

BY DEGREES

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It was the grayness, mostly. The clammy waxiness of his skin, the white crust settling into the corners of his mouth, the pained hoarseness in his voice. But more than all this: the gray of his pallor, the seeping out of his blood, the leaking out of his life, the ensuing flood that filled him. It was how he'd moaned, "Feels like it's... spreading," how he'd butterflied his fingers over his belly, how in that moment I saw right through his skin, gazed deep into him, regarded his broken guts like I might observe writhing minnows through a lake's glassy sheen. And then it was that scene, running through and through and through my mind on endless repeat. I knew it by the video clip that flickered in my brain, skipping and looping, that damn cinderblock again and again. Something in him was damaged. Failing. Ruptured.

Something within him had broken.

And then everything was breaking, splintering, shattering--the landscape of a marriage rending along fault lines invisible beneath his skin as he disappeared by inches, fading from unsnapped photographs, fading from my future like light at sunset. His waxy gray body lay heavy next to me, and he was sliding away, ungraspable. Irretrievable.

There is an easy humanity to the Fahrenheit scale. When he developed his temperature system in the early 18th century, Fahrenheit placed the average human body temperature at 100 degrees. For his zero, Fahrenheit used a frigorific mixture--a concoction that maintains its

neither thawing nor freezing, molecules oscillating between physical states in a sort of purgatory, engaged in a perpetual war between solid and liquid where atoms constantly defect. Fahrenheit's frigorific brew was a simple brine: equal parts water, ice, and ammonium chloride. We humans, too, are briny: simple yet elegant cocktails of water and salts and minerals--nothing, really, but glorified electrical conduits.

When Celsius debuted his own scale, he, too, formed a frigorific mixture on which to base his zero, yet he used just ice and water in precise proportions to craft his perpetual half-winter. In the un-human Centigrade system, 100 and 0 represent only the physical changes of water molecules: the vaporized and the frozen. Though Americans spurn the Centigrade system, it is so gracefully logical, so patently inarguable, so exquisite in its uniformity. Water is so reliable, so regulated, so well behaved.

When I taught high school on Alaska's Kenai Peninsula, the December sun, rising like a sleepy teenager, peeked into my classroom window as lunch period loomed; dusk settled just after school let out. One winter day, when average highs hovered near zero, Gary lingered in my classroom. His skin was a polished kind of brown, his cheekbones high, his lips thick. Clad in black Chucks and a metal-studded sweatshirt, his gothic style had a homemade feel. Sweeping his hipster bangs out of his face, he moved for the door, and I asked whether he had a ride.

"Nah, Miss HC, I'm walking," he replied, lilting over each syllable in that trademark native cadence, softening *o*'s and lingering on *ng*'s.

I raised my eyebrows. "How far do you have to walk?"

"Not far. It's maybe two miles to my uncle's." Gary gestured east, into the gray beyond the glass door.

"Gary," I admonished, "it's like five degrees out. And windy."

"Don't worry, Miss HC, I'll be fine. I'm *native*." With that, he was gone. The following morning, he was back in class, digits intact.

In fact, at 0°F and light wind, hypothermia takes over half an hour to begin its waxy reign of terror. At -30°F, it might take fifteen or twenty minutes. Even so, Alaskans count on the cold, relying on it like an old, hoary friend. Though it can be inconvenient, uncomfortable, even dangerous,

consistency breeds affinity. The cold provides mechanisms for survival, despite its hazards. We all need something to rely on.

Humanity's doughy, fur-free skin shows we don't typically adapt physically for our survival. A rare example of human physical adaptation is vasoconstriction: a biological response to cold in which veins in the face and extremities shrink, conserving warmth and averting hypothermia, and a feature unique to Yupik, Inuit and Athabaskan people. Gary counted on his shrinking capillaries to preserve him on his winter walk, and they did not fail him.

Frigid air, when inhaled at sub-zero temps, freezes the mucinous membranes within the nose, stiffening each hair, scraping dry the trachea, sifting breath's moisture into dissipated smoke. The secret danger of the cold is not air, however, but water. With its multiplicity of material states, water cradles winter's danger in its icy grasp. As liquid, hydrogen and oxygen slide and whirl like herring, yet seize into a rigid lattice at precisely 32°F. At that point, what slipped and slid on a molecular level becomes, in its rigidity, even more slick on a physical level.

For millennia, we humans have managed to survive cold temperatures by our wits, using behavioral rather than biological adaptations, the most significant of which is constructed shelter. This is not a solely human endeavor: hares, mice, voles—many small mammals—survive winter by burrowing into the subnivean zone, a semi-permanent layer of snow that forms in cold climates. Snow differs significantly from ice, though both form from water at 32°F. As snow drifts and settles, the particles of frozen water trap air between them, transforming it into an insulating comfort.

This property of snow did not escape the witty human thousands of years ago. In just a few hours, an Inuit huntsman can craft an iglu: a shelter that capitalizes on subnivean physics. An iglu works because the blocks of snow congeal together, retaining their snowiness outside the structure, where molecules of frozen water and trapped air contain the heat generated inside. Yet within, where a semi-hairless human sits exhaling his nearly 100°F breath, perhaps even builds a fire, the nearer molecules revert to water: the interior of the iglu melts, just a little. As the snowy exterior of

battles this heat, the interior refreezes, but when it does, the molecules resolve themselves into ice, not snow.

This is the graceful, delicate beauty of the iglu: its stasis, almost frigorific in its delicate balance. Two states of frozen water butt against one another, locked in a perpetual and symbiotic cycle. Inside, the iglu takes on a glossy sheen; the downy snow gives way to a hard, icy polish.

When I taught high school on the Kenai Peninsula, in the early months of 2013, dog mushers lamented as race upon race was cancelled due to weather. Unseasonable heat caused the dependable snow and ice to shift and adjust in unpredictable ways. Crevasses spontaneously opened up beneath a sled team, wide maws set to gorge on fallen victims. River crossings, usually thick and solid, were instead a transparent green, papered in a few frozen centimeters of ice shredded sharp by thawing and refreezing, jagged like shattered auto glass.

The warm weather inconvenienced me too; we canceled our annual snowshoe trip that routed straight across a lake in the nearby Wildlife Refuge. Days from December, ice that should have been a foot thick was instead a few thin inches topped with a slush of meltwater. My students were crestfallen as cross country ski meets were cancelled and family snowmachining trips deferred. Pithy television forecasters named it the "Pineapple Express," a warm current of air sweeping up from Hawai'i. Usually that warm, moist air bumped against the coastal ranges that trim the middle edge of North America like rickrack on a child's dress, where it gathered moisture and drizzled it down over stretches of temperate rain forest. Instead, mid-winter thaws flooded our streets, gutters clogging with half-melt that crusted solid overnight.

That February, snowpack across Alaska was a fraction of average. In Anchorage, less than a third of the normal amount had accumulated; north of Fairbanks was a fifth of normal. Mushers on the Kenai traded dogsleds for ATVs. The Iditarod race, crown jewel of dog mushing, was rerouted at the last minute to avoid passes and crossings made dangerous in warmth.

The same physical change that kept generations of Alaska Natives

cozy converted roads into rinks that February. At 33°F, rigidly aligned water molecules react predictably. Unlike wheels on ice.

On the 6th, at four in the afternoon, after kissing his family goodbye, my husband Leif climbed into our F-350 Crew Cab. Moments later, as I nursed our baby, my neighbor tromped to my door through dense, thawing snow. Unable to get through on our internet phone, Leif had called her. His voice was tight, a shaken drink struggling to stay within safe walls of glass. "I'm so sorry, babe. I got in a wreck. The truck's totaled. I'm okay though."

"It's an F-350, dude," I said, sure he was exaggerating. "It can't possibly be totaled." I could not imagine that brutish vehicle a wreck; at five-foot-two, my feet barely reached the pedals.

"Um, yeah--it's totaled," he answered flatly. "I slid on the ice. I got hit. The medics say to get checked at the hospital."

"The hospital! You said you felt fine! Are you really okay?" I shifted the baby to my other hip, pressed the phone into my ear, listened through the buzz of activity behind Leif. My neighbor hovered awkwardly.

"Yeah, I'm fine. It's just routine. I mean, it hurts, but I'm fine. I might have a cracked rib or something is all."

In Alaska, there are plenty of ways to die. Mauled by a bear is usually a tourist's first thought, though in reality, bears would rather leave and let be. Getting trampled by a moose is actually more likely; moose are surprisingly aggressive, and males weigh more than half a ton. Sometimes cyclists, pedaling the Alcan or Canadian Rockies, are chased down by wolves. A cyclist looks remarkably like a cantering moose or caribou calf, I suppose. Murder, especially at the hands of a lover, is another tragic possibility: Alaska consistently tops charts with its high rates of domestic assault and forcible rape. Booze is another likelihood, since the state ranks in the top five for alcohol related deaths, and leads the nation in incidences of Fetal Alcohol Syndrome. There's exposure too, which, though obvious, is arguably the saddest way to die, as an abandoned heap of cold, bloodless flesh. Don't underestimate drowning, either: Alaska has the longest coastline of all fifty states, and dangerously frigid waterways, even at the height of summer.

When I taught high school on the Kenai Peninsula, we teachers, on a given Saturday, piled into the school library for mandatory First Aid recertification. It was a simple matter: there was a video cassette, a relic at nearly thirty years old, dated by the clothes on its B-rate actors. There were scenes depicting heart attacks, dislocations, splints and tourniquets. There were falls from high rolling chairs and foolish custodians mixing ammonia and bleach. Yet I remember most the construction crew: a man in the driver's seat of a pick-up, his coworker in the truck bed filled with pallets of cinder blocks. I remember the driver slamming the brakes, remember a cinder block careening into the co-worker's belly. I remember the bulleted points rising over the paused scene in bright yellow Arial font:

Indications of Shock

- Rapid, irregular pulse
- Cool, clammy skin
- Shallow breathing
- Lightheadedness

I remember the injured actor's twitching frame, his ashen skin, his trembling hands. The driver-actor hovered over him, a model of concerned friendship.

Later, our school nurse would haul in the Annies, plastic human torsos at whom we would kneel as if for absolution, whose pale chests we would, one by one, forcefully compress, counting out breathily, "Onetwothreefour..." We would tuck into Annie's face and exhale heavily, twice, eyes on the cream colored plastic chest, watching for the rise and fall that told us our residual oxygen would be enough to keep an unconscious human alive. Afterward, we would fill in our own certificates and get on with the rest of our Saturday.

Leif had more than a simple cracked rib, although there were two of those. Beneath his unbruised skin pulsed a crushed organ, spewing blood by the liter into his abdominal cavity. There was also a doctor who refused to give him a CT scan, who tried to send me home with a man leaking life, a man going into shock, a man dying slowly, by degrees. A man who needed

not one, but two separate blood transfusions to survive. A man who earned his footlong scar, jagged skin stapled over the hole through which his ruptured spleen was finally evacuated.

Once Leif returned from surgery, skin gray and rubbery, he lay ensconced, immobile amidst a tangle of tubes and a sea of monitors blipping and blinking a perpetual certification of his life. It was deep morning, perhaps three, and I'd finally succeeded in getting the baby to sleep, propping him between the cushions of the window seat that doubled as a spousal bed. I was not sleeping when our sole cell phone rang. I'd texted Judy, Leif's mother, during the hours in Emergency, knowing she wouldn't respond for hours. Florida is half a work day ahead of Alaska, and today it was half a world away. Hoping not to disturb either sleeper, I tiptoed to the hallway, stood peering through the observation window into the room, watching two chests rise and fall.

"Is he okay?" Judy's voice cracked.

"Yes, he's out of surgery. We're in Intensive Care."

"Oh *Jesus*." She inhaled, and I pictured her, through the fog of distance, sweeping her hand down her face, nervously tugging her nose sideways. "You guys have to get the fuck out of Alaska," she blurted.

"I know," I said. It was all I could think of to say.

For humans, the adaptation--the definitive indicator--of intellectual superiority is the wheel. From pulleys to gears to tires, this simple machine accomplishes much with little energy. The earliest wheel is five thousand years old, from Mesopotamia; other models arose in Greece, China, Arabia, Central America. These locations all share one quality: they lie at or below the 45th parallel. The combination of wheel and axle is utterly insufficient for transportation through wintry climes.

For a wheel to move weight, there is just one physical requirement: friction. But on ice, friction is a farce. The wheels beneath a barreling ton of steel and chrome slide perpetually, catching and losing and catching and losing traction over roads slimy with the congealed snot of sludgy auto-grime and churned ice. During winter warm spells, the few roads that score Alaska's face become the huntsman's iglu in reverse. The topmost layer of

ice and snow on the road melts like the innermost layer of the iglu melts. Beneath this, a substantial layer of ice remains, refreezing meltwater from below, and after dark, when temperatures plummet, the roads harden into a freshly Zambonied rink.

When Judy finally deplaned at the tiny Kenai airport two days later, she squeezed me tightly. "They had to give him another liter of blood last night," I reported. "He's sprung a fever, too, so he's on some new meds, I guess. It snowed pretty heavy last night, I couldn't get back to him." My throat swelled; I had watched the sticky wet stuff fall to earth in clumps, and feared to risk another accident getting to him.

"It's gonna be okay." Judy gripped my arm, face gentle and earnest beneath her short chrome hair.

"I know," I lied. My empty bed last night was filled with nightmares of crushed metal, of swirling blood, of IV poles and monitor lights.

The following day, semi-coherent after seventy-two hours' recovery, Leif deployed Judy and I from his bed in Intensive Care. Our mission: clear out the truck before the adjuster came to total it. "Be sure to get the jumper cables. They were under the bench in the back. And also my fishing rod. And don't forget the ratchet straps."

The sun was early-afternoon bright when Judy and I pulled into the Reddi Towing. Even from the parking lot, the truck appeared folded in half. At the time of collision, the icy road, prodded into melting by the warm air above and cycled back into freezing by the cold beneath, had relinquished whatever traction the truck's wheels held. It had drifted into a spin, out of control, slipping first into the center lane and then into oncoming traffic. The SUV that slammed into it at forty-five had done so perpendicularly, so that the truck had wrapped itself around it, mimicked the clutching arms of a desperate lover, or the clinging of a sullen child.

Pulled by a macabre sense of awe and horror, I trudged swiftly to the vehicle through knee-deep snow, leaving Judy in my wake. The driver side doors swung open easily, but the passenger seat, where I usually sat, was virtually gone; the crushed door abutted the center console. The two car-seats on the bench behind it had crumbled; bits of plastic from their frames

littered a cab already strewn with glass and debris.

It was I, and the children, who would have faded from our future's photographs.

Judy appeared behind me. "Holy shit," she said. I nodded.

The rod was a goner, and though I braced my legs and tugged, neither strap nor cables could be dislodged. The crumpled chassis had pinned every item Leif stored beneath the bench. At the hospital, Leif clucked and humphed at our empty hands, disappointed in his blissful ignorance, while later I fished shards of auto glass from my thumb knuckle with stainless steel tweezers. Outside, thawing ice cracked and split; melting snow sloughed off the roof, thudding to earth. Behind my eyelids floated images of twisted metal, wrinkled like a dryer-hot bedsheet left unfolded.

When I taught high school on the Kenai Peninsula, a former student of mine drove down the local highway. Brittany, with her dyed-black hair and pale skin, her wide smile and ready laugh, had struggled in school. We were all pleased, none more than Brittany herself, that she managed to pass my class and all her others, had been permitted to don the billowy gown and shake the principal's hand in her rite-of-passage to adulthood. The time was perhaps seven, but since the envelope of darkness descends so prematurely in Alaskan winters, it was deeply black over the unlit highway. Her Dodge Neon, petite and cream-colored and fragile, echoed the image of its young driver.

I don't know which vehicle first slipped into a spin--a merciless, unyielding spiral--and collided with the other, but I do know the impact rendered the Neon unrecognizable, and Brittany lifeless. In such instances, law officers and claims adjusters agree on one term: fault. Someone screwed up here, drove unsafely, made a dumb decision, and now, people are dead. Justice must be served. Blame must be assigned. There is no category on the checklist for a purely weather-related accident.

Yet this is the way it goes in Alaska. Brittany wasn't the only student I ever lost. The following summer, two daughters, two friends, and a father set out for an afternoon on Tustemena Lake. When the weather turned, the boat swamped, sending all five into the numbingly cold water. Only three

made it the two miles to lake shore: one sixteen-year-old girl gone and two girls left fatherless.

This is the way it goes in Alaska.

Each time I brought up the idea of moving, Leif's temper flared. He was exhausted by his slow recovery, by his follow up appointments, by his continued efforts to finish his semester. I knew his class work left him drained each night. Still, I couldn't stop myself.

"Do we really need to go over this again?" he sighed. "We're not moving."

"But it's a *sign*," I whined.

"What is?"

"This! You! Everything!" I gesticulated wildly over him, over his blanketed lap, his incentive spirometer, his vials of painkillers. "We said we'd be here two years, tops, and now, it's been almost four! We don't even *like* living in Alaska!"

"I like the fishing," he grunted, face placid in the wake of my tantrum.

I huffed, fumed, stormed out. But the next week, I was picking the scab, peeling the raw discussion open again.

The following winter, I taught high school in the mountains of North Carolina, when the East Coast shuddered beneath what meteorologists termed the "Polar Vortex." News outlets from Maine to Mississippi ran non-stop alerts on the dangers of sub-zero temps. A person could die in such cold.

Don't I know it.

At the time, no snow peppered the ground, but temps hovered just below 0°F. School was cancelled repeatedly due the extreme weather, but teachers were still required to report. After such a day, I returned home, to Leif and our two children. Spleen-less for almost a year, Leif greeted me with the embrace I had cherished by inches in the months after the accident. The children swirled around us, each eager to share what extravagances Dad had allowed them on today's "snow" day. After dinner, Leif and I sat; two glasses of Merlot stood guard between us as the children chased

balloons, batting them with foam swords, inches from knocking over lamps and picture frames.

"So, anything good today?" Leif asked.

"Just chatting with my principal," I replied. "*Y'all must think this is terribly backward, comin' from Alaska.*" I imitated her southern drawl, still a novelty after six months in the South. "Y'all probably don't close school for anything up there!"

Leif's mouth spread into a bemused smile. "What'd you say?"

"Told her about Kai's kindergarten. How they went out for recess until minus ten." I sipped wine and smirked. "She said," I put on my drawl again, "*Well, I bet you think we're just silly closin' over a little cold weather.*" I set my glass down and sighed, remembering. "I told her no way.

People in Alaska don't mess with cold. That shit'll kill you."

Leif's voice dropped an octave. "Yep."

I told her how it isn't just cold that's dangerous, though," I continued, voice lower now as I eased into the past. "How zero might seem pretty bad here, but thirty-five in February--now *that's* dangerous." I reached for him, wiggling my hand under his shirt, fingering his scar. He drew me close and laid his lips on my forehead. Nearby, our children whooped and squealed in a cabin-fevered frenzy.