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Faith in Engineering

In the spring of 1982, while the world watched in puzzlement as a war erupted out of nowhere between England and Argentina over an archipelago almost nobody ever heard of, my mother was incinerated on her way to work. On the morning of her death, she tossed her briefcase onto the back seat of her BMW 302i and drove east from our home on West Pacific Avenue into predawn darkness.

What was she thinking? Given that she was a nuclear engineer, it could have been about the progress and prospects of Britain's nuclear-powered cruisers racing across the equator to launch missiles at their Argentine adversaries in the South Atlantic. But more likely it was about her job—the lone woman, apart from administrative staff, on a team of nine assembled by the Department of Energy to design and test prototype casks for the dry storage of radioactive waste generated by nuclear power plants.

It was a long drive to the DOE's lab in Livermore, but my mother placed great value on her quiet commute through the twilight of the East Bay roads. She believed her best solutions came to her when she was alone and unencumbered by a drafting board or technical manuals or a phone, all those distractions to the free functioning of a brilliant mind. Driving apparently did not qualify as a distraction.

The traffic was sparse as she trailed a double tanker—one tank loaded with standard gasoline, the second with jet A fuel—into the single eastbound lane of the mile-long tunnel that had been bored through the Berkeley Hills. All the investigators, from the local cops to several federal agencies, agreed on what happened next. The tanker properly slowed down in the tunnel, but my mother, an incorrigible tailgater even with her kid in the car, did not. While both vehicles were on the move, the BMW made contact with the rear fender of the tanker. There was much speculation about how the sturdy but relatively tiny car could in any way alter the path of the twenty-five-ton tanker truck. But apparently, it did, just enough to jolt the truck driver, who jerked the steering wheel to the left and in so doing made contact with the five-foot tall barrier of horizontal steel beams

separating the bi-directional lanes. Reflexively, the driver cut right and scraped the tunnel wall. So, reflexively again, he cut left. Here, the great beast took on a life of its own—official language, “driver lost control of vehicle”—and flattened a portion of the divider. The cab and middle tank, the one with the gasoline, careened sideways into the oncoming lane, breaking the three-part rig into a double jackknife. The cab and the gasoline tank tumbled onto their sides, dragging along the second tank with the jet fuel. After a short ride, everything skidded to a stop, followed by a trail of gasoline gushing from of a ragged yard-long rupture in the tank.

Uninjured in the fortified cab, the driver kicked open the door above him. He took one look at the electrical lines from the tunnel lights the hurtling truck had knocked loose and left hanging near the pavement, jumped to the roadway, and began to run. Cars in the city-bound lane had backed up, and as he raced past them he yelled for the drivers to abandon their vehicles and do the same.

On the other, reverse-commute side of the crash there was only my mother. She too must have had a clear view of the live wires and possibly the spreading fuel spill. And she, unlike the folks on the other side of the wreck, could have backed up her car, which had only minor damage to its front end, right out of the tunnel since the nearest vehicle behind her was still about a mile from even entering the tunnel. But she did not. What my mother chose to do was exit the car, shoulder her brief case, and walk a short distance to a red exit door in the tunnel wall, still illuminated above by an emergency light. She pushed the panic bar, but the door, which by law could not even have a lock, did not move. She pushed harder. At this point, or at some other point when my mother was engaged with the door, the sparks from the hanging wires contacted the flowing gasoline.

In one of the government reports, it was noted that the public impression that followed could have been much worse if it was the jet fuel that was spurting toward my mother but was dead wrong. In fact, unless it is sprayed—meaning it is mixed with oxygen—directly into a flame, jet fuel has poor ignitability. Run-of-the-mill gasoline, on the other hand, has a lower flashpoint, which was more than satisfied by the heat from the live wires. The spill ignited into a fire that backtracked through the gash and into the tank. The opening proved to be large enough to allow passage of the oxygen needed to cause the fire to spread to what remained of the seven thousand gallons of original cargo. The interior pressure built, and the tank shell of quarter-inch aluminum resisted long enough for most of the people who abandoned their cars to see the light at the western end of the tunnel. The commuters who stayed in their cars probably had the time to consider the error of that decision when the tank detonated against the tunnel walls and vaulted ceiling and propelled a monstrous tidal wave of red flames and black smoke at them. Certainly the few seconds they did have was more time than my mother had as she refused to abandon her efforts at the emergency exit or, probably, her thinking that she was going to be late for work.

Bobby Rellahan had brilliant crimson hair, a face scattershot with brown freckles, and pale blue eyes that in time also took on a red glint whenever he looked at me. He was a year ahead of me and a precocious star on the varsity lacrosse team, which in the preppy macrocosm of UHS was as good as being an all-state quarterback anywhere else. As with most high school sport celebrities, he was rarely alone. We sat on opposite sides of the room in Precalc, and one or another of his toadies was always leaning toward him whispering or choking back giggles at Bobby's witticisms. They were mainly his teammates but not exclusively. The drama girls had tried to talk him into joining the *Carousel* production, and even though he laughed it off, they started sitting at his table in the lunchroom and penning him in on the lawn where he hung out after the final bell when he didn't have practice. The math teacher himself, an expat Brit spinning his wheels in his fifth year on a PhD track in applied math at Stanford, tended to glance toward Bobby when making an easy point.

"You will recall that a dot product is the product of two vectors, the result of which is, Mr. Rellahan?"

"A scalar," said Bobby, indifferently.

The teacher, Mr. Scofield, smiled as if it was he who had earned Bobby's approval.

I was the only freshman in Precalc, the result of my mother swooping into the principal's office brandishing my test scores from the summer math camp I attended in Santa Cruz after middle school. Scofield was there, and after tossing me a couple of softballs about functions and polynomials said he could think of no reason to exclude me from his class. Probably Scofield was less impressed by my answers than by my mother, who just casually mentioned her research at Livermore into boron-impregnated metals to absorb gamma rays. Scofield sat straight up and may at that point have been willing to hand me a diploma if my mother so requested. It was Scofield again who began class one day by pulling the latest issue of *Smithsonian* from his satchel and displaying with naked wonderment the group photo of my mother's Livermore team with her front and center and the accompanying article on saving civilization from the scourge of radioactive waste.

Until that moment I was the classroom nonentity, a role I was happy to occupy and one silently condoned by Scofield, who corrected my homework and tests and otherwise acted as if I was sitting on the roof of the building during class. But Scofield could not justify passing the magazine around the classroom and then posting the first two pages, including photo, on the bulletin board outside the math office without first explaining why his students should be interested in all this.

"One of the lead researchers," said Scofield, covering my mother's chest with his forefinger as he held up the article, "is the parent of our young LaMott here." He shifted his gaze toward me as did every one of my eighteen or so classmates, each one with an expression that would have

been no different had Scofield informed them that young LaMott here was leaving school to scale Mt. Everest.

That night my mother grinned when I told her what had happened. She said the article was filled with generalities, irrelevancies, and inaccuracies, almost all of them intentionally planted by her and her colleagues, who didn't want the world to know about their real progress or lack thereof.

"The whole piece was just a DOE publicity stunt. But we all loved the photo."

She touched her hair, styled short so she only had to pass a comb through it before dashing out the door in the morning. When I was younger, after my father abandoned us and we still pressed up against each other on the couch watching *Happy Days*, she would let me draw my palm across the shiny black fringe that stopped in an exact line just above her eyebrows. I was entranced by the feel of it, soft and smooth and sometimes electric. She said in Japan they called such hair a *bōru sanpatsu*, an upside-down bowl.

That's what I was doing—combing my hair, which was just as black and straight as my mother's, at the sink in the locker room after gym—when Bobby Rellahan entered my world. As a player on an interschool team, he was exempt from gym. During the class, he sat in the bleachers joshing with his cohorts as the rest of us squirmed through calisthenics on the basketball court. As my abs burned from leg lifts, I squinted up at Bobby's group and the other clusters of teammates and cursed myself for not being athletic.

I didn't notice him standing behind me until he clamped his hands on my shoulders. He was taller than me, and his eyes met mine in the mirror over my rebellious black mop.

"You must be so proud of Mama-san," said Bobby.

I tried to shift sideways, but his grip tightened.

"But it doesn't make sense to me," he said.

"What doesn't?"

"Oh, maybe you haven't heard about Hiroshima and Nagasaki. Why would Mama-san want to get anywhere near that stuff?"

Was this a serious question or just crypto hostility and a threat? Of course, I wanted to stand up for my mother, but I was also wondering if any answer I gave was going to cause Bobby's big pink fingers to move inward around my neck.

Finally, to the mirror I said, "It's energy, not bombs," but Bobby had already left. I said it anyway, hoping it would make me feel better. It didn't.

When passing the math office, I skulked along the opposite wall of the hall trying to concentrate on my feet, but the *Smithsonian* pages and the index card with Scofield's handwritten explanation of UHS's connection to the critical work of protecting humanity exerted an irresistible magnetism. That's how I became aware of the small piece of artwork added to the photo—the circular peace sign drawn in red ink over my mother's face.

Several days later Bobby walked into Precalc with a "NO NUKES" button emblazoning his shirt pocket. I had unpinned the *Smithsonian*

pages from the bulletin board, balled them in my pocket, and trashed them on the walk home. Scofield made no further mention of the article or its absence and resumed teaching as if I wasn't there. Not so with Bobby, who I caught watching me when Scofield wrote on the board with his back to the class. I locked my head forward and still felt his glare drilling holes through my head. Between classes, when I saw his unmistakable redness approaching from the other ends of the halls, I fled straight to the nearest stairwell or empty classroom. This made me late for some class or other a couple of times a week. When it happened the third time with World History, I scored my inaugural after-school detention. The next time it happened, the history teacher told me I could explain myself to the vice principal.

At lunch Bobby was too engaged in beguiling the girls to pay me any mind even though I was in his sights at the regular table I shared with a couple of Asian boys who rarely lifted their heads from their textbooks. Eating became misery, and I had to throw out most of the empanadas and burritos our housekeeper, Angela, packed for me. I moved to a vacant table in a corner behind a trash bin and faced the wall. Still my stomach rolled and rumbled, and mainly I just waited for the bell so I could be the first to rush out of the lunchroom way ahead of Bobby.

When I was summoned during biology to the counselor's office, I was certain that Bobby would be there waiting for me and we would be told to explain what was going on. Probably Scofield was seeing more than he let on and had decided to intervene. As I descended the vacant stairwell as slowly as humanly possible, all the eventualities that swarmed through my head were ugly. The best I could hope for was that the counselor would ask me if I was being bullied, and I would say no ma'am and then ask Bobby if he had an issue with me or my mother, and again the answer would be no. At the other extreme, the counselor would grill me relentlessly until I cracked and described the insults Bobby directed at my mother in the boys' room and my certainty that he or some asshole under his command had mutilated my mother's photo. It would make no difference; the result would be the same. Bobby would change his view of me from a mere object of his bigoted derision to a legitimate threat to his security and eminence and turn my life into a living hell. By the time I reached the counselor's door I had run through three more options—running away to Canada, sneaking up behind Bobby with a baseball bat and avenging my mother's sullied honor, and ending my life with a headfirst dive through a third-floor window.

But what I found in the counselor's office was Angela, sitting with her back to me in one of the two chairs before the counselor's desk with her two-year-old, Evie, balanced on her thigh and her three-year-old on the floor filling in a page in a coloring book. The counselor, a woman named Annette Mazzella, who had long violet finger nails, stood behind her desk.

"Shiro," she said.

Angela turned, released a cry of agony, and rushed up to embrace me.

Evie, who she was still carrying, got squeezed between us and also began to wail. I looked around the office. No doubt about it, Bobby wasn't there.

After Angela composed herself, Annette Mazaella told me about the accident and that Angela would walk me home. Just inside the front door, Angela handed me Evie and raced through the house unplugging the television and all the radios fearing that I would be exposed to what every news outlet in the state was broadcasting almost nonstop. Later in the afternoon, the DCSS social worker arrived and then my mother's boss, Dr. Cronin. The social worker asked if I knew where my father was.

"No."

"When was the last you heard from him?"

"When I turned seven."

"Did he call?"

"He sent a card."

"Ah, from where?"

"Cambodia. It had Cambodian money in it."

"That was nice of him."

"It added up to about eight dollars."

The social worker smiled.

"Do you know what Cambodian money is called?" I said.

"I do not."

"Riels. They're pretty, but they're not worth much."

It was determined that the only relatives I had whose existence could be confirmed were my mother's octogenarian parents, who still lived on their sugar beet micro-farm in Hokkaido. Dr. Cronin had been my mother's PhD advisor at Cal-Berkeley and the one responsible for bringing her to Livermore, a tall man who stood in the back row of the *Smithsonian* photo. He was also the executor of my mother's will, which named him and his wife my guardians in the event my mother died or became incapacitated. Dr. Cronin paid Angela for a month out of his pocket, locked up the house, and drove me over the Bay to his home in Orinda.

The Cronins had nine children, six still living with them. Their home, which they called the Ranch, had so many bedroom add-ons, all jury-rigged by Dr. Cronin and his army of teens, that it looked more like a dorm constructed over many summers at a Boy Scout camp than a seven-figure property in an upscale San Francisco suburb. The evening I arrived I was promptly given my own room, once occupied by the Cronins' eldest daughter, now a ranger at Lassen National Park.

"The cats may drop in on you," said Mrs. Cronin.

Very true. I had never had a pet. Over the next week, they slept on the pillow against my head and woke me in the middle of the night hacking up their cat food and getting into screeching skirmishes that lefts balls of fur that stuck to my socks as I walked to the bathroom in the morning.

The Cronins were strict Catholics—the nine kids. Before meeting her future husband, Mrs. Cronin had been a novitiate with the Carmelite Sisters of the Most Sacred Heart of Los Angeles. Now the family also held a

Shabbat observance one Friday a month and had family readings from the Quran during Ramadan. Otherwise the Church of Rome was intensely present. At the dinner table, Dr. Cronin was fond of relating miracles from the lives of the saints. My favorite, the one he told several days after my arrival to joyous appreciation from his family, except for Mrs. Cronin who sighed and rolled her eyes ceilingward, was St. Margaret the Virgin. Margaret, who lived in Antioch in the second century, was swallowed by Satan disguised as a dragon. But the cross she fiercely refused to surrender before being slurped her down gave the dragon indigestion, so he spat her out. Eventually the heathens beheaded her. Beheadings would tie up a lot of Dr. Cronin's saint stories.

After dinner on my first night there, the Cronin clan raucously hammered out a plan wherein they would take shifts looking over me back in my house on West Pacific so I could go back to UHS and not squander the full year's tuition my mother had paid. Their youngest, Dimitri, was eighteen and attending San Francisco State, and two others worked downtown. But mainly it would be Mrs. Cronin who would stay over. The plan was sound, but it didn't last.

After the fog of funeral week, through which the whole Cronin clan ferried me every step of the way, I was back at UHS. My fear of Bobby seemed like a bad dream, still troubling but distant. I stopped scurrying to hide like a scared rabbit when I spotted him and his retinue in the hallways, and he no longer impaled me with the evil eye as Scofield turned from the class to write parametric equations on the board. Annette Mazzella pulled me out of gym, and I told her all about the Cronins and the cats and how they were going to take turns staying with me in my own house. She seemed pleased by this, which pleased me. So, I also related the story of St. Margaret, which made her wince. Then she asked me about my mother. Did I feel sad? Yes. Did I miss her? Yes. What did I miss the most? Sitting on the couch together watching television. There were other questions, and with each answer I gave my voice sounded farther and farther away. She handed me a tissue, which I held uselessly until she told me to blow my nose. We were quiet for a bit, and then she sent me back to class.

The next day there was another picture, this one taped to the door of my locker. A few girls had gathered in front of it, wide-eyed and whispering as I approached after the final bell. They made room for me but didn't leave. This was too good. It was a shiny page torn from a supermarket tabloid. Above the photo was a headline, below it a caption; there was some handwriting. Without pausing, I carefully detached the tape from the metal door, folded the page, and slipped it into my notebook.

"Sorry, girls, no show today," I said. But I said it to the empty air when I was already out of the building, taking Lyon Street back home. Late again.

After Dr. Cronin wrecked both his knees slipping off the trail at Los Padres on a weekend trip with his Christian men's hiking group, he tried for a time to maneuver in and out of the lab rooms at Livermore in a wheelchair. But

it was long before the days of wheelchair-friendly work places. His visits to his colleagues were tortuous and decreased in frequency. Little by little he began to lose touch with the details of the research. He voluntarily stepped aside as the team leader took a pay cut and jumped back into the science. But he had gotten too comfortable being a manager. The acuity of youth could not be reanimated, and the codeine he took for his ruined knees had the disturbing effect of making him view his correct equations as revolutionary and his errors as irrelevant. So, Dr. Cronin was nudged into retirement with a full, fat pension.

By this time I was in my third year at Miramonte, the public high school in Orinda with AP courses that made the toughest classes at UHS seem like wind-surfing instructions. The Cronins had adopted me, as they had two others, which I was stunned to learn even though my new brother Forester was a full-blooded Ojibwa who looked a lot more like me than any of his other siblings.

At Mrs. Cronin's stern urging, Dr. Cronin started weening himself off the opioids. But he still needed something, starting with a midday infusion of Jamaica Blue Mountain Mist, cabernet sauvignon, and a splash of lime-flavored seltzer that collectively filled a thirty-six-ounce mason jar right up to the lip. With all of her first nine kids off at college, married, or working, Mrs. Cronin spent her days canvassing for the Sierra Club or laboring in the community vegetable garden in Oakland. So, after a career of scholarly collaboration and a rowdy welcoming committee at home, it was now just the cats who kept Dr. Cronin company as he watched the hours pass in the immensely vacant Ranch. Stepping off the school bus, I would find him outside sitting on a lawn chair in the shade of the ash tree cradling the mason jar on his thighs. I would sit on the grass and tell him about my classes and my progress on the bowling team. It was on one such occasion that he cast a fresh light on my mother.

I had to come up with an individual project for Physics. My idea was to measure the rate of heat loss from containers of different metals. It seemed like a legitimately scientific endeavor, but I was stalled by two questions that I presented to Dr. Cronin. First, where would I get containers of different metals? Second, and more important, was there any real-world value to such an experiment?

He looked like he was trying to center me in his field of vision. The mason jar on his lap was empty. I didn't know then but would learn when I was older that there were multiple daily fillings of the jar around this time.

"Your mom would have been the person to ask," he said.

"But she was more about keeping heat inside a container," I said, thinking myself quite knowledgeable about my mother's work.

Dr. Cronin—I actually did call him Dad at this time—chuckled.

"Ah, the myth of the cask."

"Myth?"

"That's what we called it. But there was some truth to it, like all myths."

“I don’t understand.”

“No, you wouldn’t. Your mom would never have leaked a word. Actually, she did work on the waste casks maybe two days a month. So, when we said that, when the department said that’s what we were doing, it was true. But for all of us, her too, the real work was designing cladding for tactical warheads.”

“She made missiles?”

“Just the cladding. The work was spread out to all the national labs, for security. She was so sharp. They were still trying to replace her, replace her productivity, when I left.”

He then started talking about my project. It was a strong idea, he said. There were many applications, internal-combustion engines, HVAC equipment, co-generation. He said he could help me find the materials I needed.

It was a warm, dry East Bay afternoon, but my hands had gotten cold. I was nodding as Dr. Cronin talked, but after the first couple of things he said it seemed he was speaking backward. What I was really hearing were the mocking words of that prick Bobby Rellahan and feeling his hot breath on the back of my neck back in the boys’ room.

The yeasty aroma of baking bread welcomed me at the house on West Pacific. Quietly, I lowered myself into a chair at the kitchen table. Mrs. Cronin poured me a glass of her homemade lemonade. I smoothed the tabloid page before me and waited as she bustled from mincing onions near the sink to the refrigerator to the oven, readying our dinner.

“What’s this, Shiro?” she said, passing near.

What it was, mainly, was a grainy photo of the tunnel wall and emergency door after the fire had burned itself out and the toxic fumes settled. The red door was darkened by smoke damage. Other than that, the purpose of the picture was not readily apparent. The headline above, “The Shadow of Death,” helped a little, but the full explanation was in the caption below. The words guided the reader to the center of the door where there were black blotches with no more discernable shapes than a thunderhead or an oil spill that had formed on the ocean’s surface. “But this is more than a dirty door,” insisted the caption. “The circular marks and the narrow extension are, in fact, the ashes of Natsuko LaMott, who is believed by federal and state investigators to be the cause of the tanker accident and fire that killed seven people, including herself, in last month’s hellish catastrophe in a highway tunnel ten miles east of San Francisco. The fire was so hot—nearly 2,000 degrees Fahrenheit—that it instantly reduced LaMott to dust and transferred a replica of her body to the door. Look closely and you can see the form of her head, shoulders, and arm.”

It didn’t stop there. Added by hand to the caption with a caret between “The” and “Shadow” was the word *NUCLEAR!* Further down, in a white space near the photo, the handwriter added, *What goes around comes around.*

Mrs. Cronin bent closer and closer to the page, her head moving minutely up and down and side to side as she assembled the pieces.

Through her teeth, she hissed, “Jesus, Mary, and Joseph.”

She asked me where I had gotten it, and I told her that and everything else, from Scofield bringing the *Smithsonian* article to Precalc to Bobby cornering me in the boys’ room and the “NO NUKES” button on his shirt and me scurrying to hide when I saw him in the halls and changing where I sat in the lunchroom. Once it was all out in the open, it didn’t seem to add up to much. But it was enough for Mrs. Cronin. She turned off the oven, put the page in her purse, and marched me straight back to UHS and the principal’s office. By the next Monday I was enrolled at Miramonte with, ridiculously, only one month left in the school year.

The evidence stayed at UHS with the principal. But before the Cronins and Cronin kids converged on my house to pack up my belongings and move me permanently to the Ranch, I went from market to market along California and Clement streets and finally took the bus downtown and hunted the outdoor newsstands until I found a rain-stained copy of the issue. The night after Dr. Cronin told me the truth about my mother’s work at the lab, I lay in bed with the page. Weeks after the accident, he assured me that the claim made by the paper was preposterous. The temperature of the explosion would need to have been more than twice two thousand degrees to have rendered my mother into dust. More importantly—this was not spoken, but I knew it—her body was found, complete, where she had fallen to the tunnel floor. This was right near the emergency door, which would not open because on the other side a mop dropped by a maintenance worker had jammed it shut.

The image still wielded a power over me. If that was not my mother’s darkened image on the door, then why did the rounded top of it so match her *bōru sanpatsu*? And why also did the blurry extension look like an arm, just as the paper said, reaching for the panic bar? That’s how I imagined it happening. Just before the tanker truck detonated behind her and others ran as fast as they could, my mother refused to budge from her conviction that this door would open as it was designed to open and save her life as it was supposed to.

I returned the page to where I kept it with my father’s riels at the chapter on St. Margaret the Virgin in the copy of Butler’s *Lives of the Saints* the Cronins had given me for Christmas. I liked reading about the miracles and all the fantastic ways the martyred saints had been nailed, boiled, and hatcheted to death and, always, their unwavering faith that they were living and dying as god willed, so much like the faith my mother had in how the world should function. She had no religion at all, and, as far as I knew, neither had my father. I carried on their absence of belief quite naturally, never seriously wondering if I should think any differently. Perhaps the Cronins were hoping their book would inspire me to want to be baptized into Catholicism. But they hadn’t asked that of me and never would.