

Until Earthset

Blake Stacey

November 2008

DEDICATION

To my father
Creator of the Bartlesville Blue
And *Down-Home Cyber-Pulp Baggage*

LEGALITIES

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This is a work of fiction. Certain places and public personalities of deceased celebrities have been used in a fictitious manner; any other resemblance to persons living or dead is strictly coincidental.

ISBN:

*Instead of trying to explain a bunch of stuff,
I just held the .45 up on the bottom of the window
and hoped for the best.*

—PHILIP STACEY (1994)

A NOTICE FROM THE ALABAMA STATE BOARD OF EDUCATION

This novel discusses *evolution*, a controversial theory proposed by some scientists to explain the origin and diversity of life on earth. While these scientists claim that this theory accounts for life's development very well, the fact remains evolution has been unable to explain certain aspects of the earth's biological history. Among these problems are the following:

- The so-called "Cambrian Explosion," an inexplicable bloom of new species at the beginning of a recent geological age;
- the gap between microevolution (the clearly observable change of physical traits within a species) and macroevolution (the origin of new species);
- the conflict between the Theory of Evolution and the Second Law of Thermodynamics, which states that the disorder in any system must rise with time.

Microevolution is an observed fact of nature, and scientists are to be commended for their attempts to understand the world by studying its effects. However, we should not be suffered to live with our faith shattered, led like a flock to the slaughter: no scientific discovery has yet shaken the unassailable truth that the cause of any effect must be like that effect (Job 14:4). Life must therefore arise from a Living Cause, and Mankind must have been shaped in a similar image.

Study hard, keep an open mind, and know that the LORD's enemies must perish and His friends arise like the sun (Judges 5:31).

* SEPTEMBER 1968 *

A third leg emerged from the sand, and Aloysia K. told herself she was not frightened.

Feet trampled through the broken twigs and bits of glass, as half a dozen students hefted a heavy wooden frame with ominous electric vitals bolted inside, carrying it to the far side of the courtyard. The robot, a three-segmented hexapod the size of a housecat, wriggled away from them, scampering through the legs of the milling crowd. It sprang into the arms of a young woman who had been leaning casually against a yew longbow.

Slablike dormitory buildings rose on the two long sides of the courtyard, and students scurried from one to the other, dodging the paths of those who had other trajectories in mind. The south face of the courtyard was open, and two wooden platforms had been erected there. Aloysia watched a tower, coiled about by cables and surmounted by a metal sphere, be lifted into position on one platform to stand tall against the clear night sky. Its companion, likewise two metres and change in height, was already fastened, and its attendants busied themselves making connections around the pedestal.

Aloysia looked past them, over the quiet boulevard, across the river to where the Boston skyline jutted upward. Then she turned to the other end of the courtyard, where past the sand-trap which was nominally a volleyball court, a half-dozen other students were fussing with a wheelchair whose rocket motor was coughing inky black smoke.

In between, it was mayhem. University students carried sharp things and glowing things and fried food of every kind. Many of them wore shirts which proclaimed, "Bad Ideas 1968" or "Only Life Can Kill You". A few metres to her left, beer and food colouring were being mixed into batter which was fed through a funnel into sizzling hot oil. A cluster of onlookers hovered around the oil vat, nibbling and then wolfing the tangles of greasy pastry as they were handed out. Another group had gathered around the archer, whose robot shifted back and forth between her shoulder and the crook of her elbow. It managed to tangle itself in the long black ponytail which curled around her neck. She laughed, freed its limbs and tousled its antennae. Aloysia guessed her family hailed from somewhere in southern India, but as she canted her head and replied cheerfully to the questions asked her, something about the cast of her eyes made Aloysia think of the friends she had known from Indochina.

Just when she had almost given up on finding the person she wanted in the general confusion, the crowd before her opened to clear a space, compressing itself into a circle of spectators.

Rodion Hallevy stood in the center of the circle. He had time to flash her a smile before his assailants came at him from two opposite directions, brandishing staffs of a grey matte material. The motion which followed was almost too quick for Aloysia to follow. One attacker swung at Rodion, who was suddenly beside where he had been, brushing the weapon away. The pole pulsed with a momentary glow as it made a glancing contact. The man

wielding it was then flat in the dirt, and his staff had moved into Rodion's hand, which led it into an arc where it met the staff of his second opponent with a clack and a yellow-green flash. The weapons met twice more, sending gasps of colour up their lengths, green near the midpoint and escalating to red near the ends on the second, more violent blow.

Then both assailants were on the ground, and Rodion was bowing to them and tossing his unkempt, light brown hair. The crowd applauded him, then began to fragment as a pair of fire-spinners lit up *their* staffs across the courtyard, whirling them over their heads and behind their backs, tracing arcs and spirals of flame from the tips of their rods, while a stereo system blasted anbaropop into the air around them.

Rodion tossed the weapon he had appropriated to Aloysia. Her left hand reached out and caught it, and it pulsed green around her closed fingers. "You made it!" he said.

They closed the space between themselves. "Hey, you," she said. "Why don't you do that kind of thing shirtless?"

"Too many complications ensue." Rodion looked, she thought, like they could put him on a Roman coin twenty years hence—the thoroughly dissipated son of an aristocrat. He tugged on a loose spring of her coppery hair, and his kiss of greeting landed between her cheek and the corner of her lips.

"So, this is Bad Ideas—" A chain of revelers, dressed in improbably garish smocks and pantaloons, blustered past Aloysia. Nubbins of light on their cuffs and shoes flickered in unison. They encircled a knot of puzzled freshmen and, whirling counterclockwise, began to sing:

*In Andalus the time is most awry,
Our grand Protectorate got bit and fell,
But stays the Institute to suck us dry;
Your luck be fair, and tell this place from Hell!*

"What on Earth was that?" Aloysia asked.

Rodion replied, "You don't have Stratfordians where you come from?"

"The people who...geek out over those manuscripts dug up somewhere in Scotland?" Rodion nodded, and she half-grinned in bemusement. "You see that kind of thing on the Grid, but I never imagined people acting it out in real life!"

"You mean you've never had an extemporaneous serenade in iambic pentameter?"

"Never," she said. "Is it hard to learn how to do?"

Rodion took her free hand in both of his, composed himself and began, "Are these...

*Are these the wrists that launched a thousand ships
To save the gracious aspect of thy face?*

The archer's voice broke in from across the courtyard:

*We'll spill thee princes' blood to red thy lips,
For hapless Troy would burn for half thy grace!*

One of the fire-spinners set his staff at the woman's feet. The robot backed away and hid behind her legs. She pushed something white and puffy onto the feathered end of an arrow, which she nocked onto the longbow she held parallel to the ground. Bending low at the waist, she dipped the arrowhead into the flames which leapt from the staff. "The game's afoot," she called, standing straight again, "so fire within the hole!" The crowd parted before her and retreated. She pulled back the bowstring and shot the flaming arrow through the air, driving its point deep into a target which burst into conflagration.

"Nicely done, Devi," Rodion said. "Nicely done indeed."

The marshmallow attached to the arrow was roasting quickly.

"How did you plan to get it off?" he asked.

Devi Naiê lifted an admonitory index finger, then with her other hand withdrew a metal contraption from one of her many trouser pockets. The stainless steel device unfolded and swiveled until it became a pair of pliers. Briskly, she strode to the flaming target, gripped the arrow at its fletching and pulled it loose from the target. She pulled a pencil from another pocket, stabbed the gooey and partially blackened marshmallow, slid it off the arrow and into her mouth. Its hot, semisolid innards spilled from her teeth over her chin, and she dropped the arrow. Stamping it on the ground, she wiped the back of her hand across her chin and said, "oody 'ell."

Others had already gathered to roast marshmallows and sausages around the burning target.

Devi turned away from them and bent to pick up the robot. Close up, in the light from a nearby window, Aloysia saw that her eyes were the same vivid jade as the robot's photocells. Scratching the robot behind its inquisitive antennae, Devi asked, "Why is it I always find myself hanging around two people deeply involved in each other? Leave me to be the third lens in your eyeglasses." The robot purred. "At least you care. Don't you? You should. I put a lot of effort into programming you that way."

A crack and a guttural rumble like caged thunder cut off whatever she was going to say next. Their heads, along with those of rest of the crowd, turned to the south face of the courtyard, where the transformer towers had been completed. Bolts of energy flew from the steel spheres atop the cylindrical coils.

Aloysia clapped her hands over her ears. "You people don't believe in half measures!"

"What was that you said?" Rodya asked, more loudly than he needed to, in the lull which followed the coils' outburst.

A man standing at the towers' control panel, his features sharp and his frame wiry, called to them. "Rodya Teiresiavich!" He gestured to the switches which operated the lightning-engines. "Would you care to play?"

Devi and Aloysia followed Rodion to the control panel. Aloysia now saw that amongst the cables and boxes which fed into the two pedestals, a synclavier keyboard had been set up. Rodion brushed his fingers across the tops of the black keys, then settled his hand into position.

The coils flared into life again, the hum of their power surge making Aloysia step back.

“World’s greatest tuning fork,” Rodion said. “Shall we essay a scale? Something in the key of Zeus major?”

With each fractal bolt of artificial lightning, a note ripped through the air, building into a jubilant melody, like all the video games of childhood were about to be won.

“Ulp!” exclaimed Devi, as the chain of Stratfordians grabbed her arm and pulled her into their whirling lemniscate. Rodion adjusted knobs beside the synclavier as he played, cutting back the volume of the coils as the singing voices rose to join them:

*So dance the painted maypole round
And come electrify your mind
'Cause autumn is a comin' in
And winter can't be far behind.*

* * *

Cartwright Jameson dropped the metal frying vat into his kitchen sink, pulled out the hose with the sprayer attachment, gave the oily residue on its inner surfaces a good spritz, and started attacking it with a soapy brush. *Life is good*, he thought. He had successfully improvised a fried-dough recipe, drawing on little more than his memories of funnel cake at fairgrounds fifteen or twenty years before. *Only this time, they glowed in the dark.*

Geographically speaking, for much of that time, he hadn’t been significantly closer to that childhood home than the Dallas airport. Looking back, as he cleaned the fry-o-tron, he pondered how he’d always associated Dallas with doom and despondency. This was through no fault of the town’s own; in fact, he never saw more of the city than its airport. However, every airline delay or mishap forced him to stay in that airport longer than he intended. Every airborne misadventure, whether due to atmospheric caprice or human fallibility, landed him in Dallas/Ft. Worth International. It was only natural that he began to associate that whole place with failure. As his history of aggravation, irritation and despair had grown, Cartwright’s distaste had extended itself. Soon, airports in general ranked high in his subconscious as representatives of divine ill will. The advertisements he saw posterred on their walls, backlit in sterile fluorescence, instilled loathing in his psyche for everything they sold.

He settled near the Institute, in a city capable of providing him with his few wants while traveling only on or below the ground. When it came time to marry, he settled in with a postdoctorate student who identified her ethnic

ancestry as “pan-Asian fusion”. When it came time to build his first super-computer, he constructed a sprawling, interconnected (yet somehow lovable) monstrosity more reminiscent of a Stone Age mainframe than the handheld marvels the kids carried these days. One day his electric shaver broke, and he began growing a beard.

By his early thirties Cartwright was a very happy man. He established himself inside a brownstone which clung to Beacon Hill’s steeper grade; as a programmer employed however indirectly for Reconstruction he had the clout to do that. He treasured the company of his wife, and considered himself very lucky to have found in her a fellow devotee of both Tom Lehrer and the Paranoids. He adored the circuitry that gradually expanded through their house, adored it in all its retro—nay, veritably prehistoric—glory. Also, he felt very happy about his lodgers. Devi and Rodya were good kids, he decided. When he contemplated the ethereal database in the sky and tried to fathom their fates, he invariably concluded that their destinies would be far greater than his own. True, he provided technical support to the AI Lab—a job which warmed every capillary in his body and fulfilled his most ambitious dreams—but those kids were on trajectories to great things.

* * *

Rodion Hallevy knocked deferentially on the office door. A man with a baritone voice responded from within. “Come on in.” The door handle buzzed happily at the touch of Rodya’s fingerprints, and he pushed the polymerized door panel inward.

“I hear it’s the girlfriend’s birthday today,” said Kiyoshi Sims from behind the papery mess of his desk. “Anything special planned?” He gestured Rodya to the armchair opposite his own. The young physicist looked over his friend’s shoulder at the floor-to-ceiling window. Kiyoshi’s office had a magnificent view of the Institute, eastward down Vassar Street to the Swallow Center and beyond, where cranes had been swaying for as long as either of them could remember. Rodya had seen the maps circulate occasionally, showing the entire Institute campus as a grey blob marked “Under Construction.” Regretfully, the window faced away from the storm systems brewing in the west; seeing any of the past year’s monsoons sweeping over the city must have been impressive. Whoever the lucky ones were with the labs on the other side of the upper floors, he envied them.

“Italian food. The expensive kind,” Rodya said.

Kiyoshi smiled. “I’m sure you have more involved plans than that. I know I did at your age.” Dr. Sims resembled, more than anything else, an actor resigned playing to aging-charmer roles for the rest of his career. Rumor had it the King of Sweden had asked the physicist how he had maintained himself all these years. Kiyoshi’s response: “I spend too much time with young people. Like an old rat in the young rats’ cage, I stay youthful beyond Nature’s specifications.” Rodya privately considered that his friend didn’t age,

he just tended to an asymptotic limit. Senescence went on and on, but more and more slowly, so that it never reached the bold black line at the edge of most people's graphs.

"I had a netphone call this morning," Kiyoshi said, "from Amsterdam. It looks like the Council managed to agree this time after all." He dug through the strata of books and papers on his desk. Physicists could be a shockingly conservative bunch when it came to "modern conveniences". Often, when the software hadn't been written to handle the particular equations and notations they wanted to use, they fell back upon the "ULI Standard Media" the innovators fought so hard to replace: pencil, paper, slate, chalk, erasers and wastebaskets. Kiyoshi pushed aside a stack of calculations—following up a particular thought, he and Rodya had hashed the equations, eventually representing a particularly nasty factor with a large frowny face—and uncovered a jar full of lemon drops. The jar served as paperweight, anchoring a stratum yet lower in the fossil record. Kiyoshi removed a particularly thick and creamy page and pressed his thumb to the watermark in one corner. The lettering on the page faded, and new ink patterns arose.

He handed the page to Rodya, who scanned the text. A few seconds later, seeing the message he had hoped not to see, he thumbed the watermark and watched the Council's directive vanish. The paper's circuitry replaced its text with the innocuous cover message.

"So," Rodya said. "No more recruiting."

"For the indefinite future," Kiyoshi amended, unhappily. "I really think they're out to hamstring themselves, and it looks like they're going to do it with smiles on their faces." He took the paper back, thumbed it again to input his biometric signature, and scribbled a pencil across the bottom. Accepting his command, the steganographic circuits erased their memory buffers and refilled them with random byte sequences. The message, bad news though it had been, would now be harder to recover than if traditional paper had been shredded and burnt. "Ever wish that all you had to worry about was really the high-temperature superconductors we came here to study?"

"Mind if I take one?" Rodya asked, pushing the printouts aside.

"Help yourself. But does that sort of thinking ever get to you?"

Kiyoshi Sims had been running a university's materials science lab for years. He had long since given up his boyhood dreams of flash-pow-zam scientific breakthroughs and had settled for being a good supervisor and a talented grant wrangler for the people who needed him. Then one day a sample of nanotube-infused ceramic came back from magnetization testing with some truly odd results. He and his grad students had puzzled over it, trying without success to construct a theoretical model for its behavior, until one student got sick of work and killed the afternoon e-mailing old friends. One of whom happened to be Rodion Hallevy, whom he'd met building exhibits for children's science museums, and who was now wasting time after college. Intrigued by the puzzling new compound, Rodion wrote back, asking for elaboration, and a little while later returned again, sending a message which very quickly ended

on Kiyoshi's desk, saying "It looks to me like..."

As Rodya's model predicted, the next, slightly modified batch of ceramic could carry a weak electric current at room temperature, with no resistance.

"Could be worse." Rodya smiled and popped the hard candy into his mouth. Articulating around it, he mused. "What thay I put the final toucheth on my equationth, whip up a batch of high-TC, twitth it into the world's largeth tranthformah coil, and—*crunch*—summon a lightning storm upon the land the likes of which no one has seen since Noah?"

"You never take any implications seriously, do you, no matter what your task is?" Kiyoshi's eyes made a brief heavenward motion.

"I would go mad from responsibility if I did."

Kiyoshi smiled. Rodya took a moment to gaze out the window and let his eyes follow the swinging cranes over the Swallow Center. Devi worked in there, somewhere under those skew facets of metal and brick and glass, under the building that always looked like someone had stepped on it and charged a very expensive fee.

A chime rang softly in Rodya's left ear. "Laboratory Security software speaking," the building's software announced. "You have a visitor." He held up his left hand for silence and spoke into the aleph he held in his right.

"Show me," Rodya instructed. A display window glowed into existence, floating a metre in front of him, at the eye level he had chosen as ergonomic. Kiyoshi helped himself to another lemon candy, seeing nothing. "Aloysia!" Rodya exclaimed. He reached across Kiyoshi's desk and turned its digital camera towards him. "Sorry, my portable's been acting fuzzy lately."

Kiyoshi shrugged. "Go ahead."

In the video image, Aloysia stood in the building's entryway. She blinked as Rodya appeared in her contact lenses. "Sorry I dropped by so early," she said to the microphone in her aleph. "I couldn't stand the company of art critics much longer. Are you busy?"

"Not at all," Rodya said, burying the thought of the reluctant simulator he had decided to debug and the latest micrograph results he had decided to analyze. "I'll be down in a second." The video window blinked out.

Kiyoshi stood and offered Rodya his hand. Puzzled, Rodya clasped it. Kiyoshi shook Rodya's hand, solemnly yet vigorously. "You are to be congratulated, my friend. If you ever show up to work with red hairs on your shoulder, I'll understand."

Rodya leapt his way down the stairwell, letting his feet contact the stairs every three or four steps. Bursting into the lobby, he sprinted across the purple carpet and jabbed the keypad set into the wall beside the main door. The glass panel swung inward as Aloysia stepped inside. She gave him a peck on the cheek. "You didn't have to hurry."

"Grr," said Rodya. "You're looking stylish."

Rodya had long been puzzled by Aloysia's abilities in this regard. Without ever sporting apparel put out by any fashionable designer, she managed to find the exact combination of color and material that set off her slender height

and immaculate skin. Today she carried a John Steed black umbrella, hooked over one arm.

“I decided I’d let my latest canvases speak for themselves,” she said. “You want to let the evening start early?”

The broken simulator and awkward equations were now buried deep in Rodya’s mind. “Sure.”

In accord with some obscure yet inviolable rule of living, an interruption arrived at this exceptionally enjoyable moment. The elevator doors opened, and Immanuel Martin poked his way into the lobby. Spotting Rodya from the other side of the unoccupied reception desk, he raised his voice to its most penetrating pitch. “Rodion! Just the person I was looking for.”

Rodya suppressed a wince. “Hi, Immanuel. Can I help you with something?”

Immanuel had already withdrawn his aleph from its belt holster. “You on your way out?”

“I can spare a couple minutes.”

“Take a look at this, then.” The aleph’s screen showed a page of equations. “I know you’re more into condensed matter than high-energy particle theory, but the guys up on third floor were a little boggled, if you know what I mean.”

“Yeah, hmm. . . wait a second, are you throwing together intions and demions here?” Rodya asked.

Immanuel had turned his attention to Aloysia. “Hello, Immanuel Martin,” he offered a hand.

“Aloysia K.,” she said.

“You’re not the artist everyone is on about, are you?” A fluorescent highlight slid around the band encircling his finger. “What’s that painting—*Court of Isis*? I really love that one.”

“Thank you,” Aloysia said.

Rodya tugged, a trifle sharply, on Immanuel’s elbow. He returned the aleph. “Trying to embed your gauge group in that noncompact real form won’t give you three quark generations.”

“But triality—”

“Is beside the point. You could hope for two, but you’ll only get a generation and an anti-generation.” He slipped his arm around Aloysia’s and walked her out onto Vassar Street.

Ten metres down the sidewalk, Aloysia turned to her companion. “That was the creepiest praise I’ve ever received.”

“Tell me about it. On second thought, don’t.”

The lab door swung open behind them. Immanuel called out, “Hey! What’s this about decomposing the five with an anti-two?” He waved the aleph, across whose surface Rodion had scrawled a few equations.

Rodya turned. “However you try to embed G in your E_8 , you’ll get a nonchiral demon spectrum.” He kept walking.

“But we’ve only been working with this one embedding,” Immanuel protested.

“So, now you can prove it fails in general. What’s the matter?”

“We were stumped for six days,” he sputtered.

“Well, on the seventh you can rest,” Rodya replied. “Uh oh,” he added, feeling a drop of water slide down his forehead. He looked upward. A grey mass rumbled over the sky, darkening out of the west. Immanuel ran for the lab door. Rain marched between the squat industrial buildings of Vassar Street, drenching the landscaped trees and recycled-plastic benches. Aloysia snapped the umbrella open over their heads.

“Aren’t you glad at least one of us has a practical mind?” she asked, smiling at Rodya while a skin-soaked Immanuel Martin scuttled into the laboratory lobby.

* * *

The corridor stretched off to a vanishing point in both directions, punctuated by office doors and bulletin boards for student groups. A graduate student going east noticed a professor going west and made a rapid turnabout. “Hey,” he announced himself. The professor nodded in greeting. “Have you seen the preprint on the Naiê lemma?”

The professor replied, “The girl with kaleidoscope eyes triumphs again.”

“I hear talk that at her rate, the Kaolin Foundation people will be paying her a lot of money in a few years.”

“She’s heading for a million-dollar theorem, that’s for sure.”

The student tried to catch the professor’s eye. “Jealous?”

“That she’s half my age and has probed the zeta function deeper than I dreamed I could?” the professor pondered. Somewhere outside the rain rumbled on the Institute roofs. “No, not at all.” He sounded almost surprised at himself.

“I’d sure as hell be,” the student said.

“Go ahead. I won’t stop you.”

The grad student watched the professor amble his way westward along the Kubrickian hallway. He shrugged and turned to go.

* * *

A metal-and-plastic centipede clicked its way across the pen, weaving sinuously. It reached a plastic beach bucket and rummaged through the contents with its pincers. Withdrawing a pair of photocell eyes, the centipede curled around and positioned its head near its midsection. Gently laying the eyes on the concrete floor, it carefully prodded the connecting joint between two of its body segments. Its pincers severed the connector, letting the rear half of its body fall free. The centipede then busied itself working on the frontmost segment of the disconnected tail. It snapped the photocell eyes into position, reaching into the bucket again for a set of pincers and a black-cased processor box. Finally, it slid a power pack into position. The severed tail now resembled a dormant version of the original insect, which gently brushed the new

centipede's head with its own. A transceiver within the first centipede's processor box flashed signals into its counterpart, injecting virtual nerve patterns into the new insect's memory.

Stevin Dayasov watched the two centipedes parade off together, perhaps seeking a power source to recharge their batteries, and then maybe the shelter their species had constructed in the next room. He sat on the rug, leaning against the plastic barrier. Usually this brand of resilient metre-high wall stood duty against hyperactive children; the researchers had pressed it into alternative duty corralling off the robot colonies.

The lab was quieter these days than it had been during summer session. When he wasn't traveling, Professor Sirinov was busy teaching freshman calculus and introductory real analysis. The poor bastard. What was up with him, Stevin wondered, volunteering to take on classes like 18.01 and 100B, the likes of which the rest of the faculty happily shrugged off upon the new and untenured, if not dropping them all the way down the chain to grad students? Deep humanity on his part, he figured, or approaching senility. Most of the undergrad hirelings had gone back to classwork, too, on the receiving end. With the two PhD students having defended their theses the spring before, the place was getting to feel like an empty nest.

The centipedes turned away from the recharge plug and waved their way across the concrete, heading for the hole the researchers had cut in the wall. Stevin watched them proceed into the next room. Intently absorbed in the synchronicity of their legs, he failed to notice Devi appearing beside him.

"I'm back," she proclaimed.

"In that case, I bring gifts." He offered Devi a sealed container of food, holding a pair of chopsticks in his other hand. Scent molecules from a Phoenixtown takeout dive began to diffuse into the room.

"I learned long ago to be wary of geeks bearing gifts," she replied.

Stevin was slowly learning the proper way to react: he shrugged his broad wrestler's shoulders and allowed himself the barest smile. One hand rubbed his week's worth of lumberjack beard growth.

"Could be a long night," he warned. "Especially if Cartwright keeps plugging on that debug job. If he gets that working, you know what the next step is."

"Good point." Devi took the takeout food from his hand. They sat in two beanbag chairs, across the room from the insect pen. A good many people had made this lab their second home; Devi expected that more than a few made it their primary one as well. Posters covered the drywall partitions, reminding her of castle tapestries. Some former resident, had covered a considerable amount of wall space with an enlargement of the *Sgt. Pepper* cover, while a later hand had added on the opposite wall an even larger version of Zappa's *We're Only In It For the Money*.

"Any new behaviors?" Stevin asked, inhaling the aroma of his mushroom beef.

"I think the ants are starting to learn the centipedes' communication system.

We've seen a couple times where they try to confuse the 'pedes, throwing off their coordination in a battle." She opened her food box. "Kung Pao chicken? Sometimes I think you're not just observing their behavior."

"I do what I can," Stevin smiled. "Anything else I should know about? With the robots, that is, of course."

"The 'pedes are getting better at using multiple pincers. One of the newest generation has sets at both ends and can use them fairly deftly. He maimed an ant this morning. Poor bug was trying to get at a recharger and got impaled instead. The 'pedes pulled him apart and added his parts to their pile."

"I'm thinking of cutting down the parts we supply in the buckets," Stevin pondered aloud. "Maybe we can force the species into more intense competition, get some new neural patterns going. I'm trying to think of ways to stress-test our analysis routines."

"The newest routines seem to be pretty good at figuring out the neural nets. Even the worst patterns make sense if the routines can crunch them for a while." Devi transferred a chunk of chicken to her mouth, nimbly handling the chopsticks.

"That's no guarantee they'll work on the nerve nets those bugs evolve tomorrow," Stevin reminded her.

"You can say that again," Devi grimaced, working the words around her chicken.

"That's no guarantee they'll work on the nerve nets those bugs—hey!" He broke off as Devi approached him with an ominously lifted chopstick. "You could poke somebody's eye out with that thing, you know."

"I wouldn't do a thing like that," Devi said, filling her intonations with horror. "No," she decided, "I'd reprogram a couple centipedes to think you were a very large ant, and set them loose in your home while you sleep."

"Pincers at both ends, you say?"

"You better believe it."

Stevin chewed a mushroom. "Assuming Cartwright doesn't get the souped-up analyzer to work on the new routines, you have anything planned for tonight?"

"Hmm. Mumble, mumble, noncommittal noises," said Devi. "First of all, he keeps saying he'll get it going, and if I believe anyone—"

"Well, even the best can be overconfident."

"Mumble, mumble. I've got a thorny topology problem, actually, that's been bugging me a while. I probably wouldn't be very good company."

Stevin swallowed a slice of beef and licked a drop of sauce from his lip. "You know—"

Devi's aleph began to make an insistent noise from within the backpack she had left across the room, a chord for three guitars and piano which indicated that Sirinov was trying to reach her. She sprang to her feet, covered the distance in a pace and a half and began to root through her pack. The wall-of-sound crescendo grew louder as she pulled the aleph out of her pack and then cut off when she thumbed the netphone icon.

“Hello?” she said into the device. “Oh, well enough—Stevin is making a nuisance of himself.”

Me? he mouthed.

“And how is London treating you?” She paused. “Well, they do say curry is the national dish of England.” Another beat. “This early? Is something. . .” Her expression was opaque to Stevin as she listened. Then, mildly incredulously, she said, as if repeating Sirinov’s last remark, “*Plurality?*”

One eyebrow lifted and stayed there as Sirinov spoke to her.

“I’ll see you tomorrow morning, then. Godspeed, *tovarich*.” Still looking rather quizzical, she pocketed her aleph and turned to Stevin. “Ben’s coming back early,” she said. “Something about a new result he wants to test personally.”

“Odd,” Stevin said.

“Isn’t it? I’m to meet with him tomorrow morning.”

“*Morning?* Who is this man, and what has he done with Professor Sirinov?”

“You got me stumped.”

“Well, it sounds like you’re in for a solid block of chalkboard time.”

“Jealous?”

“Not very.” He reached into his jacket pocket and withdrew two fortune cookies. This time, she took the food eagerly from his hand. Devi tore the polyethylene wrapper open with her teeth and adroitly snapped the cookie in two. “I’m more irritated that you haven’t answered about tonight.”

A burly arm pushed the door open. Cartwright ambled into the room. As he adjusted his glasses on the bridge of his nose, Devi noticed the slight acne scars on its either side. “I figured out why the cycles weren’t parallelizing,” he said, without preamble. “And I polished up the subroutines. If the algorithms you laid out are the ones you want to run on your data. . .”

“Looks like it’s a moot point,” she told Stevin, *sotto voce*. To them both, she added, “Excellent. Let’s plug it into the Grid and see what happens.”

“Ho hum, mumble, mumble,” he said. “Guess I’ll have to be good-natured about it.” Gesturing to the many-legged robots prowling under and around cardboard obstacles, he added, “Let’s do this someplace where we don’t fighten the children.”

* * *

Rodion and Aloysia were four glasses into a bottle of red wine. He was eating chicken marsala, and she was halfway through a plate of vegetables prepared in some way she’d never tried before. The evening was mild, and the early crowd of the North End restaurants were spilling out onto the wrought-iron tables along the sidewalks of the narrow streets.

“To getting older,” Aloysia said, lifting her glass by the stem.

“Clink clink,” Rodya affirmed. “So, and how are all your art buddies? You never seem to let me meet them, anymore.”

“The Back Bay commune is fine, thank you.”

“A whole clan of artists, setting themselves up together to make art out of the ruin, immortalize the rebuilding after the war. Now that’s a profound thing.”

“See, that’s why I don’t let you near them,” Aloysia said, nibbling around the edges of a mushroom. “They don’t care for your brand of mockery.” Rodya held up his palms, miming defenselessness. Aloysia giggled. “These days, though, I’m wondering what there is to immortalize, except a lot of old people feeling proud about the war they fought for us.”

“With rascals like us running around,” Rodion interposed, “they must be sorry they won.”

“Actually,” Aloysia said, “they told me they have a question for you, seeing as you’re a renowned physicist and all.”

“Who wants to know what?”

“Solweig, actually, our current chairperson.” Rodion watched her over the surface tension in his water goblet. “She says she was having lunch the other day—”

“I would make an anorexic joke, but I’m not that tasteless.”

“And she started wondering why pouring sugar into champagne makes it bubble over.”

“Where was this lunch?” Rodion took a gulp of his water.

“A gala somewhere, I presume.”

“Well,” Rodya took a breadstick from the basket and snapped it, “apparently she doesn’t enjoy the science enough to find out for herself.”

“What could she do, look it up on the Grid?”

“If she wants to know a name, fine. But there’s always experiment.” Aloysia stared blankly at him over a forkful of eggplant. “Try variations. Sugar in cold champagne, sugar in warm champagne. Salt in beer. Fizzy, flat. Discover when the phenomenon changes.”

“And what do you know at the end of that?”

“Maybe nothing,” Rodya conceded. “But that’s what my job is like. When you’ve gone through enough beverages and powders and temperatures, you can cook up a name for it, I suppose, to make talking easier, when you meet wine lovers from around the world. Something in Greek or Latin, to make it universal.”

“So, what name should I tell her?”

Rodion shifted in his chair. He sighed and peeled off a strip of breadstick skin, which accumulated in a crumpled helix on his plate. “Usually, champagne or soda or whatever is filled with dissolved carbon dioxide molecules, just floating around. To make a bubble, a clump of molecules has to congregate at a particular place, which we *call* a nucleation site. It’s some kind of dislocation, a foreign crystal or even just a tiny whirlpool in the liquid. That’s why shaking a soda can makes it spray when you open,” he added. “Nothing to do with the pressure, really, just putting turbulence into the fluid.” He ran a finger over the ragged breadstick fracture.

Rodya took the boat of salad dressing and proceeded to dunk his breadstick fragments, cupping one hand under the saturated bread as he transferred it to his mouth.

“You have to be one of the most uncouth people I know,” Aloysia said.

“Yep. Why else would you be around me so long?” He raised his goblet in toast. “To salad dressing, and the imminent collapse of civilization.”

“Clink,” said Aloysia.

Conversation slowed as they speared mouthfuls of food.

Then, “In any case,” Aloysia said, “you can’t complain about not seeing my friends, considering how little I get to be around yours.”

“They keep odd hours. Some are on twenty-six-hour days.”

“Devi, for example.”

“What about her?”

Aloysia shrugged, then noticed an olive lurking under the remains of the salad. She speared it and slid it from her fork tines onto her plate.

“You think I was going to stick it on my finger?” Rodya asked, convincingly hurt. “This isn’t Thanksgiving, you know.” He grinned around a mouthful of croutons. Swallowing them, he continued, “Devi certainly is worth knowing, though. She’s the closest thing to an actual individual that I think I’ve ever met.” Without her uttering as much as a syllable, Aloysia’s countenance frosted over. “Present company excepted, of course.” The temperature rose, once again in visual silence. “Once she showed up at my door with a tattoo and ninety-eight grand in her suitcase. Now, that was a day to remember.”

Aloysia cracked a chunk of ice in her molars and tongued it over to her cheek. “What?”

“It was about a week before I came up here. She’d just finished her bachelor’s degree at Caltech. One day, I got a netphone call, and the signature said it was Devi, on a secure line. I said something like, ‘Hey, didn’t expect to hear from you.’”

“She says, ‘How’s the job coming along?’”

“I tell her that Kiyoshi Sims is taking over a big solid-state lab up here, and he’s driving down to meet me, and we’re gonna go on the great physicists’ road trip.”

“She’s like, ‘You two wouldn’t want to make a side trip, would you?’”

“‘Is something wrong? Where are you?’”

“‘Well, so far I’ve made it to El Reno, Oklahoma. Everything was fine until one of those Vegas slimeballs noticed we were betting by quadrant.’”

Aloysia fought to avoid choking. “She was playing the casinos?”

“Applied physics,” Rodya said. “Some little gizmo they’d made that told them where the roulette ball would land. An enhancement of VR glasses, I think, with a little digital video camera to track the ball’s motion. Anyway, it kept her going pretty well until her prospects around here paid off.”

“Ripped-off casino money paid for some great mathematics, I guess,” Aloysia said.

Without warning, Rodya had assumed a dreamy aspect, staring contemplatively at the last crouton on his salad plate. “It doesn’t compare with the first time I met her, though.” Aloysia waited, expectant. “That was...wow, eight years before the Vegas thing? We were at this summer camp for smart kids, you know, playing one of those stupid name games on the first day. And she was sitting off by herself, under a tree in this college quad. I went over to talk to her, draw her out, ’cause you know I knew everything about people, right? She looked up at me and said, ‘I don’t get along well with people who have forty-six chromosomes, and since you’re here I imagine you fall into that category.’”

Aloysia considered for several units of conversation time. Finally, she said, lamely, “Times change, don’t they?” and polished off the remainder of her wine.

* * *

Still ferrying green peppers and spicky chicken bits with her chopsticks, Devi rose and followed Cartwright out the playroom door. From time to time, she marveled to herself how she had witnessed the decay of this little domain. When she had first arrived at the Institute, stumbling behind in Rodya’s footsteps as he had blazed his way into solid-state supremacy, this chunk of the AI Lab had been new. More than that, it had shone with polish, effervesced from new carpet, and generally resonated with the ten percent of its budget that’d gone to artistic improvements. Now the carpet had worn, the tiles had scuffed, and the basement hallways looked like just about any other randomly selected morsel of Institute.

Cartwright pulled himself up the stairs, gripping the handrail with firm determination. Devi followed, skipping.

“How long’ve you been deliberately avoiding the rail?” asked Stevin.

“Longer than I can remember.”

Cartwright held the door open for them and recovered his lost breath. “I nailed the seg fault that was killing the router,” he said, making conversation.

“Has all the new data been loaded?” Stevin asked, tilting his food box into his mouth to get the last of the sauce.

“It has all the genome database, all of the neural maps and everything else you guys have fed into it,” Cartwright replied, leading the way down a hallway whose walls had been painted a disturbing shade of yellow in accordance with the wishes of an architect who didn’t have to work on the premises. He stood before a door fabricated from wood particles set in a substance functionally equivalent to, but somewhat more environmentally friendly than, old-fashioned formaldehyde. Waving his ID card in the general vicinity of the door handle prompted a lens above the door to swivel about and focus on each of the three of them in turn. Bolts shifted, making muffled clicks. Cartwright pushed the door open and again held it for them.

This room had a window set into the opposite wall, which looked out over the street to the glass-and-metal building across the way. Cartwright hummed, harmonizing with the fans running in the more nearly functional of the machines which packed his office shelves. He was, he liked to say, within a month of being exactly as old as the Senet 400 game console, and he'd been repairing electronic cruft for most of the years since. Now that he worked at the very hub of his entire worldview, his environment filled itself with boxes and cabling and sparkling telltale blinkenlights.

"I'm switching on the VR interface now," he proclaimed, tapping on his debugger's keyboard.

"The game's afoot," Devi said. Processors in the room, in the lab downstairs, elsewhere in the building and across the Institute campus—a network which had staked out a full two-hundred-fifty-sixth of the Grid's address space—began to donate their free time. A new analytic faculty rose from these distributed computations and gathered its presence in Cartwright's office.

Glowing shapes filled the air around the three Institute denizens, stretching elastically. A legend flashed discreetly in Devi's peripheral vision, announcing "ESTABLISHING REFERENCE FRAME". A string of dots flashed on and off after the message for a few heartbeats. Then the announcement vanished and the glowing patterns took on rigid geometrical form.

"It looks like you optimized the VR code, too," Stevin said to Cartwright. "The view through my contacts is better than ever."

"Thank you," Cartwright said demurely.

A white wireframe cube sketched itself in the center of the room. A few centimetres from each wall, panels performed smooth fade-ins and began to flash readouts. Devi turned to read the one closest to her. "The genome data is in the right format to start with, for once." She nodded with satisfaction.

Propping himself on the cot, Stevin examined another panel, this one dripping with garish colors, like a nighttime skyline composed only of casinos. "The nerve maps aren't in the right directory," he grumbled, pulling out his aleph and making rapid manipulations with its stylus. The harsher flashes on the panel's surface subsided. "Much better."

"It looks like everything is ready to execute," Devi said. "You all right?"

"Yeah, go for it." Stevin slid his stylus back into its clip.

They turned to face the wireframe cube. Neon text rose from the floor to fill it, making soft shushing noises as it rose through the tiles.

"I'm going to personally choke the person who put this sound scheme back into effect," Devi declared.

The center of the cube now displayed a neon-rendered human brain, scaled up to be about half a metre from front to back. Thin slices cut themselves from its material and rose into the air above it, showing nerve networks brightly outlined on obsidian background. The slices continued to float serenely, while the networks displayed on them zoomed inward, expanding their scales to show finer and finer details of nerve branching. Sections of networks flashed on and off in various highlights, while legends appeared in the air beside the sectioned

brain. In the lower portion of the cube, strings of letters flashed by, blinking through hundreds, then thousands of pages of text, endlessly permuting A, G, C and T into a fastforward stream.

“It looks like it’s working,” Cartwright said, breaking the silence.

“Most of it means absolutely nothing,” Devi said. “But I still think it looks good.” She paced in a circle around the cube, stopping occasionally to admire how it stayed in one place relative to the floor, just like furniture should. VR had not always been so.

They watched the analyzer software cogitate for a few silent minutes. Devi and Stevin circulated about the central cube, occasionally tapping a section of its surface with a stylus. The position sensors, busily deadreckoning the stylus’s location within the room’s reference frame, signaled their alephs, which in turn passed a data packet to the analyzer program.

“So,” Stevin said, making smalltalk, “Rodion and that artist, Aloysia K., how long has that been going on?”

“They walk together many moons,” Devi replied. “Five months, perhaps.” Out of the corner of her eye, she noticed a scarlet indicator on a wall panel. She broke off speaking and examined it more closely, then shrugged it off as unimportant.

Stevin sat on the cot, scrutinizing a data panel on the wall before him. Examining an expanded view of a miniscule portion of the analyzer’s calculations, he announced, “This is farther than it’s ever gotten before, and the results look cleaner.” He paused while the stream of figures rearranged for a while longer. “I’d hate to be the one to break the good news, but—”

He broke off as the central cube flared heme-red. Legends flashed in the air above each of its lateral faces. “ERROR 147: ESSENTIAL SINGULARITY DETECTED.” The streams stopped flowing; the wall displays froze and sheathed over in gauze.

Devi squinted and looked away. “We should reprogram that so it doesn’t keep shouting like that.” She pulled off her glasses and held them in her hand, the cube and readout panels now an unfocused blur against her palm.

Cartwright was looking guiltily at the floor. “I had thought,” he began.

“That wasn’t your problem,” Devi reassured him.

“That wasn’t a system crash,” Stevin continued. “That was a problem with our assumptions.”

Devi swung her glasses by the earpiece, letting the VR lenses project against her wrist. “Our routines don’t work after all, not on the *Homo sapiens* dataset.” The hum and whir of Cartwright’s rehabilitated cruff collection filled the silence. “They’d handled everything before.”

“We’d never gotten that error message before,” Stevin mused. “Oh, well, we’ve gotten a bad error, but at least it’s an interesting one.”

Devi turned to face away from the spot where the cube had been. Slowly putting on her glasses, she withdrew her aleph and began to whisk its stylus across its surface. The cube stopped its flashing cycle; she turned to face it and stepped closer.

Rodion and Aloysia stepped into Cartwright's kitchen. Draping his coat over the back of a chair, Rodya turned to the mag-chill refrigerator. "I hope he's kept his dessert stock filled." He pulled open the freezer compartment and let out a joyous shriek. "Freudian sticks! Oh baby." He took the frosted-over polyethylene bag in one hand and clawed it open with his fingernails.

Aloysia took one of the chocolate-coated popsicles and examined it critically. She asked, "Freudian stick, do I want to know?"

"They're symbolic," Rodya said, extracting one and shoving the rest back into the freezer. "These are the best. Cartwright has spent decades, I think, finding the best desserts in the world. He's found some outstanding recipes, culled from cultures all over the planet. This, though, is an original invention. Try it."

Aloysia took a tentative bite into the popsicle's tip and found the chocolate to be a thin, hard outer layer. It cracked under her teeth, and a rapid succession of flavors dissolved over her tongue.

"A bit like a tiramisu on a stick," Rodion said, delicately munching. "But not quite. I don't know exactly what goes into making them, except that Cartwright and his wife refuse to let us into the kitchen while they do it."

They climbed the narrow stairs to the upper floor and entered Rodya's room. He took his theremin case from the foot of the bed and worked the latches. Deftly, he extended the instrument's antennae and worked the tuning knobs. Aloysia watched him pluck the air near one antenna, tilting his head to catch the sharp notes. Soon enough, he had settled into a tune, a vaguely familiar instrumental, a backing for something Aloysia was sure she'd heard before.

"That's an Incuberie Mondiale song, isn't it?"

Rodion nodded. "From all the way back, *Džsabbersmok*, their first U.S. album."

"Oh, I remember." Aloysia drummed her forehead with the heel of her hand. "Track 7. 'Tsiaberwocki,' isn't it?"

Rodion continued to play, improvising, trying to reduce Incuberie Mondiale's symphonic post-rock to a single instrumental. "You know, their chief songwriter, Katya, had to teach herself overtone singing. It became the band's trademark, right, that Tuvan sound, but no one wanted to teach her."

"Why not?"

"Because Tuvan prejudice held that women singing *khoomer* would make them go sterile. So she taught herself and made a band around it."

Rodya had settled into the song, flowing his hands freely around the theremin antennae. Aloysia felt herself relaxing, letting all the recollections of hungry eyes slip from her mind. She opened her mouth to suggest that they close the door, when she heard footsteps ascend the stairway and shuffle down the hall.

Devi let her backpack slide off her shoulder and sank into a beanbag chair, sighing luxuriantly. "I need to get away from work more," she announced.

Rodya looked uneasily from her to Aloysia. “Excuse me a minute, I have a bladder that wants emptying.” He rose and stepped over Devi’s outstretched legs on the way to the door.

Aloysia hazarded a safe question: “How are you feeling?”

Devi, limp in the chair, rolled her head to one side and focused on her. “Like I’ve been outgrabbed by a mome rath.”

Aloysia sensed something incredibly, well, *Devi* about Devi this night. She huddled under her shapeless clothes, no trace of an emblem, let alone a designer label. Not for the first time, Aloysia wondered how Devi accomplished it—removing almost every distinctive feature from her own appearance. She never could have passed for classically pretty, Aloysia decided, but she could easily have been pleasantly striking; instead, she’d aimed for this, the polar opposite. Not ugly or grotesque, simply overlookable.

“Does work always keep you this late?” she asked, watching Devi sag, listless.

“Not always, though sometimes putting in a late Friday or Saturday night can help fill the void. No, this was just a day when things decided not to work.” More clearly now than ever before, Devi looked like someone who wanted to be forgotten.

Rodion softly pulled the door outward. “The entire urogenital system is an amazing thing,” he said, stepping over Devi again and returning to his theremin. “You remember the old joke about how it had to be an engineer who designed the body, putting a recreational area right alongside the waste disposal plant?”

Devi smiled; Aloysia might have called her attitude *wicked* if it had been more enthusiastic. “I’ve always been telling you, evolved systems aren’t like engineered ones. Functions overlap in the same biological part. That’s one way you can separate Nature’s handiwork from the technological kind.”

Rodion plucked the theremin field, producing a low pulse. “At least, it was until you AI people started mucking with the borderlines,” he said, goodnaturefully.

“Dare I say I’m confused?” asked Aloysia.

“It’s a simple thing,” Devi said. “I might even forgive Rodya for making me think about work if you want me to explain.” She paused. Seeing Aloysia nod, she continued. “When natural selection creates a structure, a complicated thing like an organism, functions can coexist in unexpected ways, like recreation and waste disposal in the same organ.”

“Hee hee,” Rodion said. Aloysia diverted her attention from Devi long enough to glare.

“The same principle applies to nervous systems. Look at how manmade computers get laid out, and you see some memory over here, an arithmetic-logic unit over here, silicon this and that, some kind of pretty grid, microscopic blocks laid out over nanoacres. On the other hand, biological systems have wet, fleshy nerve nets, in which seemingly unrelated functions can evolve to occupy the same physical network section. Late last decade, when they first

started fooling around with evolving robotic neural networks—bugs running around like what we have today—this was a pretty novel thing. You could tell the difference between a neural network that evolved through natural selection and one that some guy programmed to do the job.”

“I’m not sure how machines can evolve,” Aloysia said. “Doesn’t that involve reproduction, and genes doing things, and all that?”

“The wonderful thing about natural selection,” said Devi, “is that the substrate doesn’t matter. It doesn’t have to be organic, just able to reproduce and subject to survival constraints. What we do is let a bunch of robots loose in a playpen, with some goals they must fulfill to stay alive, and varied neural nets programmed into their cute little chip-brains. We call them ‘nymphets’, from *nymph*, an immature insect. Look here.” She unzipped her backpack and withdrew a robot, the oddly feline insect Aloysia had seen her carry around the East Campus courtyard. A series of clicks and snaps loosened a panel in the creature’s head, and Devi withdrew a transparent cylinder, perhaps two centimetres long and a fingernail’s area in cross-section. “Hold it up to the light,” she instructed, holding the cylinder in her palm.

Aloysia did so, holding the robot’s brain between index and thumb. When the rays from Rodion’s reading lamp shone through it, the brain cylinder lit itself on opalescent fire. Flecks of color danced, trembling and fluctuating as she rotated her hand.

“It’s a carbon nanotube processor,” Devi said. “You know, for the longest time, everyone thought AI would make real progress when the computers got more powerful. Everyone decided that the important thing was getting a lot of memory and speed into a tiny box.”

“Typical men,” Aloysia said. “My chip is bigger than yours.”

“Hey,” Rodion protested.

They ignored him. Devi said, “Now that we have decently big nanotube crystals, as powerful per unit volume as human brain tissue, we realize that we’re just as confused as ever. Hence our work, evolving robots. You see, some of the robots, just by pure luck, happen to be slightly better at staying alive than the others. They get to reproduce, exactly like organisms in nature. Natural selection goes to work, on an astonishingly rapid timescale. We’ve seen substantial progress over a few hundred generations—a matter of days for these guys.”

“So some of the robots have better brains,” Aloysia said, “or better-adapted brains, and their characteristics get passed on. How do they do that, though? I mean, do they have little virtual sex cells, with tiny virtual chromosomes?”

“Pretty much,” Devi confirmed. “Of course, it’s not DNA, just a byte sequence—we make the approximation that very few of the chemical details of the wet and wiggly DNA molecule matter, for our purposes. This byte sequence tells the virtual nerve cells, little simulated protoplasmic globs, how they should grow, not exactly, but as a general pattern.”

“That would be far too many cells to specify exactly,” Rodya commented. “In actual vertebrate animals, there are many more neurons than genes, so

the biologically realistic thing to do is to go after patterns, anyway.”

“We started a year ago with a predefined way of encoding these patterns, a genetic code for playpen bugs, if you like. It was just a way for the nanotube brains to simulate their own growth, go through a kind of embryo stage where their brains develop based upon a virtual DNA sequence. Oh, may I have that back, please?” Devi snapped the nanotube cylinder back into its receptacle. “From there, we tried to increase the variability, make our robots closer to a wet ecosystem. I devised a way to let natural selection influence not just the nerve patterns, but also the way those patterns get written down as virtual DNA.”

“So they can evolve to make their DNA more efficient?” asked Aloysia.

“More efficient, more versatile, more lifelike, really,” Devi said. “Then Stevin broke out the toolbox and found some truly brilliant ways to build robots with interchangeable parts, segments they could rearrange by themselves, based also on DNA bytestreams. Evolving the body, as well as the mind. Actually, come to think of it, he made that breakthrough not long after breaking up with Susann Ovoce. Maybe there’s a connection,” she mock-pondered.

“So now you have robots with evolving brains and bodies and genetic codes,” Aloysia said. “Must make figuring them out difficult.”

“Aha! But there’s the payoff, right?” interjected Rodya.

“Or there would be, if what we’d tried today had worked,” Devi said, glumly. “All along, we’ve been working on analysis routines, computer programs that look at the DNA bytes and the nerve patterns they create and tell us how those nerve nets work.”

The robot, now reactivated, crawled into Devi’s backpack. Aloysia watched it huddle there and laughed. “Reading robot minds?”

“If you like. Anyway, we’re studying their behavior and where it comes from. The payoff, we’d hoped, would be that we could turn those same analysis routines to *human* DNA, brain maps from inside our own skulls, and use those same computer programs to understand what goes on inside our own heads.”

“Wow,” Aloysia said. “That’s, um. . .”

“Creepy? Scary? Improbable? But just think!” Devi cupped her hand, palm up. “If our analyses paid off, with nothing more than a sphere of this same nanotube crystal, we’re talking the size and weight of your average grapefruit, we could make a computer as human as you are.”

Aloysia considered the possibility: a fiery opal sphere, graspable in the hand, thinking and emoting. What, no more soul, no more spirit, just a heap of nanotubes doing the spirit’s job? The visceral impact was larger than any intellectual objections she could marshal up. Her heart skittered for a moment, while a part of her mind wondered why. It seemed a remote possibility, an option she would have filed with the pet dinosaur and the summer vacation on Europa, but what if, in a very real sense, it only required more of what Devi was already doing? “Difficult, it sounds like to me,” she said.

“It’s sure worked out that way,” Devi agreed. “Naturally, we’d hoped for better, counting on our luck, basically, that the robots would evolve in ways that paralleled how organic life has developed in the last half-billion years. We’d had some good fortune there, actually. I wrote a paper several months ago, pointing out parallels between the body-brain developments in our playpen and the origins of the chordate phylum. Half a billion years ago, some wormy guys first lucked onto an internal stiffening rod, a cartilaginous thing that eventually, in some descendants, became a backbone. Parallel with that, the central nervous system evolved, coordinating the new muscles the notochord made possible.”

“Notochord,” Rodion mused. “That’s what I said about Wagner.” His remark elicited two wry smiles.

“We saw some parallels between our pet robots and the protochordates of the early Cambrian, and we’d hoped we had, well, struck a chord with Nature. Unfortunately, even though we were pretty good at handling the worms, applying our analysis programs to the human data doesn’t fare so well.”

“You tried to do that today?” Aloysia asked, all the more aware that this investigation was a live matter, an effort proceeding in the present moment. This was the ragged edge where knowledge stopped.

“We’d tried a few times before, but always the computers crashed under the load. Cartwright, the man responsible for your desserts, got them working. And today,” she sighed, “we discovered crashing computers were the least of our problems. I’m still not sure exactly how to explain this. Maybe if I knew that I’d be closer to solving it.” She released a morose chuckle, contemplating carefully her word choice. “It appears,” she said, “that the analysis routines we developed looking at more primitive neural structures fail when applied to a *Homo sapiens* dataset.”

“Is the dataset just too big?” Aloysia asked. “I know image-processing software always likes to crash on the big, detailed pictures.”

“It’s not exactly a matter of overloading the computers,” Devi elaborated. “As far as we can tell, it’s as though the mathematical principles on which we’ve based our analyses simply don’t apply to the human case. When the analysis software looks at the human data, it generates a chart, say, a plot of some quantity. In a well-behaved system, the plots should change smoothly—all the graphs would turn out to be continuous lines. Instead, we get truly nasty failures, lines going up and down an infinite number of times in an arbitrarily small interval. Things like that.”

“Ouch. So the analysis software is based on something fundamentally wrong?”

“Maybe. I sincerely hope not. It’s hard to tell, though, because...” Devi’s voice trailed away as her hands gestured in the air, tracing outlines as if molding thought balloons from rubber. “It’s an over-simplification to say the software produces charts, really. Its products, or at least the ones we’re interested in studying now, are surfaces in higher-dimensional space... wait just a

minute.” She rummaged in her many trouser pockets and withdrew a folded piece of electronic parchment. Unclipping her stylus from the aleph she wore on her belt, she scrawled a command on the dotted line which ran across the page’s upper edge. The empty space below the command line filled with a convoluted shape, a smushed sphere with many handles and twisted loops attached, covered all over with gridlines. “This is a projection of a higher-dimensional shape to 3-D, which the parchment reduces further to 2-D, of course. The analyzer produced this particular surface by cogitating on the brain map of Xantippe here.” She tickled the robot in her lap. The loops and handles had a sort of regularity, Aloysia thought, a rough symmetry among their angles.

“Now watch,” she continued, “what happens when I run the same program on the DNA and brain-map data we have on human beings.” She scrawled another command. The parchment blinked off and returned with a new image.

“Looks horrible,” Aloysia said. The original sphere was almost totally obscured by a matted tangle of extrusions, bursting asymmetrically in wild directions.

Rodion had stopped strumming his theremin. Rubbing his chin, he contemplated aloud. “So you have a manifold in some n -space that behaves badly, in some respect, when you feed the program human data. An essential singularity?” Devi nodded. “More than one, I suppose, when you give it the full works.” She nodded again. “Yeah, that’s pretty damn miserable.”

“Yeah. You know,” Devi said, almost energetically. “I could really use a Freudian stick right about now.”

“I’ll oblige,” said Rodion. He hopped to his feet and padded down the stairs. The two women sat without conversing. Devi appeared comfortable with silence, remarkable for a youth destined to become a classroom lecturer. Aloysia decided she admired the trait.

Rodya returned and gave Devi her dessert. She took a couple bites, then stood. “I’ll leave you two to your devices,” Devi said. She left still munching.

It only took Rodya and Aloysia a little time to reach where they’d been before. Perhaps two hours later, they were asleep.

Soon, all three were lost in dreams.

* * *

The water was cold around Rodion’s bare feet. Incoming surf washed away the concavities left in the sand as he climbed the slope of the beach. The sand was loose and yielding around his toes, then firm as he rose to higher ground, then pliant again as he reached the dry dunes shot through with nettles. He crouched among the plants and switched up the magnification on his lenses.

The noise of the party arrived with the smell of chlorinated pool-water on the breeze. He tapped the wireless bud lodged in his ear canal. “You there, Construct buddy?” he asked. “Come on, Richard, don’t let me down.”

Limousines were pulling up around the fountain which splashed and burbled in front of the mansion. Men in tuxedos and women in diaphanous dresses emerged from the cars, and liveried servants ushered them up the red carpet into the main entrance.

"You make it up the shore?" asked the Construct over the wireless link.

"In position three metres from the inner sensor chain, southeast sector," Rodion said.

"Encryption keys will roll over in twenty seconds," said the Construct.

"Roger," said Rodion.

"I'll ride shotgun from here. Watch your back and keep your ghost in your head, my friend. Go, now!"

Rodion sprang forward. The edge of his monofilament garrotte made short work of the iron fence bars.

"In through the fence," Rodya sub-voked.

"Roger that."

"Heading up the garden path on the east side."

"You've got two security guards under the palm tree by the conservatory door, and three people making out in the gazebo."

"Getting started early, aren't they?"

"Guards moving away... Clear. Move!"

Rodion reached the glass wall of the conservatory. Orchids bloomed on the other side.

"The windows are alarmed," Rodya told the Construct. "Deploying countermeasures."

"Better hurry—guard's coming around the south corner."

"Bypassing sensor circuits... now."

"Smooth hands," Richard the Construct told him.

"That's what *she* said," Rodya whispered. "I'm in the conservatory and heading for the exhibit hall."

He hid behind a table of hors d'oeuvres as two men passed. The corridors were dark, the only bulbs burning shining largely in the ultraviolet, a few accents here and there picked out in red. He saw that each man led a woman by a thin cable.

"The Baron throws a wild party," Rodya said. Behind him, in the main ballroom, Natalie Delectra was singing.

*She slows her heart while on a sniper run
And fires between the beats for steady aim...*

"The man can afford a pop star. I'm at the hall of mirrors, standing by."

"Roger. Moment of glory, my friend."

Rodion shouldered open the door and padded along the hall of mirrors. He had almost reached the gallery entrance at the far end when the Construct barked in his ear, "Down!" He dove to the floor as a bullet smashed into the mirror above him. The guards were sprinting up the hall, guns raised.

A throwing star was in each hand, and his hands moved, and the guards toppled to the floor, clutching their throats amid arterial spray. The pooling blood was black under the mood lights.

“I give you ninety seconds,” the Construct said.

Rodion kicked in the gallery door.

He knew, without the Construct telling him, where his goal waited for him. He moved among the plexiglas display cases, each artifact and objet d’art spotlit in its own puddle of illumination. He saw a movement on the ceiling between him and the alcove he sought, and he ducked momentarily behind a granite column, stolen from an Egyptian temple. The hieroglyphs on its surface told of the goddess Isis trying to find the body of her dead husband Osiris. “Active laser,” said the Construct.

Rodion used a throwing star and retrieved it on his way past.

She was kneeling inside a transparent cylinder. Wires ran from the back of her neck, through her thick, dark hair, up into the ceiling. The latex suit reached from her ankles to her collarbone. Her eyes were closed, and she did not respond when he slapped his palms against the cylinder wall.

So be it. He took the microfilament garrotte in his hands.

“Work fast,” the Construct said.

The wire sliced through the transparent wall.

Feet in heavy boots were stomping across the shards of mirror outside the doorway.

Rodion cut her loose from the cables. Her eyes opened, weakly. One was steely grey, the other a deep violet.

“Devi,” he said. “Up we go.”

He helped Devi to her feet, then turned to face the drawn weapons.

They were converging, closing in a semicircle, handguns ready.

“Getting interesting at last,” he said.

* * *

The author sat in the upper reaches of Manhattan three-space. His window faced Central Park, letting nighttime enter his den. The study where he hammered upon an obsolete word processor was buried within the apartment, lit only by wide-spectrum electroluminescent panels. On a beautiful evening like this, however, when he had nothing more pressing to do than sop up a tall glass of hot chocolate with a plate of shortbread cookies, chatting with a friend on the netphone, why then it was a perfect occasion to enjoy the view.

He had been there to see New York put itself back together. In those first few weeks, all he had known to do was record the best and kindest deeds he had seen take place around him, trying by instinct to make some fraction of it unforgettable. Now, almost two years later, the City glowed again. You could still find the empty spaces, the fissures left by chaos, but they no longer resembled wounds or even scars. Each pause in the City looked for all the world like a place where they’d be building a parking garage, the monumental

sense of history chipped away by a million citizens still changing for the E train, eroding the mightiest of evidences by the mere act of living.

Great Space, he thought. *That's how we know the Sicarii lost, isn't it?*

"What's been keeping you busy this week, my friend?" asked the bioinformatician on the phone. The young woman's voice came from Southern California, where the sun had not yet set.

"I think I'm close to closing a deal with the Japanese folks," he told her.

"The anime company?" she asked.

"Yes. We're on the cusp of agreeing on the story arc, at which point I'll be able to start work on the screenplays for the individual episodes. They're budgeting for twenty-six episodes of half an hour apiece, with strong hopes for additional seasons to follow."

"So, at two point two hours per script, you'll be done with the first gig in—"

"Har har. Actually, I've found it quite intriguing. A continuous development over thirteen hours of screen time gives me lots of room to build up the ideas, build up the people and the way they live. It might just be enough time to get science fiction done right, and wouldn't that be a nice change?"

"Can you tell me the story arc, or would that violate some non-disclosure agreement, signed in peculiar red ink and all that?"

"The premise," he said, "is fairly straightforward. Start early in the next century, when we're busily leaving TwenCen behind. Robots are doing more and more of humanity's manual labor, and at least in the industrializing countries, the standard of living has never been higher. Each robot is programmed with a Hippocratic ethic, first do no harm—"

"I couldn't see you doing it any other way."

"This was the only less than completely stupid way I could see to achieve the starting condition they had wanted me to extrapolate upon. But once I sketched them the back story I had developed, they fell in love with it and the possibilities it offers for later seasons."

"Mm-hmmm. Continue!"

"Robots are, of course, programmed to guard their own safety, since they are far from cheap. Human orders can override that instinct, if necessary, but preserving human life against both deliberate harm and incidental happenstance is an even higher priority. That's Moral Code One, as we're calling it."

"So far," she said, "your robots don't sound very different from the best of our own breed."

"The only rule more fundamental than Moral Code One, which insists that robots respect and protect human life, is the injunction to preserve humanity as a whole. The only way they can allow themselves to falter in their protection of the individual is to safeguard the whole. Of course, this program only comes into play for the highest-grade robots with the greatest responsibilities and the most subtle functions."

"And the 'protect humanity from all enemies, foreign and domestic' rule is Moral Code Zero."

“Right. Now, how would you imagine we set up a conflict?”

“Well, with the robots being as decent as only you could make them, I can guess that it’s the humans who screw things up.”

“War. Senseless and bloody war between the last remaining superpowers. Biological, nuclear, detonating the methane hydrates—whatever horror we can make lurk in the background.”

“You’re sure a chipper fellow.”

“Hey, you know me. I write a murder mystery, I put the murder offstage and have it happen before the story even gets going. Only stands to reason that I’d do the same for a global thermonuclear war.”

“But wait, the robots survive, don’t they?”

“And, compelled by Moral Code Zero, they preserve the last traces of humanity, shielding both their bodies and their minds from the wasteland which human beings made of the world. Human civilization continues inside a virtual reality, a million bodies and brains wired in parallel and sustained by nutrient broth grown on hydroponic yeast farms. Fusion reactors power the lamps under which brews the intravenous food of all mankind—”

“Yes yes,” she said, not too hurriedly. “*Sacre noir*, my friend, I knew you were a claustrophile, but I would have thought living inside a vat was too much even for your taste.”

“There’s more open space inside the virtual reality than I had put into my first metropolis,” he reminded her.

“So what’s the conflict that drives the show?” she asked.

“Not all humans live inside the simulation,” he said. “A few refugees survive in the bleak and blasted real world, and they strive to overthrow the order which has, as they see it, enslaved humankind within invisible bonds.”

“Nice. And of course, the machines, impelled as they are by Moral Code Zero, must fight to preserve the majority, which means they have to kill the rebels.”

“Now, which side would you say has the moral high ground?”

“Oooh...”

“Aren’t you glad I’ll have thirteen hours to work it all out? And that’s in the first season alone!”

He heard a doorbell chime in the background, in Pasadena. “That’ll be my dinner guest, I’m afraid,” the bioinformatician said. “Please give my best to your fiancée and your typewriter, not necessarily in that order.”

“Next year in Jerusalem,” he said.

“Godspeed, comrade,” said the genome specialist, and the netphone connection flickered out.

While the writer delicately crumbled a shortbread cookie, the woman in Pasadena spritzed herself with a puff of perfume against the arrival of her dinner guest, whose tastes in romance had turned out to be far more eclectic than he had suspected even six months before. All through dinner and the rites which followed, she turned a sentence over in her mind, spreading its shades into a spectrum, trying to tell if the odd lines she almost surely detected were

only innocence shifted the wrong way by her rapid motion intrigue-ward, or if those telltales marked a breach of secrecy.

* * *

Aloysia found herself standing at the western end of the Infinite Corridor, her feet not feeling quite connected with the floor. She noted, somewhat bemusedly, that she was moving down the hallway without taking any steps in that direction. As she passed people dressed in somber hues, she wondered why their conversations sounded switched off, muted. After watching mouths move silently for a while, she decided she was in some sort of car, perhaps an electric coupe, driving down the Infinite. Much better.

The car, a stylish model new from Tokyo, glided on freshly pressurized tires past unremarking students, chatting amongst themselves and dressed like beat poets. Stereotypical beat poets, at that. Aloysia drove leisurely, letting the pedestrians move to either side. She reached the lobby at the Corridor's midpoint and braked the car to a halt, so she could read the names of the Institute dead carved into the walls. Shifting back into drive, she let the coupe idle forward, its electric motor silent. The lobby doors were open. Responding admirably, the suspension handled the shock of driving down over the stone steps into Killian Court. Clusters of students broke off their frisbee games as she drove over the grass, quietly regarding her as they stood, immobile as fashion adverts.

Oddly, Aloysia never reached the river, which she knew was just on the other side of the street onto which Killian Court opened. Instead, after leisurely idling between the neoclassical Institute buildings, she found herself traveling much faster than she preferred, down a highway marked with unfamiliar traffic signs. Symbols blurred past on either side; she vainly tried to spot a familiar symbol, a comforting universal sign. Cars about her switched lanes, flashing signals in complex patterns. The highway divided, branching into two and then four roads, while she tried to keep her stylish Tokyo electric from drifting into another lane or crashing into the concrete barriers on either side.

Some kind of traffic lights appeared in the distance. Aloysia felt her car respond sensitively, turning and accelerating far more sharply than expected at the slightest touch. The lights ahead flashed in strange colors, gold and amber, brighter versions of afterimages. Cars around her responded knowingly, sorting themselves into the proper lanes. Aloysia barreled onwards, confused and by now traveling far too fast for comfort.

She had branched off onto a one-lane road, traveling through fields covered in green undergrowth. In the bluest of distances, hills rolled. Feeling just comfortable enough on the straight road to move her eyes about, she checked her mirrors and noticed a car following her, a sport utility vehicle lifted on monstrous tires.

Her hands began to shake. Responding with the same exquisite sensitivity, her car slid off the road and crunched to a halt amongst the plants. She worked

the door latch and stepped out, tripping and landing facedown amongst the foliage. They looked like no flora she could recognize; sharp, almost crystalline leaves wound around paler stems, with flowers like scaled-up dandelions. Some of the flowers had wilted and shriveled, with golfball-size fruits growing at their centers. Looking more closely, she noticed that the fruits indeed had the golf ball's dimpled surface and pale color, as well as its size. She scrambled to her feet and stood over them, the tallest plants rising just over her knees.

The sport utility vehicle had stopped on the road, a few metres behind her own car.

She decided to run.

The plants in this part of the field were taller, paler, with more flowers and fewer fruits. The stems stretched over her head. Leaf edges sliced through her skin as she ran past. Casting a quick look over her shoulder, she recognized her pursuer. Her therapist, the psychotherapist she had seen in high school.

She burst into open space. The plants here had been stomped to the ground, in a long strip of flattened, pale green that she could see opened out at both ends into circles, fifteen or twenty metres away. Aloysia sprinted again for the cover of the tall crops, feeling the leaves bite into her as she brushed them.

Another stomped clearing, and another burst for cover. She felt a blow to the back of her skull, and she felt hard rocks pressing into her stomach.

"Hello," he said from above her. "I haven't seen you in a while."

Her eyes rolled back into her head under their closed lids, as her hands clenched the edge of her blanket.

The psychotherapist lifted himself to his knees again and idly plucked a flower. Aloysia began to crawl, the cuts on her hands and arms and face stinging. She heard a voice calling through the rows of crops. "Hallooo!"

Aloysia crawled into the next clearing, where the plants had again been stomped into the ground and crushed underfoot. She looked behind her and saw her therapist contentedly picking his fingernails.

Devi and Rodya stood in the center of the clearing, in the center of a flying saucer-shaped circle of flattened foliage. They hurried over and lifted her to her feet. "We're making crop circles," Devi said. "Want to help?" Rodya asked.

* * *

Stevin's aleph began to ring in between his second and third sips of double-esspresso cocoa. He saw that Devi was calling, took another swig of hot liquid and thumbed the flashing icon.

"Hello?" he asked.

"You sound like you're slurping something."

"Hot chocolate with two espresso shots—it burns, but it's a *good* burn. I still don't believe that hours this small really exist."

"You miss your nine o'clock lecture again?"

"Shut up. What's going on?"

“Have you heard from Ben?”

“No.”

“He didn’t show up today. I couldn’t reach him on the phone. I tried calling around, but only a couple people even knew he was back in town. Everyone else wasn’t expecting him until next week.”

“You think something is wrong?”

“It all just seems... out of the ordinary, you know?”

“Maybe we should go by his house.” If Sirinov hadn’t called the evening before with his unexpected news and his mysterious hints, Stevin would have written it off as oversleeping and taking time for breakfast or any combination of a thousand other reasonable excuses. But this was, he decided, more than a little odd.

“I’ll meet you at the Kendall T-stop, then,” Devi said, “and we’ll head out to Newton and see if the place has burned down.”

* * *

They stood on the front steps of Ben Sirinov’s house, a compact but well-groomed building on one of the many quiet, leafy side streets which Newton had to offer. His car, an Aston Anbaric, was parked on the brief driveway which skirted the side of the house and stopped at the garden shed.

“Let’s give this one more try,” Devi said, keying up his contact card on her aleph’s touchscreen. She let it ring five times, then shook her head and returned the aleph to her trouser pocket.

“Dead battery?” Stevin suggested.

“His netphone account is accessible anywhere on the Grid,” she pointed out. “If his handheld were dead, he could pick it up on his desktop, or any of the machines at work...” She pressed the doorbell.

They heard the bell chime within the foyer, and they waited.

Stevin knocked on the door.

“If he’s not home, then where *is* he?”

“The Hell with this,” Devi said. She took out her aleph again, made a quick notation with her stylus and said into its microphone, “*Honorificabilitudinitatibus!*”

A bolt behind the door pulled back with a *thunk*. Devi twisted the knob and pushed the door open. “Hello?” she called to the interior.

“Neat trick,” Stevin said.

“We set it up for emergencies.”

The foyer opened into a den, done up in oak paneling and shag carpeting. *You’d think a man would notice people prowling in his house*, Stevin thought. He poked his head around the corner into the kitchen and saw nothing of interest. He turned to Devi and shrugged.

“His study and the bedroom are back there,” she gestured.

Beside the study door hung a few framed photographs, grainy black-and-white images of undistinguished buildings and people in sturdy working clothes.

Pictures, Stevin guessed, from the Old Country. The door was closed, but unlocked.

Stevin saw Professor Sirinov sitting at his desk, the back of his armchair to them, the top of his head poking above its cushions. Then he heard Devi behind him give out a strangled sort of sound. She stepped forward, past him into the study, and he saw her take in what she saw.

They stood beside the professor's desk. His hands lay at his sides, their fingers curling upward. His head tipped to his left, his eyes were closed, and his jaw hung slack. Before him on the desk were an empty vial and a single sheet of paper. On the paper they found written,

I was myself.

I am now all men.

Farewell.

* * *

