

## THE QUALIA ENGINE

by Damien Broderick

Damien Broderick, who has been called “the Dean of Australian science fiction,” these days lives mostly in Texas. His recent popular science book on paranormal minds was *Outside the Gates of Science*. Damien tells us that a recurrent SF theme that has gripped him since childhood is the saga of superintelligent children struggling to come to terms with an unsympathetic world and their own gifts. That theme drove poignantly through many memorable stories, from A.E. van Vogt’s *Slan*, Wilmar Shiras’s *Children of the Atom*, and Mark Clifton’s “Star, Bright” to Heinlein’s “Gulf” and *Friday*. “The Qualia Engine” is the author’s tribute to those classic tales, carrying forward the legend of a first generation of uncomfortably bright *Homo novissimus* to ask what happens to *their* offspring, the grandchildren of the atom.

1

My sixteenth birthday was early spring, in effect, instead of late winter, that winter-spring when the bees continued to die and die.

For a long time nobody knew why that was happening. I suppose specialists in the honey business were on it sooner than most, watching their apiaries emptying and shutting down, the poor bees stumbling about on the ground, forgetting how to get up in the air, dragging themselves round in confusion and then drying up dead. Soon enough the agribiz guys also grasped that their free pollinators were dropping like, well, flies.

I know what it feels like to be one of those poor flightless bees.

The stranded bees were one of the mysteries of science, of which I understood there were many, and even I couldn’t expect to ace all of them. You do have to try, though. I stood waiting for the bus at 8:15 in the morning, thinking about ants and other topics. This was the last day of my life that I’d be obliged by law to wait for this damned daily humiliation, but that didn’t mean I was off the hook.

In our neighborhood, nine-tenths of those parents competent or fortunate enough to have kids in high school senior year insisted on the bus, even for those old enough to drive. Gas conservation was the cause of the month. Hey, fair enough, although it was obvious, if you thought about it, that peak oil was no more than a blip in the future energy curve, soon to be forgotten. Long before we ran out, hard-edged R&D would find a replacement, and simultaneously mend the greenhouse crisis. Some of my friends were working on it in their spare moments, of which they, like I, had plenty, time-sharing the appalling waste lands of the classroom.

Didn’t make me relish the ride.

It was pretty full that morning, and I was stuck with half the empty seat next to Cliff Dolejsi, jock. “Dude,” he was telling his phone, “I’m wasted. Yeah, man. I porked that bitch in her daddy’s Mercedes. Totally, dude.”

This went on for a while. Up and down the bus, most of the others were busily texting, but that was too arduous a task for my companion. I tried to find some comfortable way of sitting that didn’t put me in his lap.

“I’m on the damn bus,” he explained. “Yeah, on the bus. School sucks. On the school

bus, dude. Where are you? Yeah, man, she was screaming for it. No, on the bus.”

According to rumor, Dolejsi had scored with most of the cheerleaders, and for once I didn't doubt public opinion. His excruciatingly repetitious report to Dude held no tincture of braggadocio; he was just relating the facts.

What made me grind my teeth is that Dolejsi was not unusually stupid. In two months he'd be graduating, along with the rest of us seniors. He was about as smart as, say, Xander Harris in *Buffy the Vampire Slayer*, or Prince Myshkin. No, scratch that; the prince, a saint, was not to be rated so simple-mindedly. Cliff Dolejsi was.

He shifted on his muscular left buttock and I took my chance, squirming further onto the rest of my seat. In disbelief, Dolejsi slammed his right elbow into my chest.

Having read the U.S. Army Ranger Handbook, I know eight silent ways to kill a man, plus some noisy ones. I twisted full on to Cliff, took my very sharp hexagonal section yellow RoseArt 5PK pencil from my pocket protector and clenched it between my right index and little fingers. I seized his ears and pulled his face across to me, where I kissed him slobberingly on the mouth, with plenty of tongue. Dolejsi went into a rictus of gay panic and disgust, slammed his head backward into the side window, and howled like a stuck pig. Which by then he was. I pushed the pencil in under his upper right eyelid, bumping and fracturing the thin bone, in through the socket, and deep into what he'd been pleased to call his brain, where I churned it around for a while, tearing the frontal lobes from the thalamus as his body convulsed and hammered the back of the seat where Judy Frick and Phuong Nguyen had jerked their heads around, staring in revolted horror at the—

Of course I didn't do any of that. It's messy, and they wouldn't let you forget it. I oofed at the elbow strike, clenched my teeth, and remained mute. He went on yacking as if nothing had happened. Nothing had happened.

“No, dude, still on the bus.”

For a long moment I did try to imagine just what the hell it could be like, being a jerk like Dolejsi. Or to be anyone else in the bus, for that matter. I couldn't do it.

Was brain-power, raw and cooked, the gap dividing us? Well, obviously, in part. But I decided everyone was in the same leaky boat, really. And maybe that was the problem. Not just the Hard Problem, as the philosophers rather quaintly called it, but the Big Problem.

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After school, I walked a mile to audit a perceptual psychology lecture informally, and ended up sitting at a table in The Genteel Pizzeria, catty-corner from the university's Physics, Engineering, and Computer Sciences wing with my three best friends who'd gathered for the event (my birthday, not my routine bus ride from hell nor the Dearth and Death of *Apis mellifera* and her sisters).

I said, “I've decided what I'm going to do with the rest of my life.”

We were speedtalking in Lhasa Tibetan that day (our pronunciation was probably terrible), dropping into clipped English as needed. The only possible downside was the slight chance that some panicky idiot might imagine we were Al-Qaeda terrorists, plotting in Arabic, and drop a dime on us to Homeland Security. Unlikely. Besides, nobody else in the

place was listening; who eavesdrops on kids, especially nerds?

“Oh yeah?” Marius picked up a chicken thigh, dipped it in sauce, gnawed with gusto. “Let’s see, the top ten list of what you’ll do with the rest of your life. Power your way through to the mega-prize on *Survivor*. Discover the Higgs particle in your garage proton accelerator. Did I mention getting laid by supermodels ‘til your ears bleed?” He carefully put the naked bone on a paper plate and grabbed another, fully fleshed, crispy-browned, herbed and spiced.

“Saul’s the sensitive type, you maroon,” Ruthie told him. “He’s extending the Bible Code to the genome.” Ruth was the youngest of us seniors, only fifteen, total advanced placement with a perfect 2400 SAT (oops). Geek-grrl compleat: flat lifeless hair dragged back and cinched at her thin neck, big glasses the better to see you with and peer at distant galaxies besides. Rudimentary wearables in her flak-jacket-styled denim. I’m not judging—me, with the style sense of a contestant on *Beauty and the Geek*.

“Then,” Ruthie added complacently, “he’ll solve the monetary crisis.”

Jane said, “Saul despises faith-based initiatives of all kinds. He is developing a new fuel source that will close down the cartels and bring peace to the Mideast and then the world.”

“Shut up, you guys,” I said. “I decided this morning in the bus. I’m going to solve the Hard Problem.”

“You’re telling me none of those is hard?”

“With the supermodels,” said Marius, “for about thirty seconds.”

“Ma-arr!”

“Chalmers,” I said. I foraged in my blue vinyl JanSport backpack with the ‘leventy-seven zippered pockets, snug against my right sneaker on the floor beside me, my laptop tucked away safely from slopped condiments, and pulled out *The Conscious Mind*. “Block, Dennett, Hofstadter, Damasio, Edelman, Hawkins, Searle, McGinn, the Churchwoods—”

“Oh,” said Janey, “*that* Hard Problem. *Qualia*.”

“And what’s one of those?” Marius was peering up at the menu.

“One of those is a *quale*, singular.” Not at all to my surprise, Janey pronounced it correctly: kwah-lay, rather than quail. “Qualia, plural. Raw feelings.”

“Oh, right. I’ve never heard it pronounced before.” That happened to us all the time; even when you’ve read right through Webster’s or the OED, stuff sometimes doesn’t stick without a context. “Units of consciousness, sort of.”

“So what’s the problem,” Ruthie asked, “and why is it hard?”

“Capital-H hard. Because qualia seem kind of *unnecessary* and *superfluous*. Why would evolution build them into us? It’s like ... Well, do I *have* a body, or *am* I a body? No, that’s not it, either. Why do we see red and taste sweet and hear plangent, all those

completely different sensations?”

Ruthie pounced. “We don’t always. Synesthesia, that’s a condition when the senses get mixed up.”

“I’m not getting this across. What’s it *like* to be a *bat*?”

“What’s it like to bat a bee?” asked Marius instantly, blithely.

I felt frustrated. Why couldn’t they feel what I felt about this? I said, “Like, why do we *feel* stuff instead of just computing it.”

“We *do* just compute it,” Ruth said, an edge to her high-pitched child voice. “What were you just saying about faith-based—?”

“The brain’s *not* a computer,” Janey said. “Neurons aren’t logic gates. Has the failure of the AI program escaped your attention? Earth to Ruth.”

Ruth stamped her foot. “Don’t talk crap. Your logic sucks, Janey. Pay attention. Empirical premise: current computers *as of 2009*, just like those of 1949, are *not yet* brains. Your brilliant conclusion: brains are not computational.” She sat back, looking smug. “Spot the logical lapse?”

“Oh, shut up. If you’re going to appeal to some undefined computation on futuristic architectures that don’t exist yet, how can you lose? And if you think you’ve won, what do you think you’ve won?”

“Delicious as this banter is, dear friends, I’m outta here.” Marius hoisted his own laptop, slipped off the stool, bounced on his Reebok’d toes. He punched me in the shoulder. “B-Day, dude. But hey, yeah, I’m in.”

“Cool,” I said. 2 heads ] 1 head, but then *greater than* does not always equal *better than*. Consider a pile of elephant manure. “You guys in too?”

“Someone’s got to educate you idiots,” Ruthie said, and Janey added, dryly, “No Problem too Hard, no Solution too Hygroscopic.”

I said, intelligently, “Huh?”

“Dehydration 101, doofus. Google it. ‘Bye.’” And they were gone, arm in arm, like a pair of plotting twelve-year-olds. I wondered how it felt to be a girl. And of course, noticing myself wondering that, I had to smile. Those kids were just bats.

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The reason we knew each other so well is because our parents were some of the so-called “Atom Kids,” which was a slick cover-up for what they really were, which is the first crop of plasmid-injected, crudely genetically engineered humans. (Much of this bizarre history I did not learn until later that night.) Just five years after Crick and Watson first announced the structure of DNA. All the ‘rents were born within ten months of the Los Alamos nuclear lab accident on 30 December, 1958, when a poor guy code-named K. splattered himself with three kilograms of plutonium in solution. He was dead a day and half later, his ruined heart cooked by twelve thousand RADS of ionizing radiation. Two other

workers had been in the next room, shielded (lucky for them!) by various sturdy tanks. The near-coincidence was later noted by a diligent security publicity officer and starred in case it was ever needed as a cover story.

*None* of our grandparents was anywhere near the DP West building complex, which was located thousands of feet from any living or routine working quarters. They *were* all stationed in the general vicinity, in the extremely secured Biowarfare Unit, where the women went through the discomforts of primitive experimental IVF. Did that matter to the media, forty years later, when a garbled and massaged version of the actual incident was released? You think? Lapped up the nuke version like tame puppydogs. Those poor all-American fetuses, born late in 1959 to parents whose gonads were accidentally exposed to the frightful rays of the atom. But wait—it's okay! They turned out fine! No sign of illness except for some hairline scurf, red watery eyes for a few weeks after birth, and some temporary spikes now and then in their blood work. And what's more, Lord be praised, their own kids, the not very attention-grabbing grandchildren of the atom, were in good shape, also, making solid grades in school. Next story.

We'd been trained from infancy to keep our lips zipped and our lights well hidden under a bushel of general competence. Ruth, the youngest, chafed under those restrictions and could not help showing off a little; hence her SAT scores. But nobody, except for us and our folks, knew that she was pumping scads of freeware code into the net, everything from patches for Microsloth bloat to Linux tweaks and CGI shortcuts for YouTube homies, as well as freelancing for the big operators.

Me, I did well enough in class to deflect unwelcome interest from teachers and administrators, as my parents had done when they were kids, until the brief bubble of exposure that was swiftly burst by the brilliantly conceived "accelerated schooling" scheme that ran interference on them for several years and allowed them to sink back out of sight as quickly as humanly possible.

More exactly, as superhumanly possible, I suppose, but the key part of the equation was the greater world in which they were immersed, those several billion *Homo sapiens sapiens* with a mean IQ of one hundred and a sigma of fifteen or sixteen points. Only a modest proportion fell in the diminishing tail beyond three sigmas either side of the mean (the bell curve being what it is, a map of what happens when tens of thousands of alleles jostle together in the gene pool and out paddles a new little person). Those on the right tail of the graph were the 2 percent or so who could join Mensa because they'd aced the test and wanted to sit about all night talking to other lonely people about humungous test scores and doing fearsome crossword puzzles and fun stuff like that. The Terman Longitudinal Study of gifted children, say, of whom you didn't hear much these days. Out farther along the tail were the real frighteners with IQs up in the 190s and 200s, of which the whole history of the world had seen only a sufficient tally to cram into a large SUV. And off beyond *those* human geniuses were radical outliers who simply didn't exist in nature, and hadn't prior to 1959, because the thorny paths up Mount Improbable were too steep. You can't get there from here. Unless someone carried your genome up in a plane and parachuted you in at the peak. Hi, Mom! Hi, Poppa!

Hush, little baby. Keep your feet tucked under the table, heads down, don't make waves, and other mixed metonymies and synecdoches.

I went to Billies gym above Jakes Bodyworks on Main after I'd spent an hour in the library stacks reading agalmic political theory (Ruth's recommendation) and waiting for my gut to digest the evil but delicious load I'd subjected it to at The Genteel Pizzeria, and

burned it off in hard sweaty sets of weight work and aerobics, showered for the sake of politeness, changed into a rather worn cotton uniform for my thrice-weekly drills in the adjoining dojo, fell down and got hit a lot less than I had when I was a kid, broke no bones in my own body or anyone else's, took a more serious shower, then went home to the formal birthday party I knew the parental units would have cooked up, even though I'd told them not to. I really would have preferred to rustle up something for myself, as usual, out in my self-contained studio apartment, blasting away with what Mom called "that abominable pseudo-musical noise," then take Scarf for a long walk along the river before an early night. I wanted the solitude to think about the Hard Problem. No such luck.

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*Smallville* music, care of Janey the ironist: The Cult, Missy Higgins, Depeche Mode, Diamond Nights. Fragrant steak and tilapia cooking on a griddle. Salad dressing sharp with cider vinegar, garlic, and virgin olive oil. Laughter and babbling, people drinking soda, not many drinking anything more serious. A man I hadn't seen in too long stepped through the door to the back porch, and I said, "Hey, Father Paul. Or is that 'Monsignor' these days?"

I felt a burst of cheerfulness, seeing Paul Westfall here, even if I was still angry at my parents for the inevitable party. He was outfitted in clerical black, must have flown straight in from Chicago especially for my birthday. A few months earlier, I'd overheard my father say, "So he's wearied of treading water in the Holy See. Paul must be a major headache for them in Rome, L.C. They can't canonize him, because he's not dead. They can't send him a writ of excommunication, and then burn him at the stake, because—" L.C. had said sharply but quietly, and I wouldn't have heard her if I hadn't been deliberately eavesdropping, "Hush." My mother is pious to the point of mania, having been infected, along with Paul, by a charismatic Thomist at a tender, vulnerable age. Dad, not so much. Me, I'd announced my agnosticism at seven, then my embrace of full-blown atheism two years later, devastating Mom. But what can you do? This, and other things, flashed through my mind as the priest turned with his big smile.

"You can still call me Paul, for gosh sake. Good to see you, kiddo. Happy birthday! Here, gimme a Saul-and-Paul hug." We did the manly embrace, and he added, "That whole hierarchy thing is making a comeback in my diocese, hence the dog collar. Give me ten minutes and I'll be in a track suit like a human being. You're looking healthy. Working out?"

"Uh huh."

"Way to go. *Sans corpore, sans Mensa*, you know."

I gave a dutiful laugh. "Wit score, point five." Maybe 0.67, let's be fair. But already he was pressing his way through the crush of my friends, my parents' friends, college educators and hangers-on, probably a stringer for the local paper. No TV cameras, though, we're (carefully) not that newsworthy, not even dinky hand-helds, except for the Korean digital marvel my mother was deploying. She's a fiend for archiving everything, so for a while I picked the custom up from her. Hence, this record as well, I suppose. Hard to break the habit. I started a journal when I was eight, writing in rather bad Sanskrit, then burned all the piled up volumes when I was fourteen and puberty kicked in, however feebly and belatedly. Didn't start again. But here we are, seems I have, after all, but this time, as you see, under NSA-grade crypto.

Food was laid out alfresco on trestle tables, and I was munching shish kabob from a skewer while the old lady from next door expatiated on the breeding of daylilies (tetraploids, their male and female parts are large and easy to work with even for the arthritic, and their seeds are big lunky things) when someone grabbed me by the belt and started tugging me backwards. "Sorry," I said to the neighbor, "excuse me." And "What?" to Ruthie. Mysteriously and without expression, she handed me a small box wrapped in foil, and drew me into the backyard and around the side of the house. Scarf barked and tagged along. "Really, what?" I had the silvery foil off the matchbox by the time we reached the front gate, and the thing rattling inside was a car key. Ruth opened the gate and bowed me through. "For me?" I said. "I thought you didn't care."

It was a yellow Ford Focus hatchback, several years old, clearly secondhand, but in good shape.

"I know you won't believe this," I told her, "but I'm going for my license tomorrow morning. This is just what I wanted!"

"Of course it is," Ruthie said, and even by the pale street lighting I could see her blush. She punched me in the arm. "Don't kill yourself, okay?"

"Come on, get in." I opened the passenger side, tucked her inside, went around and climbed aboard, moved my seat back a little, let my hands rest on the wheel. Perfect. Just the sort of ride the 'rents would approve; low-key unnoticeable (yellow is visible, but that's a safety feature and anyway adolescents are flashy, right?), reasonable fuel consumption, not really enough room for wild sex parties, even if I put down the back seat and threw a blow-up mattress on top. Even if I really felt the urge to do so, which I was slightly ashamed to admit I didn't. Ah, peer pressure! "This is great, geekgrrl. You sold another patent, or something?"

"Royalties on. Don't know what to do with it, the stuff just piles up in the bank. I'd have gotten you a Lamborghini, but—"

"Yeah." I started it up, revved the engine once or twice, switched it off again, and got out. I rubbed my hand over the roof. "Let's get something to eat before the greedy bastards have scarfed it all down." Hearing his name, Scarf the dog barked happily behind the gate. We went in and mingled. What a grrl!

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Before midnight, a handful of neighbors cleaned up, helped by the few Atom Kids who'd made it to the event. Ruthie's parents had already walked her home. The sound system was softened to bluesy jazz after everyone else had been politely, good-humoredly, but firmly shown the door. "Another school day tomorrow," my father had said. That was all the explanation needed in this neighborhood.

I loaded washables into the dishwasher, rinsed and stacked the recycle candidates, gobbled down the last of the pistachio ice cream, felt mildly sick as a result and finally, sighing, when Father Paul caught my eye, followed him into Dad's study. Janey had hinted at some Rite of Passage (she'd turned sixteen three months earlier) but refused by a dozen amusing diversions and one snappish outburst to tell me what to expect.

Mom and Dad followed us in. Marius watched keenly from the hall; nothing got past that guy. I heard the door click shut, and lock.

Relaxed in Dad's leather and tubular steel reading chair, an elderly gentleman in his mid-seventies was already in situ, wearing a suit and Harvard club tie, of all things.

Omg. The Patriarch. I was shaken, bewildered, gratified. I'd met him only once before, for a long discussion after my declaration of fervent disbelief in deity. After all, he was the powerful personality who'd persuaded L.C. to read Thomas Aquinas shortly after he saved her from a childhood of quiet desperation that made my daily troubles seem like a night at the opera.

"Hello, sir," I said, and held out my hand. I realized a moment later I'd said it in Tibetan and, shaking my head, repeated my greeting in English. Trust me, I urged with my modest demeanor, I'm house-broken. I don't really slay repugnant oafs on the school bus with a sharpened pencil to the brain. I don't even really want to. No, really.

His happy laughter rumbled. He rose, with a little difficulty, and in a gesture almost exactly like Father Paul's earlier in the evening, opened his arms. "Come on, you scamp. Give me a hug, and tell me how you justify your godless existence."

My eyes filled with tears. Who'd have thunk? But this man had brought my parents together, as children, in the dark days when—according to everything I'd read on the period—the heaving sixties were expiring into the early seventies in confused, sexually reckless utopian optimism, women and gays finding their voices finally, amid the last gasps of a brutal, seemingly unending war in Asia. A pointless war, part of my mind annotated automatically to itself, that ended in baffled defeat after twelve bloody years—and now, all these decades later, we were embroiled again in another apparently pointless war, had been for five years.

Was *that* the unavoidable outcome of a numbed, dumbed-down population with an average IQ only a bit above one hundred? Citizens who elected as their representatives men and a few women smarter than themselves, yes, by and large, yet lacking real perspective, most of them? Missing the aptitude to cast themselves forward in well-grounded imagination, to test out their proposed actions before barging into costly ruin? Was what I saw and heard everywhere, every day, just concerted stupidity run riot in a polity vastly larger than the cozy hunter-gatherer aggregations humans were evolved to deal with? It couldn't be that simple, could it?

There was more than a whiff of self-preening in that thumbnail analysis, and I knew it. Yet equally self-interested, concealed agendas held sway, I was sure, among the owners, the judges, the clergy, the warrior chiefs of labor and military, the imprisoned, the drugged, and the dealers in sedation. Yes, all that, no doubt—but still, what sort of person deliberately sets out to derange the larger part of the planet into violent hatred and opposition? Al-Qaeda and Hamas were not the only crazies at that game. Was this widespread barbarity, too, a consequence, a manifestation, of the Hard Problem? Simply an inability to sense that other humans have interests and profoundly private *feelings* of their own, and potent beliefs, however delusional most of them had to be (since almost all were at odds with the rest)—an incapacity for that sympathetic resonance which somehow emulates the qualia of the deepest inward lives of their foes?

These fairly commonplace reflections, as I say, dashed like foxes pursued by hounds in my own inwardness, as I stepped into Dr. Herbert's embrace and felt flooding through me his kindness, generosity, concern for us all—and his ordinariness. His mental limitations, measured against two generations of his appalling charges.



And a part of me recoiled. I didn't *want* to know what it was like to be the Patriarch. He had made it possible for us to find a place in the world, had guarded us when we were most vulnerable, had filled the troubled and often squalid lives of the young Atom Kids with warmth and encouragement, had stood against their public enemies. And yet ... his mind was small, narrow, constricted by the limitations imposed by his brain's natural genetic program. And I could not bear to imagine such restriction, the stifled qualia of such imprisonment. A pulse of horror passed through me.

And he felt it. His clasp failed, for a moment. He did not draw away, but I knew that a deep, abiding sadness must have bruised his heart at that moment. For, after all, this could not have been the first time he'd know such instinctive rejection. It was the cost and misery of his vocation as our mentor and protector.

"I'm sorry," I said.

He placed his hands on my shoulders. "That's all right, lad. It's your fate, this loneliness, this aloneness. I wish I could bridge it, Saul, but the barrier is too high. Still, we can be friends, I hope?"

I recalled, with bitter sharpness, something Father Paul had let slip once. Yes, we could be friends—as I might offer friendship to my dear pal Scarf, and he, in his loyal, hungry, restless, scurrying way, might offer his in return. It was a sickening realization. I tasted the bile in my throat, and then Dad was holding my arm, steadying my shaky legs. Unseasonable spring warmth had left the air. My ears rang. Mom brought me a chair, touched the back of my head lightly, and I let myself down. Dr. Herbert remained on his feet, alone. It seemed to me his features were carved in saddened resignation, an acknowledgment of loss beyond loss greater, perhaps, than any man had ever been obliged to bear.

"Sure," I said. There was a tremor in my voice. "Sure. I'm proud to be your friend, sir."

After a long moment, my father cleared his throat, and both my parents, by turns, with a word here and there from the Patriarch, started to explain things to me.

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We second-gen kids already knew the atomic radiation legend was bogus, not to mention ludicrous, despite the *X-Men* franchise that seemed to capitalize, distantly, on our leaked cover story. How could a blizzard of alpha particles and neutrons sleeting at random through the bodies of unprotected researchers all create *precisely the same mutation* in their offspring? Chemical mutagens, yes—radiation, not a chance. Getting a major REM load is like being sprayed with machine-gun bullets, not tweaked by exquisitely targeted tweezers. That required deliberate insertion of modified genes, which, they told me, is what had been done back there in the Above Top Secret Los Alamos Biowarfare Unit to our pregnant grandmothers, using fragile and primitive techniques nobody else would replicate (or at least publish) for years.

I thought this was ridiculous, about as likely as hearing that we'd been created as hybrid UFO aliens. The genome project was still limping—well, galloping—toward closure half a century after this miracle of gynecology was supposedly wrought. L.C. flicked on the computer and called up a brisk briefing for me. Holy cow. I read it over her shoulder, flicking down pages with voice command.

The first “test tube baby” IVF was announced to the press in 1978, twenty years after the Atom Kids were conceived. And there was nothing modified about little Louise Brown, of Greater Manchester, England, except for her very existence. (The poor Indian guy who produced the second IVF child known to history was hounded by his purblind and moralizing marxist Bengali government, and killed himself several years later. Another class of motive for keeping all this hushed up, maybe. Humans do seem to love rushing about with pitchforks and blazing brands. “Burn the witch!”)

But, obviously, classified work had been going on much earlier than that.

“Shortly after the end of the Second World War,” Mom told me, even as I speed-read the details, “Dr. Min Chueh Chang moved from China to Massachusetts and started working seriously on fertilization.”

“The contraceptive pill,” I muttered.

“Ironic, yes. But he and his colleagues found ways to create life as well as suppress it.” I expected a mini-lecture on the wickedness of unnatural tampering with God’s plan for human life, but I guess she knew I had it memorized. The images jumped on the screen. Cold shock technique. Sperm capacitation. Genetic recombination. The door was opening for—

Wait a moment. It had already been opened as far back as ... 1935! Chang’s colleague, Gregory Pincus, had fertilized rabbit ova *in vitro*, but few believed him. His work wasn’t recognized until around the time the first “Atom Kids” were born. Interesting timing! Clearly some observers had been paying attention.

“Meanwhile,” Mom was saying, “from the moment Crick and Watson clarified DNA’s helical structure, and then cracked the code, a black team at Los Alamos was building on Chang’s work.”

“Plasmids,” said Father Paul. I turned; he’d come quietly into the study and relocked the door behind him. The adults regarded me with a sober solemnity I rarely saw in them. “Josh Lederberg was already doing good work in the late forties on bacterial conjugation. He and his wife Esther shared a Pasteur Medal in 1956. Outstanding work in microbiology and genetics.”

And on my parents? Maybe not—but someone else had followed swiftly in the Lederbergs’ tracks.

“Plasmids,” I repeated. Biology was Ruthie’s stomping ground, not mine. “Little rings of DNA or something, right?” You could insert them into cells, and they’d start pumping out their own specialized proteins—or sneak into the nuclear DNA, where with luck they’d take up residence.

“Hence bacterial conjugation. Syzygy,” said the Patriarch, and he broke into a smile. “That’s what we called it back then. No sex, but as good as.” He shot Paul an amused glance, and got a faint frown in reply.

“I thought that had something to do with the moon. Syzygy, not sex.”

“Well, Saul, yes, it does, but that’s a different sense of the word. This isn’t astronomy, I assure you—nor astrology, neither. It was dirty, but it worked—some of the time.” Paul

looked grim. “It also killed seven women, and dozens of babies. They had *no right...*” He broke off. “Well, different times. Nuclear weapons were the doomsday disaster poised to obliterate all life. You’d probably heard about the CIA medical experiments on black prisoners?”

I nodded. No words necessary. The screen flickered under Mom’s finger clicks with officially mandated horror. Two hundred women infected with viral hepatitis in 1950, so the military might learn what would result if evil communists turned to germ warfare. Fifteen years later, just to be sure, another doctor repeated it with retarded children living in Staten Island. Live cancer cells shot into prisoners at Ohio State Prison by Sloan Kettering researchers in 1952. From the early fifties to the late sixties, Project MKULTRA craziness using lysergic acid and electroshock that damaged Canadian patients beyond any hope of recovery, on behalf of US intelligence researchers. It was all too justifiable. It’s the Cold War, stupid. What other excuse did you need?

And it hadn’t stopped with the McCarthy hysteria. I kept speed-reading, unable to look away. In 1967, when Mom was eight years old, more than five dozen prisoners in California were injected with a terrifying substance, succinylcholine, that made them feel that they were drowning in their own fluids. Waterboarding by any other name. Five of the prisoners refused permission, and were injected anyway, against their protests.

I’m pretty sure I was looking green around the gills again. I sagged against the back of the chair, and L.C. got out and spun it around for me to collapse into.

I looked at my Mom and Dad and ... I know it’s vulgar, and trivializing, and entirely unjustified, but I felt a horror movie shiver, I did.

“So you’re—genetic experiments? And I’m what? Son of Frankenstein?”

“Not exactly,” my father said. “But close enough.” His grin seemed a bit strained; he was profoundly uncomfortable. One arm went around Mom’s shoulders, and she leaned against him.

“The plasmid autoinserted into the nuclear DNA,” Paul told me. “It’s heritable. To some extent.”

“So nobody had to screw around with *my* genome? Wow,” I said, heavily, “imagine my relief.”

“You’d be surprised how minor the changes are,” L.C. said. “Mostly it’s an unstable CHRM2 allele, plus downregulation of a dysbindin SNP.” I heard it as “snip” and at that stage didn’t know how to unpack the rest of it. We might be geniuses, but we have to read something to remember and understand it, and as I say I’d tended to delegate microbiology to Ruthie. Shockingly sexist, no doubt. “It’s like the small modifications that caused the chimpanzee to go in one direction and *H. sapiens* in another. In this case, an extra cortical rind added atop the six human layers of cortex, thicker and more numerous axonal connections, some neurotransmitter oddities. It doesn’t always,” she added, with a glance she deflected even as it began, “breed true.”

I had known all my life that I’m not remotely as smart as the Atom Kids. Sure, beat the academic pants off a Cliff Dolejsi; run circles from infancy around children three times my own age (but it was getting a little harder these days), yet I had to admit that I just wasn’t transcendently brilliant like the ‘rents. At my age they’d been publishing biographies and

novels and advanced theses in math and poli sci. Ruth had her software patents, true, and I'd published that fat fantasy trilogy before I got tired of reading made-up stuff and disgorging imitations, but I wasn't hearing anything unexpected. Still, it stung. It stung like a son of a bitch.

"Regression toward the mean," I said.

"Absent any extra modifications, I'm afraid so. And worse than that—most pregnancies in our group kept miscarrying. We all tried desperately for ten years or so, then Kuzi finally worked out the haplotypy problem and we..." Mom trailed away.

"It's an inbreeding problem, mostly," Dad told me. "We found a way, but it involved some sacrifices."

They were all looking at Paul Westfall. His face did not move, but his eyes fixed on me.

"With the help of good old nature, and nature's God," he said. He crossed the room to me, took both my hands firmly in his own. A thumb closed over the knuckles of my right hand in a firm, professional clasp, the deft grip of a man who'd never done any real physical work in his life, never worked combinations in a dojo. I'd seen that thick, blunt thumb shape before, every day of my life. How could I never have noticed? He smiled, finally. "Yes, Bud, belay what I said earlier. You have every right to call me father."

\* \* \* \*

Was I angry?

Hell, yes.

I swallowed down that anger, because it's what we'd been trained to do, and because, really, I loved the guy. Paul Westfall was the first of the Atom Kids located by Dr. Herbert, and perhaps, by all accounts, the brightest. He'd done as much as anyone in rounding up the rest, easing them, one by one and then in concert, through the trauma and triumph of their self-discovery, their redemption from extremity and bitter isolation. In the joint foolishness and longing for absolutes of the Patriarch's medievalism, he and L.C., my mother, had cultivated their immense minds into a shared *folie*, but hardly a radical one, an architecture of belief and worship shared, after all, by many of the finest minds in Western history, and even today by a large percentage of the planet. I'd confronted or avoided their faith for years, in a mutinous but largely unspoken resistance. Not hostility; how can you turn against the woman who gave you birth? But they both knew the antagonism I nurtured toward their beliefs. And now—

—*No more than a hypocritical imposture!* raged the furious two-year-old locked inside me. Faked piety! Bogus fidelity to spouse and church!

Knowing, even as the spasm made my arm tremble and withdrew my hand from his, how unfair, reductive, patronizing, *adolescent*, for God's sake, I was being.

Qualia, I noted. I noticed that abstract fact from a higher, remoter part of my aggrieved self. Bursts and gusts of feeling, trammelled as swiftly as they arose in rationalizations and language games. Yet how could *thatfury* be calculated, specified by neural algorithm, traced back to Darwinian adaptations and Machiavellian maneuvers?

Well, easily enough, in fact. I knew that. But the logic tree of abstractions didn't *feel* true.

Deliberately, I shut down this noisy inner babble. I turned my face away from the Hard Problem and from the present instant's merely Absurd Problem churning in my mind and body.

Yeah, you bet I was angry.

"I'm going for a walk," I said, turning away from them and opening the study door on a quiet house. Nobody waited out there; even Marius had gone home. "I have to take Scarf out for a crap."

My mother and father, and the priest who was merely my sperm-donor, in vitro or in vivo I didn't care, and their aged Patriarch, they all four let me leave, in silence, and without reproach. Well, I suppose they were getting used to it. Emotionally, we are all quite simple creatures, *H. sapiens*. and *H. novissimus* alike.

I found Scarf's chain on its hook and went out into the cool of the night, my dog capering happily at my heels.

\* \* \* \*

3

I destroyed the intervening entries after my crisis with Maxine. Just couldn't bear to read all that protracted late adolescent *Sturm und Drang*. I've decided to pick it up again—I owe it, arguably, to the dead. So let's start with an instant recap:

I fell in love at last, or so I thought at the time, four years later. Maxine Bukowski wasn't one of us, but she was fearsomely bright, by her own standards; she danced like a flame caught in a light breeze, and her hair was the tawny flame of triploid cultivar daylily *Hemerocallis fulva*. So much of my life had to remain concealed, partitioned, which tortured me, and Maxy, too, at some level of masked perception she wasn't able to deny. One day she found the three paperbacks of my *Starlight Genera* trilogy, which I'd written over a long school holiday when I was thirteen and published as Peter Regan two years later.

"What's this? Not the kind of thing you usually read, Saul?"

I was distracted with circuit design. "Uh, a friend gave it to me. He wrote them."

Leafing through the opening pages, she hummed a jazz tune. "Hey, this isn't bad. How come you've never introduced us?"

"That's not his real name. He's embarrassed, I think."

"Can't see why. I hope he made pots of loot." I saw her settle into my big chair, flipping pages fast. After a while it got dark, and I flicked on the overhead fluoros. Maxine was halfway through volume two. I squirmed, but secretly hoped to hear words of praise. By the time I shut down and showered, and pulled her to me on the bed, she was polishing off the final book. "Hey, that was fun."

"No, *this* is fun," I said, and it was. But a couple of weeks later she found a mint copy, in a sealed baggie, of Jeri Steiner's *The New Astrologies*. "Oh my god, Saul, wtf?" (She

spelled it out, as people did that year.)

“I’d rather you didn’t open—” But she had unsealed the bag. “That’s an investment, sweetheart. Pennies today, zillions in half a century.”

“Not funny.” She blew a raspberry, and starting reading down the contents page, in a sarcastically excited yet dazed rendition of a diphead: “Ethnoastrology. Neuroastrology.”

“That’s my favorite,” I said, and tried to grab it from her. She squirmed away. “I googled it, and of course neuroastrology.org and neuroastrology.com were domain names. Luckily, they’d expired.”

“Luckily? But wait, there’s more: Relativistic astrology.” She laughed a little uncertainly. “I love it! Astrology at the speed of light. String astrology. Does that included brane astrology?”

“Brainless astrology, I imagine,” I said, getting nervous, watching a contest inside her between humor and censure. “Look, can’t we—”

“Genome astrology. Demon astrology. Non-Euclidean astrology. Galactic and of course for extra credit extra-galactic astrology. Dark matter astrology. *Dark matter astrology!* Wait, wait! Dark *energy* astrology. Post-poststructural astrology. Oh, Saul, this has to be a send-up. Green eco-astrology. And lastly, virtual astrology.”

“The universe as a computational simulation. Don’t mock it unless you’ve tried it. Have you never read Bostrom or Tegmark?”

“I saw the *Matrix* trilogy.” Her mood settled. “No, it’s really not funny. This Steiner woman is preying on the vulnerable.”

“On the intellectually underpowered but pretentious, anyway.”

“It’s gross, Saul. What are you *doing* with this sort of iniquitous dreck hidden under your bed?”

I made my first and last mistake with Maxine. “I wrote it.”

Aghast. “You *what?*”

“I co-wrote it. Dictated it to the machine. With Marius. One day when it was raining heavily. Don’t hate me, babe. We made more money than you could imagine. Pots.”

Now she wasn’t laughing. Or smiling. Maxine, my beautiful tawny lily, put the book down on the bed as if she needed to wash her fingers, and got dressed. She left. She never came back. I cried quite a lot, and ranted at Marius, and sobbed on Ruth’s wearable-cluttered bony shoulder, and got over her, eventually, when I met Andrea. And learned, even more than I’d learned before, to keep my damn mouth shut.

But I wondered, as always, and now even more poignantly: What could it be like to be a Maxine Bukowski? And what would it be like for a Maxine to discover, though unimpeachable direct experience, what it’s like to be a Saul Collins?

\* \* \* \*

What attracted me to Andrea was her playfulness. Well, and her short dresses, but hey.

I was sitting at the back of a dizzyingly canted lecture theater trying to remain focused on the most boring neurophysiology presentation the world has ever known. Herr Doktor Professor Faxon Bander is one of the great experts in cortical structure and connectivity, but if his presenter skills were an index of his surgical prowess, he'd be doing serious time in the Big House. I yawned. I shuffled my feet. I parsed into Farsi everything he was saying four or five times. I'd known all this stuff backwards and forwards, which is pretty much the way he was presenting it, since my early adolescence, but the geniuses in charge of the course insisted that all Ph.D. candidates must audit every lecture. On the blank pad under my left hand, I scribbled *Much more of this backing and filling and I will run down and kill him with my bare paws.*

A snigger, and a bare female right paw wielding an old-fashioned fountain pen, fashionable again that year, reached across and scratched on the pad *This toing and froing*

I did not glance to my left but wrote *Hither and yoning*. A tiny bit of naughty under the surface. Was that embedded *yoni* too racy? I hoped she was not a nun fluent in Sanskrit. *Hi-ing and lo-ing* wrote the woman's hand. I scribbled *Inning and outing*. The hand instantly annotated *Upping and downing*, hesitated a moment, and then went back to add a *T* at the start. A fan of Shakespeare, I thought: *Othello*, Act I, Scene I. A nicely ribald sense of humor, which allowed me to relax a bit. This time, finally, I shot a glance her way. Green amused eyes met mine. Older than I, but perhaps not by much. She was not beautiful in any conventional sense. I felt my heart lurch, and other parts. Awake the snorting citizens. I wrote *Sniggering and snorting*, and left my hand resting on the pad. She wrote *No time like the present. My name is Andrea*. The smooth back of her hand brushed my wrist. In a moment of shivery delight, our qualia fell into synch. Stayed that way, for a while.

\* \* \* \*

Busy, busy, busy. I should pick this up again. Oh, Ruthie, Ruthie.

After the first commercial 1024-qubit adiabatic computer was released by D-Wave, a Canadian company, several years later than anticipated but sooner than the doom-criers of vaporware had gloomily warned, the four of us bought one outright with our research funds and had it shipped with extreme care to my neurosci lab. (I was completing that doctorate under a friendly prof who'd known the Patriarch for years and asked few questions; it was helpful, despite the tedium and inconvenience, to patch into the university's infrastructure.) The potential power of the thing was breathtaking, if Ruthie could get her software to run right. In principle, the number of states it could address simultaneously was greater than 10300. The number of atoms in the entire observable universe was a comparatively minuscule 1080.

We'd decided on an end run around the philosophers. We were building a Qualia Engine.

That name was our nod of acknowledgment to Dean Charles Babbage's marvelous nineteenth century designs of a pre-electronic mechanical Difference Engine (a sort of programmable clockwork computer, never built until enthusiasts put one together a century later) and an Analytical Engine (a genuine Turing machine). Aside from the raw grunt of the

quantum computer we'd put at its core, our device—our congeries of cobbled-together devices—more closely resembled a magnetoencephalographic scanner, and in fact used a shrunken version that fitted over the upper body, and especially the scalp, listening for traces of ... feelings. Affective responses to the outer empirical world and the inner subjective world of imagination. Qualia.

“Oh the quale machine,” sang Janey, deliberately mispronouncing it to rhyme with *Quayle*, like the late Vice President, “the quale machine, it reaches inside where nothing is seen. It knows if you're happy or feeling mean—that wonderful, sensitive quale machine.”

I couldn't let her get away with that. “You're a deeply ignorant woman, Jane. Those are not the lyrics of the song.” I ad-libbed, “It goes like this:

\* \* \* \*

*I'll parlay my quale  
for a look at your soul,  
and a ride on your Harley  
in the back streets of Bali,  
as long as your hol-  
ism isn't reductively  
loitering palely,  
like watery gravy,  
at the lee of the sea, be-  
cause—”*

\* \* \* \*

She clipped me over the head, and settled back into the MEG sensor web of superconducting quantum detectors, excruciatingly sensitive to the ten femtoTesla magnetic fields of the neocortex in working order.

I shut the door and went back into the shielded control room.

That year, Harvard was still working on a *Mus* connectome, using an automatic tape-collecting lathe ultramicrotome. Not recommended for human brains, or even mice, if they are still alive; it sliced its way through a brain, imaging in three dimensions as it peeled, creating with each chomp a twenty megapixel record of every synapse and its precise location. The Allen Institute was working toward a brain atlas using in situ hybridization. We planned to achieve much the same effect in a *non*-invasive scan, creating an instantaneous massive entanglement between each molecule in Janey's brain and a separate dedicated register in the superposed state of the computer. No, we weren't trying to upload her consciousness onto an inorganic substrate—just create a static map of one person's momentary memories, sense impressions, plans, and ... feelings. No point futzing around for



years with murine qualia. Those dear little mousy critters are quite complex, in their way, far more so than the stupid psych behaviorists assumed back in the day of the Atom Kids, but still not up to scratch for the questions I needed to ask, the puzzles I hoped to resolve.

But let's pause a moment.

As I look back over this interrupted and partly sanitized or reconstructed record, "Peter Regan," the fluent author of the *Starlight Genera* trilogy hesitates, abashed. Far too much Tell here, not nearly enough Show. My predicament is that I don't really know whom I'm writing this for. Is it my peers—hi Janey, Marius, Mom, Dad, you other *Homines novissimi*? Not for Maxine, long gone, nor for Andrea, sad-eyed lady. To the memory of Ruthie? Not really. I'm hardly the group's archivist. Perhaps for some later generation who wasn't here and now? I suppose, eventually. As an explanation, an *Apologia pro vita sua*, to *H. sapiens* readers, sometime soon, or maybe not for years? I guess that's the audience I've had in the back of my mind all along. We went underground out in the open precisely to avoid that kind of explicit engagement—but hey, maybe things will change.

I could go back a few pages and insert an exciting expository conversation with Maxine as we rappelled down the face of the Empire State Building in driving snow, or during the successful bid by Andrea and me to prevent terrorists from nuking the Large Hadron Collider in Switzerland, and maybe that's the way we'll do it in the movie, but let's get a grip and cut to the chase. When I was "Peter Regan," teaching myself to write blockbusters, I scouted the web for rules of narrative—and one prohibition I learned early was never to dump dollops of information and backstory through the pitiful contrivance of characters telling each other stuff. "As you know, Professor..." But hey, this is my personal journal and I can do what I like, and it's directed finally to an uncertain audience. So—

The standard human brain has a lot of housekeeping and motivational apparatus tucked away in the middle—thalamus, hippocampus, amygdala, blah blah, thank you, Prof. Bander—along with cavities surging with transmitter-rich circulating fluids, wrapped in what amounts to a large dinner napkin of neocortex crumpled up to squeeze inside the skull. Data lines run in and out from processing brain to torso and limbs and back, a million or so fibers from the eyes, an equal number from the muscles and the touch sensors, as few as thirty thousand dealing with auditory sensations. (So a picture is actually worth 333.3 words.)

The two-millimeter thick cortex is where the heavy lifting is done among you brainy apes. Just consider this for a moment: a sheet of tissue no thicker than six stacked envelopes, stripping down a bit-torrent into schemas and holons, each cortical layer abbreviating and abstracting the incoming from below until finally the top layer, with its plethora of far flung connections, deals in a world of invariant representations very far removed from the jumpy, jittery, scatty flood of inputs that assails us every waking moment—but those invariant abstractions *match the structure of the external world*. Carving the world at its joints, as Plato put it in the *Phaedrus*. (That Plato detail won't be on the exam.)

What the *H. novissimus* plasmid genes do is persuade a growing fetal brain to add a seventh layer to the neocortex, plus a whole lot more synaptic connections. But wait, that's not all. They beef up the brain's ability to prune any coincidence links that turn out to be poorly informative or actively misleading. You *H. saps* remain stuck with a brain prey to illusions and superstitions, because your traditional gray matter assumes, as its default, *post hoc, ergo propter hoc*. Often that's justified. Just as often, it's a highway to gut-churning errors ardently embraced and enforced, provoking sectarian hatred, bloody war, and the purchase of expensive sports utility vehicles hardly anyone can afford gas for. But wait—I

hear you object—wasn't I just bellyaching about Father Paul's equally baffling embrace of the Roman dog collar, and L.C.'s devotion to a belief system nearly as absurd as Norse worship of the cosmogonic cow Audhumla? Yes. I admit it. Even the Atom Kids are prey to emotional attachments and rushes of feeling to the head. They're trapped, when all's said and done, by their qualia.

\* \* \* \*

The way Ruthie died was unforgivable: stupid, stupid, heartbreakingly stupid.

I was still driving the aging Ford Focus, her birthday gift to me when I turned sixteen. It did the job, didn't require explanations. She didn't drive. That night Andrea was at the Pillbox until late, rehearsing *Mother Courage*. She'd dropped out of neuro; somehow I'd discouraged her, hadn't meant to, I swear. I was taking Ruth home from the lab. By then she had so much hardware hooked up to her wearable ensemble that most of the time she might as well have been flying through Second Life. Ruthie had never been scanned by our juicy system, because it would've made a mess of her onboard equipment, which in turn would have munged ours, probably.

On one level, her connection to reality was larger than mine; miniature LEDS cast a non-stop data feed into the upper visual field of both eyes, her fingers danced a coding echo in sim space via the thread transponders printed on the back of her hands and wrists, music and other chopped, sped-up acoustic feeds went directly to her mastoid bone. I never tried it directly, but a sim-set let me emulate a pale shadow of the experience (or so she said, disdainfully), and it was a Niagara of noise even my much-vaunted seventh cortical layer couldn't quickly reduce to meaningful pattern. Ruth followed a dozen RSS feeds along a hundred, a thousand blog links; she attended the launch of the first Chinese moon orbit, a remedial operation on the cleft palate of a five-year-old girl in Tanzania, a football game at Notre Dame (she liked the hunks), the stock market streaming quotes and NASDAQ Level II negotiations....

What was it like to be Ruthie? Like drowning in the world, or like surfing atop its oceanic wave. Yet her focus was intense. I think she was the smartest of us, maybe as smart as the Atom Kids our parents, and with the incomparable advantage of thriving in an epoch when the parallel quasi-intelligence of the web gave everyone entrée to everything anyone had ever said, written, painted, shaped, made manifest from their thoughts and dreams and hungers and schemes. For someone as glowing as Ruthie, that was a free one hundred points of IQ on top of the icing.

I turned with the green light, carefully, maybe too carefully, and the benighted fool with his lights off, his cell phone stuck in his ear and his small anthropoid brain in neutral went into the side door at sixty, maybe, according to police analysis, caved the steel and glass into a jagged fist that slammed Ruth so hard her brain caromed off the inside of her skull and ... broke, bled, died.

Somehow I escaped with only a cracked ulna, shock, and the kind of furious agony that never goes away, never, never, just ebbs bit by slow shuddering bit in weeks and then months of grief. It would catch me at moments as I sat alone (Andrea left me when my bitterness turned, unfairly, against her, as it turned against everyone who tried to comfort and sustain me, and drove her away), it would bring up choking sobs that were her name, somewhere in the swimming light and the snot and thickened juices of my throat. It lacerated some protected autistic part of me I'd never understood was my emotional protection against a world where I didn't belong.

I wanted her back.

“Give me back my Ruthie,” I said aloud, in my empty living room before the meaningless jabbering TV, and wept, and nobody answered, because she was gone and could never return.

It wasn't as if I'd been in love with the girl, the woman. I know why, too—in effect, we were “kibbutz siblings”; she was out of emotional bounds, like Janey, due to over-exposure at some pivot of childhood. Maybe Piaget could pinpoint it, or Bettelheim. Fond as I was of little Ruth, and I was—I loved her with all my heart—it was not a sexual bond. It held no magical spark. She was not Maxine, nor Andrea. But losing her really did tear an ancient scab off my heart, or maybe punched through a defective barrier I'd had cloaking it since childhood.

I wept as we buried her in the old Catholic church where Father Paul laid her crushed flesh to rest (Ruthie was an atheist, like me), and when the moment came for me to approach the front of the gathering and add words of remembrance, I simply could not do it. My heart was poisoned with rage and grief, and it rose to block my mouth. It blocked my heart against Andrea, too, and I did not know why that should be. I stood beside her at the grave, mute and useless, and felt nothing but wretchedness.

Later, later, I understood what had been done for me in that tragedy. I will hate that drunken fool until the day I die, and carry his name in wrath unspoken before me, but his wicked stupidity was the occasion (and how I wish it had been otherwise, that I could turn it back and make it not happen) of my admission into the mysteries of the Qualia Engine.

\* \* \* \*

4

“Power,” I instructed Marius. These days he was playing a thirty-string guitarangi da Gamba in a band called The Fluting Opera (they did no opera, and there were no flautists) and slept very late, but always came over to the lab, even early in the morning, for big occasions. He toggled the board. Lights went from red and yellow to green or white. Overhead, there was a perceptible flicker as we drained juice from the building's transformer.

“It's alive!” Marius cried in a maniacal voice that echoed inside the acoustically shielded control room. “It's alive!”

I shot him a grin, then ignored him. Janey was poised at the edge of a second-order phase transition, with cortical correlations and anti-correlations extending across her entire brain. At criticality, the phases would collapse together in a series of neuronal avalanches. With luck and exquisite timing, we'd capture a time slice of Janey's soul, and port it to the D-Wave box. I switched my microphone on.

“Think of a butterfly lighting on a day lily, Janey,” I suggested, and displayed a stereo picture of a gorgeous zebra swallowtail drifting past a tiger lily in Mom's garden.

“Yo,” she said, drowsily. “With warm breast and with ah! bright wings.”

It took me a moment to catch the quote: Gerard Manley Hopkins. Over the bent world

broods. Yes. I activated the scan.

Diode lights went on everywhere.

“Mirror neurons,” Janey said, and Marius nodded. The boyish chubbiness, I noticed absently, had lately drained from his face; there was a firmness in his cheeks and his jaw.

“They’re big players in the qualia game,” I agreed, “but we’ve been through this before.” Dedicated F5 cells in the premotor cortex. Monkey see, monkey do—and presumably monkey feel the same raw feels. Trust me, urged the politicians, I feel your pain. But was that all? The Peggy Lee standard that my Mom used to croon drifted in memory: *Is that all there is?* “The neurology of emotive reciprocation is a *prerequisite* for empathy, sure—”

“For even the *simplest* appreciation that other people have feelings,” Janey said more loudly. “That their experience is akin to our own. To *my* own. To *yours*. However oddball each of us is, and I think it’s clear that when it comes to odd, you, my dear Saul, take the—”

Beneath the good-natured banter, I felt a current of frustration and even animosity. This was *my* project, finally; somehow they’d allowed themselves to be roped in, years ago, and all we had for our thousands of hours and millions in investment was a machine, an engine, that did just what evolved mirror neurons did in an ape: echoed back, mirrored, what it saw. Seized, or rather embraced, a frozen instant of a soul in very ordinary passage. Less than ordinary, in fact: lying on your back, or propped up on a padded chair, sniffing a rose is a rose as sweet or attending to Delius in a country garden or tasting jalapenos, capsaicins burning the front of your tongue ... these qualia were vivid enough as you experienced them, and worthy of capture and butchering on the analytic bench—but was it science? In the true sense: was it knowledge that eased open the universe a little more readily to our human grasp?

I felt my throat constrict. Fear? Anxiety, at least. I must take the next step. This was the key commitment we’d been working toward all these years. In a sense, Ruthie had given up her life for it. I had to patch into someone else’s qualia and run them through me in the most intimate embrace of another’s experience the world had ever dreamed of, outside delusions of spirit possession. Mom or Paul, it occurred to me, would probably be more at home with this prospect than I, soul believers both. The thought made me shiver and clench my toes. Yes, Oedipus, step right up to the scanner. But that risk was well in abeyance; none of the Atom Kids knew about this project. Quite a lot we never told them. Poor supermen.

“Cut the crap,” I said. “Let’s roll.”

\* \* \* \*

The MEG imager room uses active shielding, a nested set of aluminum layers wrapping a one mm. sheet of high permeability ferromagnetic alloy. Inside that safe, quiet barrier, the MEG listens for the fragile magnetic fields generated by ionic currents in the brain’s dendrites as synapses pulse out or swallow their neurotransmitter messages. The signals it registers are foully dirty, the babbling from hundreds of adjacent cortical columns conflated and run together, so we cleaned them on the fly with a Bayes classifier and k-Nearest neighbor machine learning algorithms. All this took place at the interface between the D-Wave kilo-qubit processing units and a living brain—in this case, mine.

I thought again of Ruthie. But it was Janey's qualia I was about to ... what? Emulate? Re-run? Instantiate, that's probably the *mot juste*.

I was drowsy; we used a low dose of diazepam to settle the butterflies. (Swallowtails winging across bright daylilies! My zonky mind skittered.) I moved lips that seemed thick and heavy. "Hit me, maestro."

It was—

Faintly sickening, like a moment of vertigo, peering over the edge of a tall building and waiting for your confused eyes to focus on the tiny vehicles creeping past below. The double vision didn't correct itself at once. A photo flashed into the display above me. A hairy dog running beside waves, golden sand spraying up from his galumphing paws, tail high, grinning mouth open, tongue flapping and moist in the brilliant beach sunshine. "Scarf," I started to say, and knew at the same moment that this was Mousy, my grandparents' beloved dog, when I was five, visiting them in Fort Lauderdale, and—

That wasn't my memory. Nor my perception. And the colors were wrong, a little off. The reds were a tad flatter, somehow, and the yellows glowed as if in a heightened, pushed Photoshop rendition. Then hues swerved back to the spectrum I was used to. Erp. Oops. Next picture. Fruit in a gleaming bowl, on a table I remembered, one of us remembered. I'd knocked it over when I was three, climbing from chair to tabletop against Mother's strict prohibition, and it shattered into shards of light that stung.... Not my memory, either. But it resonated with my authentic recollection of tearing off sheet after sheet of toilet paper and dumping it in the toilet bowl, then lighting a match and throwing it in. The sharp stink of the match igniting, the slow blue-edged spread of flame across sagging, sogging paper, the rising thread of black and merry, gray smoke, the sudden terrifying racket of the smoke alarm, L.C.'s frightened, angry shout—

We're not that different, I thought, and my mind wrapped itself about Janey's memories, her guesses, her being. I looked up at picture after picture in the stimulus display, falling more and more deeply into resonance with her soul, I suppose you'd have to say, jolted back out again from time to time (the weight and heft of breasts as I jumped, smacking the volleyball hard, cramping in my guts with my period, the pleasure of lightly coating my pouted mouth with lipgloss of *just* the right color, the faintly heavy sweet odor of that gloss in my nostrils, those three savage hours of Britten's *Peter Grimes* at the Met), but all of it no more, really, than a visit to a museum exhibit, a wonderful holographic or (somehow) articulated waxworks display of a mind and body caught in one timeless moment—

"Here are some people you know," said a voice. Marius, I supposed. Not Paul, my father. But there was Paul's face, and again from another angle, snapped at different ages, hair never too long or short, never the rebel, Paul, always the good dutiful boy who accepted his responsibilities with grace and endurance, but wasn't it a little odd how sometimes, in the right light, with his mouth held at that angle, he seemed so much like Saul—

Marius, defiant at six years of age, when they'd decided to send us to conventional schools, the Atom Kids had, explaining how we must try to fit in as best we might, not boasting, not showing off what we knew, our skills, our odious specialness, must learn *how to be them*, dear god, to absorb and mimic the qualia of their limited lives, learn that their hungers and heartbreaks were no less agonizing to them than ours to us, that their joys called for respect and happiness shared, that—

Ruthie's face, and she was gone, gone, half-cyborg, half sweet sharp-tongued angel, never to grow through the rest of our life together, never to have our babies together as, girl to girl, we'd promised each other—But that was Janey's recollection, channeled like the whisper of a ghost to my memory, my clenching, bitter gut—

Janey, now. My clever friend. My sister. My companion. My—

Oh, oh, oh. Like a cruel light flung in your blinking eyes. Unable to turn away. Insupportable. Had her qualia been utterly impenetrable, if the machine had worked but shown that we inhabited dissimilar inward realities—*that* would have been disheartening, the waste of years and effort, but this was—

I was scalded by her incandescent love. The richness of it was a wave crushing my petty pragmatism, my small resentments against L.C. and Paul.

The pictures had moved on. Kuzi, the Patriarch, all the rest of them, but I was floundering.

"Turn it off," I said. "For god's sake turn it off."

There was Janey, beside me, practical, matter of fact, pulling the sticky squid contacts from my head and torso. I watched her sensible face. It was impossible to reconcile my inward knowledge that she was profoundly, achingly, in love with me, had been for years, had never said the smallest word or given any hint because Ruthie—

"Thanks," I said. "We can do a debriefing in a few minutes. Have to be ... by myself for a while," and stumbled to the rest room, perched on the toilet seat. I was thinned by her absence from my doubled soul, by my self-knowledge that, to me, she had never been, can never be, anything more than a pal.

"Oh shit," I muttered. "What the hell am I going to do?"

Reality came back into single focus. I had to stop her from undergoing a reciprocal qualia immersion. It would devastate her, I told myself.

A dying echo of her soul inside mine gave a derisive laugh. Get over yourself, Saul Collins. You condescending, sexist little man.

But that, too, was just a slice of the complex reality.

I washed myself quickly, making the water run as hot as I could tolerate, then as cold, splashing myself back to myself, then walked to the control room where they waited for me.

"Hey, Odysseus," Janey said, and sent me a sad smile. She knew. She had known, of course she had, what I would find there. I shook my head.

Marius glanced between us, rose casually and left the room. "Later, dude."

I looked at Janey, and she looked at me. "Hey, Jane," I said. "Hello, my dear friend." Eyes misting, I waved one hand at the MEG control panel, at our Qualia Engine. "You'll have to take it for a spin."

"Jump right in, huh?"

“Sure,” I said, mixing my metaphors, “the water’s fine!”

We went out arm in arm, as friends do, qualia humming in us, to where Marius cooled his heels against a corridor wall, and headed off, all three, toward The Genteel Pizzeria to eat something disgustingly wicked and clogged with cholesterol.