing. The hospitals that work, the ambulances that lift patients smoothly off the ground: we neglect the small revolutions that maintain these functions, but when things fall apart we are suddenly alert to the chasms left behind. If we could measure homeostatic stamina—if we could somehow capture and quantify resilience—we might find a way to conserve things worth keeping before


they failed, or, for that matter, learn to break things that we wanted broken. It is easy to notice the kind of activity that drives change; stasis, on the other hand, requires a more vigilant reckoning.

Once his body stopped resisting death, my father died rather quickly. “Old age is a massacre,” Philip Roth wrote. For my father, though, it was more a maceration—a steady softening of fibrous resistance. He was not so much felled by death as downsized by it. The blood electrolytes that had seemed momentarily steady in the I.C.U. never really stabilized. In the geriatric ward of the new hospital, they tetherballed around their normal values, approaching and overshooting their limits cyclically. He was back to swirling his head vacantly most of the time. And soon all his physiological systems entered into cascading failure, coming undone in such rapid succession that you could imagine them pinging as they broke, like so many rubber bands. *Ping*: renal failure. *Ping*: severe arrhythmia. *Ping*: pneumonia and respiratory failure. Urinary-tract infection, sepsis, heart failure. *Ping, ping, ping*.

Those feats of resilience surrendered to the fact of fragility. And, as the weeks bore on, an essential truth that I sought not to acknowledge became evident: the more I saw my father at the hospital, the worse I felt. Was *he* feeling any of this? Two months had elapsed since his admission to the geriatric ward. One evening, around the dinner table, I broached the topic of bringing him home. I had expected resistance but found none.

So we shut off the chirping monitors, pulled the I.V. lines out of his veins, and unsnaked the gastric tube from his nose. We bathed and shaved him, put his shoes on, and wrapped him in his favorite pashmina shawl. We brought him to his own bed. The fishmonger delivered a spectacular specimen of the river shad that he loved, and my mother curried it with mustard and ginger, pulverized it into a mash, and fed it to him with a baby's spoon. He died in his sleep three days later, his restless body finally at rest. ♦

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Leo Cullum, October 15, 2007

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