

POST- SINGULAR by Rudy Rucker

Rudy Rucker's most recent nonfiction book was about the meaning of computation: *The Lifebox, the Seashell, and the Soul: What Gnarly Computation Taught Me About Ultimate Reality, the Meaning of Life, and How to Be Happy*; the paperback is out from Thunder's Mouth Press this fall. The author's latest SF novel is *Mathematicians in Love*, which gives life to some of his ideas about computation, not to mention parallel worlds, and toppling an evil government. It will be out from Tor Books later in the year. Rudy is currently working on a novel, *Postsingular*, which uses the current tale, as well as "Chu and the Nants" (*Asimov's*, June 2006), as back-story. He tells us he spends an inordinate amount of time writing and photographing for his blog: www.rudyrucker.com/blog.

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1.

The Singularity happened when, encouraged by his business backers, President Joe Doakes sent an eggcase of nants to Mars. Nants were self-reproducing nanomachines: solar-powered, networked, capable of gnatlike flight, and single-mindedly focused on transforming all available material into more nants. In a couple of years, the nants had eaten Mars, turning the red planet into a Dyson sphere of a duodecillion nanomachines, a three-millimeter-thick shell half a billion kilometers across, with Earth and the Sun trapped inside.

The stars were hidden by giant ads; in daytime the ads were a silvery background to the sky. Doakes's backers were well-pleased. And behind the scenes the nant swarm was solving a number of intractable problems in computer science, mathematical physics, and process design; these results were privily beamed to the nants' parent corporation, Nantel. But before Nantel could profit from the discoveries, the nants set to work chewing up Earth.

At the last possible moment, a disaffected Nantel engineer named Ond Lutter managed to throw the nants into reverse gear. The nants restored the sections of Earth they'd already eaten, reassembled Mars, and returned to their original eggcase—which was blessedly vaporized by a well-aimed Martian nuclear blast, courtesy of the Chinese Space Agency.

Public fury over Earth's near-demolition was such that President Doakes and his Vice President were impeached, convicted of treason, and executed by lethal injection. But Nantel fared better. Although three high-ranking execs were put to sleep like the President, the company itself entered bankruptcy to duck the lawsuits—and re-emerged as ExaExa, with the corporate motto, "Putting People First—Building Gaia's Mind."

For a while there it seemed as if humanity had nipped the Singularity in the

bud. But then came the orchids.

2.

Jil and Craigor's home was a flat live-aboard scow called the *Merz Boat*. Propelled by cilia like a giant paramecium, the piezoplastic boat pattered around the shallow, turbid waters of the south San Francisco Bay. Craigor had bought the *Merz Boat* quite cheaply from an out-of-work exec during the chaos that followed the nant debacle. He'd renamed the boat in honor of one of his personal heroes, the Dadaist artist Kurt Schwitters who'd famously turned his house into an assemblage called the Merz Bau. "*Merz*" was Schwitters's made-up word meaning, according to Craigor, "gnarly stuff that I can get for free."

Jil was eye-catching: more than pretty, she moved with perfect grace. She had dark blunt-cut hair, a straight nose and a ready laugh. She'd been a good student: an English major with a minor in graphics and design, planning a career in advertising. But then in her early twenties she'd had a problem with pseudocoke abuse. Fortunately she'd made it into recovery before having the kids with Craigor, a son and a daughter, seven-year-old Momotaro and five-year-old Bixie. The four of them made a close-knit, happy family.

Although Jil was still hoping to make it as an ad designer, for now she was working as a virtual booth bunny for ExaExa, doing demos at online trade fairs, with her body motion-captured, tarted up, and fed to software developers. All her body joints were tagged with subcutaneous sensors. She'd gotten into the product-dancer thing back when her judgment had been impaired by pseudocoke. Dancing was easy money, and Jil had a gift for expressing herself in movement. Too bad the product-dancer audience consisted of slobbering nerds. But now she was getting close to landing an account with Yoon Shoon, a Korean self-configuring-athletic-shoe manufacturer. She'd already sold them a slogan: "Our goo grows on you."

Craigor was a California boy: handsome, good-humored, and not overly ambitious. Comfortable in his own skin. He called himself an assemblagist sculptor, which meant that he was a packrat, loath to throw out anything. The vast surface area of the *Merz Boat* suited him. Pleasantly idle of a summer evening, he'd amuse himself by arranging his junk in fresh patterns on the elliptical pancake of their boat, and marking colored link-lines into the deck's computational plastic.

Craigor was also a kind of fisherman; he earned money by trapping iridescent Pharaoh cuttlefish, an invasive species native to the Mergui Archipelago of Burma, and now flourishing in the waters of the South Bay. The chunky three-kilogram cuttlefish brought in a good price apiece from AmphiVision, Inc., a San Jose company that used organic rhodopsin from cuttlefish chromatophores to dope the special video-displaying contact lenses known as webeyes. All the digirati were wearing webeyes to overlay heads-up computer displays upon their visual fields.

Webeyes acted as cameras as well; you could transmit whatever you saw. Along with earbud speakers, throat mikes, and motion sensors, the webeyes were making cyberspace into an integral part of the natural world.

There weren't many other cuttlefishermen in the South Bay—the fishery was under a strict licensing program that Craigor had been grandfathered into when the rhodopsin market took off. Craigor had lucked into a good thing, and he was blessed with a knack for assembling fanciful traps that brought in steady catches of the wily Pharaoh cuttles.

To sweeten the take, Craigor even got a small bounty from the federal Aquatic Nuisance Species Task Force for each cuttlefish beak that he turned in. The Task Force involvement was, however, a mixed blessing. Craigor was supposed to file two separate electronic forms about each and every cuttlefish that he caught: one to the Department of the Interior and one to the Department of Commerce. The feds were hoping to gain control over the cuttles by figuring out the fine points of their life cycle. Being the laid-back kind of guy that he was, Craigor's reports had fallen so far behind that the feds were threatening to lift his cuttlefishing license.

3.

One Sunday afternoon, Ond Lutter, his wife Nektar and their high-functioning-autistic ten-year-old son Chu came over for a late afternoon cook-out on the *Merz Boat*. They were a less happy family than Jil's.

Jil had met Ond at work; he was the fired engineer who'd put a stop to the Nantel nants, now elevated to Chief Technical Officer of the reborn ExaExa. The awkward Ond thought Jil was cute—in a nice way—and the two little families had become friends. They got together nearly every weekend.

"It's peaceful here," said Ond, taking a long pull of his beer. He rarely drank, and even one bottle had a noticeable effect on him. "Like Eden." He leaned back in his white wickerwork rocker. No two chairs on the *Merz Boat* were the same.

"What are those cones?" asked Nektar. She was talking about the waist-high shiny ridged shapes that loosely ringed the area Craigor had cleared out for today's little party. The kids were off at the other end of the boat, Momotaro showing Chu the latest junk and Bixie singing made-up songs that Chu tried to sing too.

"Ceramic jet-engine baffles," said Jil. "From the days before piezoplastic. Craigor got them off the back lot at Lockheed."

"The ridges were for reducing turbulence," said Craigor. "We sit in an island of serenity."

"You're a poet, Craigor," said Ond. The low sun illuminated his scalp through

his thinning blonde hair. “It’s good to have a friend like you. I have to confess that I brought along a big surprise. And I was just thinking—my new tech will solve your problems with generating those cuttlefish reports. It’ll get your sculpture some publicity as well.”

“Far be it from me to pry into Chief Engineer Ond’s geeksome plans,” said Craigor easily. “As for my diffuse but rewarding oeuvre—” He made an expansive gesture that encompassed the whole deck. “An open book. Unfortunately I’m too planktonic for fame. I transcend encapsulation.”

“Planktonic?” said Jil, smiling at her raffish husband, always off in his own world.

“Planktonic sea creatures rarely swim,” said Craigor. “Like cuttlefish, they go with the flow. Until something nearby catches their attention. And then—dart! Another masterpiece.”

Just aft of the cleared area was Craigor’s holding tank, an aquarium hand-caulked from car windshields, bubbling with air and containing a few dozen Pharaoh cuttlefish, their body-encircling fins undulating in an endless hula dance, their facial squid-bunches of tentacles gathered into demure sheaves, their yellow W-shaped pupils gazing out at their captors.

“They look so smart and so—doomed,” said Nektar, regarding the bubbling tank. She had full lips and she wore her curly brown hair in a fat ponytail. “Like wizards on death row. They make me feel guilty about my webeyes.”

“I had a dream about angels coming to set the cuttlefish free,” said Craigor. “But it’s hard to remember my dreams anymore. Bixie wakes us up so early.” He gave his daughter a little pat. “Brat.”

“Crackle of dawn,” said Bixie.

“You finally got webeyes too?” said Jil to Nektar. “I love mine. But if I forget to turn them off before falling asleep—*ugh*. Spammers in my dreams, not angels. I won’t let my kids have webeyes yet. Of course for Chu—” She broke off, not wanting to say the wrong thing.

“Webeyes are perfect for Chu,” said Nektar. “You know how he loves machines. He and Ond are alike that way. Ond says he was autistic too when he was a boy. I’m the token normal in our family. As if.” She blinked and stared off into the distance. “Mainly I got my webeyes for my job.” Now that Chu was getting along pretty well in his school, beautiful Nektar had reentered the workforce as a cook in an upscale San Jose restaurant. “The main chef at Ririche talked me into it. Jose. He’s been showing me the ropes. I can see all the orders, and track our supplies while I cook.”

“And I showed her how to plug into what Chu’s seeing,” said Ond. “So she can keep a webeye on him. You never quite know what Chu will do. He’s not hanging over the rail like last time, is he, Nektar?”

“You could watch him yourself,” said Nektar with a slight edge in her voice. “If you must know, Chu’s checking the positions of Craigor’s things with his GPS, Momotaro’s telling him where the newer things came from, and Bixie’s hiding and jumping out at them. It must be nice to have kids that don’t use digital devices to play.” She produced a slender, hand-rolled, non-filter cigarette from her purse. “As long as the coast is clear, let’s have a smoke. I got this number from Jose. He said it’s genomically tweaked for guiltless euphoria—high nicotine and low carcinogens.” Nektar gave a naughty smile. “Jose is so much fun.” She lit the illegal tobacco.

“None for me,” said Jil. “I cleaned up a few years back. I thought I told you?”

“Yeah,” said Nektar, exhaling. “Did you have, like, a big after-school-special turning point?”

“Absolutely,” said Jil. “I was ready to kill myself, and I walked into a church, and I noticed that in the stained glass it said: God. Is. Love. What a concept. I started loving myself and I got well.”

“And then, the reward,” said Craigor. “She meets me. It is written.”

“I’ll have a puff, Nektar,” said Ond. “This might be the biggest day for me since we reversed the nants.”

“You already said that this morning,” said Nektar irritably. “Are you finally going to tell me what’s up? Or does your own wife have to sign a freaking non-disclosure?”

“Ond’s on a secret project for sure,” said Jil, trying to smooth things over. “I went to ExaExa to dance a gig in their fab this week—I was wearing a transparent bunny suit—and all the geeks were at such a high vibrational level they were like blurs.”

“What is a fab exactly?” asked Craigor.

“It’s where they fabricate the chips,” said Jil. “Most of the building is sealed off, with anything bigger than a carbon-dioxide molecule filtered out of the air. All these big hulking machines are in there turning out tiny precise objects. The machines reach all the way down to the molecular level—for nanotech.” She fixed Ond with her bright gaze. “You’re making nanobots again, aren’t you Ond?”

Ond opened his mouth, but couldn’t quite spit out his secret. “I’m gonna

show you in a minute,” he said, pinching out the tiny cigarette butt and pocketing it. “I’ll drink another beer to get my nerve up. This is gonna be a very big deal.”

Bixie came scampering back, her dark straight hair flopping around her face. “Chu made a list of what Daddy moved,” she reported. “But I told Chu my Daddy can leave his toys wherever he likes.” She hopped onto Jil’s lap, cuddly as a rabbit, lively as a coiled spring. She resembled a small version of her mother.

“We await Comptroller Chu’s report,” said Craigor. He was busy with the coals in his fanciful grill, constructed from an old-timey metal auto fender.

Chu and Momotaro came pounding into the cleared area together. Momotaro thought Chu was great: an older boy who took him seriously.

“A cuttlefish disappeared!” announced Momotaro.

“First there were twenty-eight and then there were twenty-seven,” said Chu. “I counted them on the way to the rear end of the boat, and I counted them again on the way to the front.”

“Maybe the cuttle flew away,” said Momotaro. He put his fingers up by his mouth and wiggled them, imitating a flying cuttlefish.

“Two hundred and seventy tentacles in the tank now,” added Chu. “Other news. The Chinese gong has moved forty-four centimeters. Two bowling balls are in the horse trough, one purple and one pearly. The long orange line painted on the deck has seventeen squiggles. The windmill’s wire goes to a string of thirty-six crab-shaped Christmas lights that don’t work. The exercise bicycle is—”

“I’m going to put our meat on the grill now,” Craigor told Chu. “Want to watch and make sure nothing touches your pork medallions?”

“Of course,” said Chu. “But I’m not done listing the, uh,——” Bixie, still perched on her mother’s lap, had just stuck out her tongue at Chu, which made Chu stumble uncertainly to a halt.

“Email me the list,” said Craigor with a wink at Bixie. But then, seeing how crushed the boy was, he softened. “Oh, go ahead Chu, tell me now. And no more rude faces, Bixie. I’ll keep cooking while I listen.”

“Please don’t cook any cuttlefish,” said Chu.

“We aren’t gonna bother those bad boys at all,” said Craigor soothingly. “They’re too valuable to eat. Hey, did you notice my stack of three fluorescent plastic car-tires?”

“Yes.” Chu recited the rest of his list while Craigor set out the plates.

The four adults and three children ate their meal, enjoying the red and gold sunset. “So how *is* the cuttlefish biz?” Ond asked as they worked through the pan of tiramisu that Nektar had brought for dessert.

“The license thing is coming to a head,” said Jil, looking worried. “Those damned forms. I tried to file them myself, but the feds’ sites are buggy and crashing and losing our inputs. It’s like they want us to fail.”

“I used to think the feds micromanaged independent fishermen like me so that they could tell the public they’re doing something about invasive species,” said Craigor. “But now I think they want to drive me out of business so they can sell my license to a big company that makes campaign contributions.”

“That’s where my new tech comes in,” said Ond. “We label the cuttlefish with radio-frequency tracking devices and let them report on themselves. Like bar-codes or RFIDs, but better.”

“It’s not like I get my hands on the cuttles until I actually trap them,” said Craigor. “So how would I label them? They’re smart enough that it’d actually be hard to trap the same one twice.”

“What if the tags could *find* the cuttlefish?” said Ond. Pink and grinning, he glanced around the circle of faces, then reached into his pocket. “Introducing the orphids,” he said, holding up a little transparent plastic vial. “My big surprise.” Whatever was in the vial was too small to see with the naked eye, but the watchers’ webeyes were sketching tiny balls of light inside the vial, little haloes around objects in rapid motion. “Orphids are to barcodes as velociraptors were to trilobites,” said Ond. “The orphids are gonna change the world.”

“*Not* another nanomachine release!” exclaimed Nektar, jumping to her feet. “You promised never again, Ond!”

“They’re not nants never,” said pear-shaped Ond, his tongue a bit thick with the beer and tobacco. “Orphids good, nants bad. I realize now that it’s got to happen, Nektar. I want to get in first and do it right. Orphids self-reproduce using nothing but dust floating in the air. They’re not destructive. Orphids are territorial; they keep a certain distance from each other. They’ll cover Earth’s surface, yes, but only down to one or two orphids per square millimeter. They’re like little surveyors; they make meshes on things. They’ll double their numbers every few minutes at first, slowing down to maybe one doubling every half hour, and after a day, the population will plateau and stop growing. You’ll see, like, fifty thousand of them on this chair and a sextillion orphids on Earth’s whole surface. From then on, they only reproduce enough to maintain that same density. You might say the orphids have a conscience, a desire to protect the environment. They’ll actually hunt down and

eradicate any rival nanomachines that anyone tries to unleash.”

“*Sell* it, Ond,” said Craigor.

“Orphids use quantum computing; they propel themselves with electrostatic fields; they understand natural language; and of course they’re networked,” continued Ond. “The orphids will communicate with us much better than the nants. As the orphidnet emerges, we’ll get intelligence amplification and superhuman AI.”

“The secret ExaExa project,” mused Jil, watching the darting dots of light in the vial. “You’ve been designing the orphids all along?”

“In a way, the nants designed them,” said Ond. “Before I rolled back the nants, they sent Nantel some unbelievable code. Coherent quantum states, human language comprehension, autocatalytic morphogenesis, a layered neural net architecture for evolvable AI—the nants nailed all the hard problems.”

“But Ond—” said Nektar in a pleading tone.

“We’ve been testing the orphids for the last year to make sure there won’t be another disaster when we release them,” said Ond, raising his voice to drown out his wife. “And now even though we’re satisfied that it’s all good, the execs won’t pull the trigger. They say they don’t want to get the death penalty like Joe Doakes. Of course Doakes’s oil-biz backers saved off his wetware and software, but never mind about that. The real issue is that ExaExa can’t figure out a way to make a profit. So there’s been a lot of company politics; a lot of in-fighting. If we do it my way, the orphids will be autonomous, incorruptible, cost-free. In the long run, that’s the right path; profits will emerge. Not everyone sees that, but one of the factions has given me informal approval to go ahead.”

“Ha,” said Nektar. “You’re the faction. You want to start the same nightmare all over again!” She tried to snatch the vial from Ond’s hands, but he kept it out of her reach. Nektar’s picture-perfect face was distorted by unhappiness and anger. Her voice grew louder. “Mindless machines eating everything!”

“Mommy, don’t yell!” shrieked Chu.

“Chill, Nektar,” said Ond, fending her off with a lowered shoulder. “Where’s your nicotine euphoria? Believe me, these little fellows aren’t mindless. An individual orphid is roughly as smart as a talking dog. He has a petabyte of memory and he crunches at a petaflop rate. One can converse with him quite well. Watch and listen.” He said a string of numbers—an IP address—and an orphid interface appeared within the webeyes of Chu and the four adults.

For now the orphids were presenting themselves as cute little cartoon faces, maybe a hundred of them, stylized yellow Smileys with pink dots on their cheeks

and gossamer wings coming out the sides of their heads.

“Hello,” said Jil. Bixie looked up curiously at her mother. To Jil, her daughter’s face looked ineffably sweet and vulnerable behind the ranks of dancing orphids.

“Hello, Jil,” sang the orphids. Chu and the adults could hear them in their earbuds.

“I want you fellows to find all the cuttlefish in the South Bay,” Ond told the orphids. “Ride them and send a steady stream of telemetry data to, uh, <ftp.exaexa.org/merzboat>.”

“Can you show us a real cuttlefish?” the orphids asked. Their massed voices were like an insect choir, the individual voices slightly off pitch from each other.

“These are cuttlefish,” Ond instructed the orphids, pointing to the tank. “Settle on them, and we’ll release them into the bay. Okay, Craigor?”

“No way,” said Craigor. “These Pharaohs took me four days to catch. Leave them alone, Ond.”

“They’re my Daddy’s cuttlefish,” echoed Momotaro.

“I’ll buy them from you,” said Ond, his eyes glowing. “Market rate. And we’ll let some orphids loose on your boat, too. They can map out your stuff, network it, make it interactive. That’s where the publicity for your sculpture comes in. Your assemblages will be little societies. The AI hook makes them hot.”

“Market rate,” mused Craigor. “Okay, sure.” He named a figure and Ond instantly transferred the amount. “All right!” said Craigor. “Wiretap those Pharaohs and spring them from—what Nektar said. Death row.”

“We’re doomed if Ond opens the vial,” said Nektar, angrily lunging at her husband. Ond danced away from his wife, keeping the orphids out of her reach, his grin a tense rictus. Chu was screaming again.

“Stop it, Ond!” exclaimed Jil. Things were spinning out of control. “I don’t want your orphids on my boat. I don’t want them on my kids.”

“They’re harmless,” said Ond. “I guarantee it. And, I’m telling you, this is gonna happen anyway. I just thought it would be fun to do my big release in front of you guys. Be a sport, Jil. Hey, listen up, orphids, you’re our friends, aren’t you?”

“Yes, Ond, yes,” chorused the orphids. The discordant voices overlapped, making tiny, wavering beats.

“That was very nice of you to think of us, Ond,” said Jil carefully. “But I think you better take your family home now. They’re upset and you’re not yourself. Maybe you had a little too much beer. Put the orphids away.”

“I think tracking the cuttles is a great idea,” put in Craigor, half a step behind Jil as usual. “And tagging my stuff is good, too. My assemblages can wake up and think!”

“Thank you, Craigor,” said Ond. He turned clumsily towards the cuttlefish tank. This time he didn’t see Nektar coming. She rushed him from behind, a beer bottle clutched in her hand, and she struck his wrist so hard that the vial of orphids flew free. The chaotically glowing jar rolled across the deck, past Jil and Bixie, past Craigor and Momotaro. Chu caught up with the vial and, screaming like a banshee, wrenched it open and threw it high into the air on a trajectory towards the tank.

“Stop the yelling!” yelled Chu. Perhaps he was addressing the orphids. “Make everything tidy!”

Through their webeyes, Chu and the adults saw illuminated orphid-dots spiraling out of the vial in mid-air, the paths forking and splitting in two. And now the webeyes overlaid the scene with a tessellated grid showing each orphid’s location. Some were zooming towards the cuttles, but others were homing in on the curios crowding the aft. Additional view-windows kept popping up as the nanomachines multiplied.

Jil hugged Bixie to her chest, covering the little girl’s dark cap of hair with her hands as if to keep the orphids off her. Ond bent forward, rubbing his wrist. Perhaps it was broken. Craigor stared into the tank, using his webeyes to watch the orphids settle in. Momotaro stood at his father’s side. Chu lay on the deck, tensely staring into the sky, soaking up orphid info from his webeyes. For her part, Nektar was fumbling to remove the special contact lenses from her eyes.

4.

“Do at least you have an ‘undo’ signal for the orphids?” Nektar asked Ond. “Like you did for the nants?” Only a minute had elapsed, but the world felt different. Human history had rattled past a major switch point.

“Quantum computations aren’t reversible,” said Ond. “Not when the world is all the time collapsing states to get information out of the orphids. Never mind about that. I think I might need a doctor.”

“Tell your precious orphids to fix your wrist,” snapped Nektar.

“Good idea!” said Ond, holding out his arm. “Burrow in,” he said to the

orphids. “Patch up the crack—there’s not a crack? Well, loosen up the clots for me anyway. Ah, that feels better. Good to go.”

“I want you off our boat,” repeated Jil. “You’ve done what you came to do. And for God’s sake don’t spread the word that you did your release right here. I don’t want cops and reporters trampling us.”

“Sorry, Jil,” replied Ond. “It’s historic. I’ve been vlogging this for the record. In fact it’s already on the Web. Wireless, you know.”

Craigor hustled Ond, Nektar, and Chu onto one of the *Merz Boat*’s piezoplastic dinghies, which would ferry them to the Alviso dock and return on its own. The dinghy was like an oval jellyfish with a low rim around its edge. It twinkled with orphid lights.

“Watch me on the news!” called Ond from the dinghy. Jil lost her cool enough to give him the finger.

“Are we right to just sit around?” Jil asked Craigor next. “Shouldn’t we be calling for an emergency environmental clean-up? I feel itchy all over.”

“The feds would trash our boat and it wouldn’t change anything,” said Craigor. “The genie’s out of the bottle for good.” He glanced around, scanning their surroundings with his webeyes. “Those little guys are reproducing so fast. I see thousands of them—each of them marked by a dot of light. They’re mellow, don’t you think? Look, I might as well put those cuttlefish in the bay. I mean, Ond already paid me for them. And there’s orphids all over the place anyway. What the hey, free the wizards.” He got busy with his scoop net.

Jil’s webeye grid of orphid viewpoints had become a disc-like Escher tessellation that was thousands of cells wide, with the central cells big, the outer cells tiny, and ever more new cells growing along the rim. The massed sound of so many orphids was all but unbearable.

“I hate their voices,” said Jil, half to herself.

“Is this better?” came a smooth baritone voice from the orphids. The many had become one.

“You actually do understand us?” Jil asked the orphids. A few of the orphid’s-eye images slewed around as Craigor carried his first dripping net of cuttles to the boat’s low gunnel and lowered them to the bay waters.

“We understand you a little bit,” said the voice of the orphids. “And we’ll get better. We wish the best for you, Craigor, Momotaro, and Bixie. We’ll always be grateful to you. We’ll remember your *Merz Boat* as our garden of Eden, our

Alamogordo test site. Don't be scared of us."

"I'll try," said Jil. In the unadorned natural world, Momotaro and Bixie were cheering and laughing to see the freed cuttlefish jetting about in the shallow waters near the boat.

"We're not gonna be setting free the Pharaohs every day," Craigor cautioned the kids. He smiled and dipped his net into the holding tank again. "Hey, Jil, I heard what the orphids said to you. Maybe they're gonna be okay."

"Maybe," said Jil, letting out a deep, shaky sigh. She poured herself a cup of hot tea. "Look at my cup," she observed. "It's crawling with them. An orphid every millimeter. They're like some—some endlessly ramifying ideal language that wants to define a word for every single part of every worldly thing. A thicket of metalanguage setting the namers at an ever-greater remove from the named." Jil's hand twitched; some of her tea spilled onto the deck. "Now they're mapping the puddle splash, bringing it under control, normalizing it into their bullshit consensus reality. Our world's being nibbled to death by nanoducks, Craigor. We're nanofucked."

"Profound," said Craigor. "Maybe we can collaborate on a show. A Web page where users find new arrangements for the *Merz Boat* inventory, and if they transfer a payment, I physically lug the objects into the new positions. And the orphids figure out the shortest paths. Or, wait, we get some piezoplastic sluggies to do the heavy lifting, and the orphids can guide them. I'll just work on bringing in more great stuff; I'll be this lovable sage and the *Merz Boat* can be, like, my physical blog. And you can dance and be beautiful, at the same time intoning heavy philosophical raps to give our piece some heft."

"Men are immediately going to begin using the orphids to look at the exact intimate details of women's bodies," said Jil with a shudder. "Can you imagine? Ugh. No publicity for me, thanks."

Craigor spoke no response to this. He lowered the rest of the Pharaohs into the bay. "A fisher of Merz, a fisher of men. Peace, dear cuttlefish."

The empty dinghy swam back towards them, orphid-lit like a ferry, nosing up to its mooring on the side of the *Merz Boat*. Spooked by the dinghy, the skittish cuttlefish maneuvered and changed colors for safety. Their skins were thoroughly bespeckled with orphid dots outlining their bodies' voluptuous contours.

"Voluptuous?" said Jil.

"I didn't say that out loud, did I?" said Craigor. "Jeez, you're picking up my subvocal thoughts. This orphidnet link is like telepathy. I better be a good boy. There's meshes all over you, Jil. In case you didn't know."

“Already?” said Jil, holding out her hand. She’d been blocking out perceiving the changes to herself and her family, but now she let herself see the dots on her fingers, dots on her palms, dots all over her skin. The glowing vertices were connected by faint lines with the lines forming triangles. A fine mesh of small triangles covered Jil’s knuckles; a coarser mesh spanned the back of her hand. The computational orphidnet was going to have realtime articulated models of everything and everyone—including Jil’s kids.

Yes, the orphids had peppered Momotaro and Bixie like chicken pox. Oh, this was happening way too fast. God damn that Ond. Jil knelt beside Bixie, trying to wipe one of the dots off her little girl’s round cheek. But it wouldn’t come loose. By way of explanation, the orphids showed her a zoomed-in schematic image of a knot of long-chain molecules: an individual orphid, far too tiny to dislodge.

“We’re like cuttlefish in a virtual net,” said Craigor, shaking his head. He sat down next to Jil on the deck, each of them holding one of the kids.

“Look out there,” said Jil, pointing.

The orphids were twinkling in the bay waters, on the freeways and buildings of San Jose, and even on the foothills and mountains surrounding the bay. Jil and Craigor hadn’t really believed it when Ond had said it would only take a day for the orphids to cover Earth. But everything as far as the eye could see was already wrapped in meshes of orphid dots.

“I don’t know whether to shit or go snowblind,” said Craigor, forcing a hick chuckle. “Where does that expression comes from? Like, why those two particular options?”

“I’m so scared,” said Jil in a tight voice.

“How about the way Ond and Nektar were fighting?” said Craigor, skating around the subject. “What a pair of lovebirds, hey?”

“I guess Chu puts them under a lot of stress,” said Jil weakly.

“Yeah,” said Craigor, patting Jil’s cheek. “I enjoy Ond, but, please, don’t be a geek *and* a drunken maniac. And this is the same guy who saved Earth three years ago. Weird. Did you notice the way Nektar was talking about her new friend Jose? I see an affair taking shape. Adultery will get even harder, with orphids tracking every inch of everyone’s body. Not that you and I have to worry.”

The world as they’d known it was over, but Craigor was gossiping as if nothing about human nature would really change. “You okay?” he said, wrapping his arm around Jil.

“Oh, Craigor,” said Jil, leaning her head on her husband’s familiar shoulder. Drained by shock and fear, the two of them dozed off there, sitting on the soft deck with the kids.

5.

After the orphids got loose on the *Merz Boat*, Jil yelled and Craigor made Chu’s family get in a soft dinghy and leave. Chu would have liked to bring Bixie home with them; she was such a cutie-pie.

The orphidnet hookup got better and better all the way home. Chu realized that, with his eyes closed, he could still see Bixie there on her parents’ scow. Having orphids blanket the world made it so your eyes were everywhere. Chu liked seeing with his eyes closed.

Before they got home, Chu saw police waiting at their house. He told Ond, but Ond said he didn’t mind. When they got out of the car, one of the policemen touched Chu, and Chu screamed and acted crazy so they’d leave him alone. Chu and Nektar went in the house and Ond got in the police car. Nektar was mad, she said the Pigs could keep Ond for all she cared. She said Chu could watch video, and then she went and lay down on her bed with her pillow over her head like she always did when she was upset.

Chu didn’t bother with the video, he just lay on his back and explored the orphidnet. He saw Ond in the police car. He saw Bixie and Momotaro playing on the *Merz Boat*. And he swam around inside one of the cuttlefish Craigor had thrown back into the bay.

It was both dreadful and fascinating to be a cuttlefish, especially when Chu’s host began rubbing up against another cuttlefish, tangling his tentacles with hers. The cuttlefish were doing reproduction. Chu’s cuttlefish girlfriend squirted out some eggs, and Chu’s heart beat really fast. Then he and his cuttlefish girlfriend started eating algae off the rocks, scraping it up with their beaks. And then, all of a sudden, Chu’s cuttlefish girlfriend was gone. He jetted about looking for her, to no avail.

In the real world, Chu’s arms were hurting. Nektar was shaking him and asking him if he were having a fit. She was angry. Chu realized he’d been beating his arms on the floor to imitate the cuttlefish’s tentacles, and chewing on the rug with his teeth. He’d wet his pants. He felt silly. Nektar helped him into some dry clothes. Chu promised he wouldn’t be a cuttlefish anymore, and Nektar went back to her room.

Nektar felt guilty and bad about yelling at Chu for wetting his pants again. Her family life was an endless round of lose-lose. She lay back down on her bed, closed her eyes and watched Ond arriving at the jail. But then she got distracted.

Thanks to the orphidnet, she could see the insides of all the neighbors’

houses. She'd always wondered about that crabby Stephanie Cally across the street; was she on meds or what? With the slightest touch of will, Nektar was able to examine Stephanie's orchid-outlined medicine cabinet, and yes, it was loaded with prescription pseudocoke. As long as Nektar was there, she looked at Stephanie's jewelry, her shoes, and her surprisingly large array of sex-toys.

The thought of sex turned Nektar's thoughts to her cute new friend Jose. She sent a virtual copy of herself to his apartment on the second floor of a retrofitted yellow-brick building on Santa Clara Avenue, right across the street from Ririche, the restaurant where they worked together.

Virtual Nektar flew in through Jose's window; he was lying on his bed in his underwear looking totally hot. The room was smoky; Jose's eyes were closed. He was in the orchidnet, too. Nektar followed a golden thread leading from Jose's body to his mental location; she came up behind a wireframe outline of him and said, "Hi."

He turned; his skin filled in; his mouth opened in a grin. For the first time, they kissed.

They were in, like, a temple. A domed round room with bouncy Buddhist-looking monks against the walls. The little monks weren't human, they were orchidnet agents, wearing shallow, pointed coolie hats decorated with blinking blue and green eyes. The monk AIs were chanting.

Humans were in the temple too, orchidnet users come here to adore the new beings they were seeing in their minds. And in the middle of the room was a round altar holding a shape of light, a glowing woman. She was soaking up the worship. She said she was an angel.

6.

"I see colored dots on everything," Momotaro told his sister. Night had fallen. "Those are the orchids the grown-ups were arguing about."

"Orpid," said Bixie, repeatedly touching her knee with her finger. "Orpid, orpid, orpid, orpid. Do they bite?"

"No," said Momotaro. "They're talking to us, Bixie. Can you hear?"

"Be quiet, orpid," said Bixie. "You sound like teachers. Blah blah blah."

"Blah blah blah," echoed Momotaro, laughing. "Can you show me the *Space Pirates* online video game, orchids? Oh, yeah, that's neat. Bang! Whoosh! Budda-budda!" He aimed his fingers, shooting at toons he was seeing in the air.

"I want to see the *Spice Dolls* show," said Bixie. "Ooo, there's Kayla Kool

and Fancy Feather. Hi, dollies. Wanna have a tea party?"

Waking up to the kids' chatter, Craigor understood that they were all fully immersed in the Web now. The orphids had learned to directly interface with people's bodies and brains. He popped out his contact lenses and removed his earbud speakers and throat mike. Jil shifted, rubbed her face, opened her eyes.

"Check it out, Jil, no more Web hardware," said Craigor. "Nice work, orphids. And how are you getting video into my head? Magnetic vortices in the occipital lobes, you say? You're like smart lice. Wavy. I can turn off your feed into my head, I hope? Oh, I see, like that. But leave it on for now, I'm loving it. Behold the new orphidnet interface, Jil."

"Oh God, does this have to be real?" mumbled Jil. "I feel dizzy. No more hardware, you say? Oh, I don't like the kids having so much access." She sat up and began stripping off her own Web gear. "Too much video turns kids into zombies, Craigor. I feel stupid for having all those joint sensors under my skin."

"Fa-toom!" said Momotaro, cradling an invisible rocket-launcher.

"More tea, Fancy?" said Bixie, holding an unseen teapot.

With a slight twitch of will, Jil and Craigor could tune their viewpoints to the virtual worlds the kids were playing in. Really quite harmless. And the orphid-beamed visual images were of very good quality. The webeye overlays had always been a little fuzzy and headachy.

"Thus ends the market for my cuttlefish," said Craigor. "Well, I never did feel that good about putting the Pharaohs on death row."

"But you had fun making the traps," said Jil. "It was a skill. Everything's going to be so different now. Will anyone do anything anymore? Everyone will be terminally distracted."

"It'll be easy to catch fish to eat," said Craigor. "I'll always know where they are. I can see their meshes under the boat right now. Some rockfish and a salmon."

"Yeah, but what if the fish are watching *you*? And who'll grow rice and potatoes?"

"Hey, I can always outsmart a fish," said Craigor. "As far as work goes, I bet orphid-controlled piezoplastic sluggie bots can do the chores. But people will still do some labor anyway—for exercise."

"Karma yoga," said Jil. "Hey, orphids, can you stop displaying all those triumphant halo dots? They bother me; it's like having to see every single germ you

come across. That's better. Now, listen up, kids, Mommy and Daddy don't want you playing computer games all day long."

"Leave them alone for now, Mother Hen," said Craigor. "Let's check out the news."

The news was all about the orphids, of course. ExaExa was blaming Ond; he was in police custody now. ExaExa said the orphid release had taken place on a fishing scow named *Merz Boat* in the South Bay, and here were some pictures.

Cursing, Jil and Craigor glanced up to see buzzing dragonfly cameras against the night sky, the cameras visible by their glowing infrared eyes.

"At least they're not spraying solvents on us," said Craigor.

"The authorities considered that," said the baritone orphidnet voice in their heads. "But we orphids have already blanketed the whole West Coast. And great numbers of us are traveling overseas in the jet streams. It's way too late to disinfect the *Merz Boat*." A second later, the newscaster echoed the same words.

The news imagery segued to Ond, giving a press conference on the steps of the San Jose jail to a crowd of reporters and a hostile mob. To satisfy the public's need to know more about the ongoing events, the sheriff was letting Ond talk for as long as he liked, lit by an arch of glo-lights.

7.

Ond was verbose, geekily, defiant. The beer and tobacco had worn off. He was speaking clearly, selling the notion of the orphidnet.

"What with the petabyte and petaflop capacity of each orphid, the full sextillion-strong orphidnet will boast an ubbabyte of memory being processed at an ubbaflop rate—ubba meaning ten to the thirty-sixth power," said Ond to the crowd by the jailhouse steps, relishing the chance to inflict techie jargon on them. "The orphidnet's total power will thus be the square of an individual human's exabyte exaflop level. My former company's name was well-chosen: ExaExa. The orphidnet has the computational clout that you'd get from replacing each person by the entire population of Earth, and having all those people thinking together."

"How will the orphidnet impact the average citizen?" asked a reporter.

"Dive in and find out," urged Ond. "The orphidnet is all around. Anyone can dip into it at any time. It'll be teeming with artificial intelligences soon, and I'm predicting they'll like helping people. Why wouldn't they? People are interesting and fun."

“What about the less-privileged people who don’t have specialized Web-access gear?”

“The orphids are the interface,” said Ond. “Nobody needs hardware anymore. We’re putting people first and building Gaia’s mind.”

“That’s the ExaExa slogan,” remarked another reporter. “But they fired you and disavowed responsibility for your actions.”

“I’ve been fired before,” said Ond. “It doesn’t matter. ExaExa’s real problem with me was that I released the orphids before they could figure out a way to charge for orphidnet access. But it’s gonna be free. And, listen to me, listen. The orphids are our friends. They’re the best nanotechnology we’re going to get. I did a proactive release while there was still a chance of getting it right.”

“How soon do you expect to be freed from prison?”

“Right now,” said Ond. “I wouldn’t be safe in jail.” Plugged into the orphidnet as he was, with a full awareness of the exact position of everyone’s limbs, and with the emerging orphidnet AI helping him, Ond was able to simply walk off through the crowd.

In the crowd were some very angry people who truly wished Ond harm. After all, he’d forced Earth away from her old state; single-handedly he’d made the decision to change everyone’s lives—possibly forever. Ond was in very real danger of being stabbed, beaten to death, or hung from a lamppost.

But whenever someone reached for him, he was just out of their grasp. For once in his life he was nimble and graceful. Perhaps if the others had been so keenly tuned into the orphidnet as Ond, they could have caught him. But probably not. The orphids were, after all, quite fond of Ond.

A grinning guy at the back of the crowd gave Ond a bicycle; Ond recognized him as a friend, a fellow nanotech enthusiast named Jeff Rojas. Ond mounted Jeff’s bike and disappeared from the view of the still-coagulating lynch-mob, cutting through the exact right dark alleys to avoid the pursuing cars, though not quite able to elude the dragonfly cameras.

Alone on the dark side-streets of San Jose, Ond asked the orphids to disable all the dragonfly cameras following him. The devices clattered to the street like dead sparrows. Next Ond had the orphids systematically change every existing reference to his home’s address. Done.

But when he asked the orphids to make him invisible on the orphidnet, they balked. Yes, they would stop broadcasting his name, but the integrity of the world-spanning mesh of orphids was absolutely inviolable. The orphids reminded

Ond of a Nantel design meeting where he himself had altered the orphid operating system to include this very principle of Incorruptible Ubiquity.

Before long, people would be figuring out how to track Ond in real time. And by dawn there'd be no safe place on Earth for him.

8.

Chu lay on the rug, careful not to touch the wet spots he'd made. He was mad at Nektar for yelling at him.

Eyes closed, he was studying the new living things in the orphidnet: shiny disks whose edges bent under and curled up, with short thick stalks under their disks. Virtual mushrooms! Each mushroom had six or seven eyes on top, and the fatter mushrooms had baby mushrooms growing out of their sides. Some were boys and some were girls. They were cute and friendly—and glad to talk to Chu. When he asked where they came from, they said they were emergent orphidnet AIs, and that people's thoughts were their favorite thing to look at. They spoke really well, like regular people, in a way—although their thoughts came across in fatter chunks than just sentences and words.

Chu steered the conversation around to cuttlefish. One of the cartoony mushrooms said “Aha,” and he showed Chu the cuttle-data flowing to <ftp.exaexa.org/merzboat>. Chu decided to analyze the data himself, with the orphidnet AIs helping him.

Pretty soon he noticed something interesting about the cuttlefish. Every so often, one of them would totally disappear. And occasionally one of the cuttlefish would pop back from the mysterious nowhere.

Chu wondered how this could be. One of the mushroom AIs obligingly did a quick search of all the science papers in the world, and found a theory that there's another world parallel to ours, and that objects can quantum-tunnel back and forth, thus seeming to disappear and reappear.

“But when I set something down it always stays put,” said Chu.

“People collapse the quantum states of things they look at,” said the mushroom AI, wobbling the cap of her head. “The watched pot never boils. Objects stay put in the presence of a classical observer.”

“Sometimes I do lose things,” allowed Chu. “I guess they could disappear when I look away.”

“When things are on their own, they can sneak and quantum-tunnel to the other world,” agreed the mushroom. “Or maybe someone from the other world

reaches over here to grab them.”

“People in the other world are taking our cuttlefish?” said Chu. “But we’re using the orphids to watch the cuttlefish all the time. So they should stay put.”

“Orphids are quantum computers. They don’t *observe*; they *entangle*. An orphid isn’t like some bossy schoolmarm who keeps everyone in their seats until she looks away. It’s perfectly possible for an orphid-tagged cuttlefish to quantum-tunnel to a world on a parallel hypersheet.”

“What’s the name of the other world?” asked Chu.

“What would you like to call it?” asked the mushroom. “You’re the one discovering it.”

“Let’s call it the Mirrorworld,” said Chu. “Can we see a Mirrorworld person grabbing a cuttlefish?”

“Let’s try,” said the mushroom. “Aha.” A moment later she was showing Chu some shiny figures like people made of light. “They’re popping in and out of our world all the time!” exclaimed the mushroom. “And our good, smart, quantum-computing orphids are landing on them. No more sneaking around. Look, look, there’s a Mirrorworlder taking a cuttlefish! They’re having a fad for cuttlefish. It’s lucky we looked at the cuttlefish data stream.”

“My good idea,” said Chu.

The orphidnet was showing him a grid of scenes in which the glowing figures capered about, grabbed cuttlefish, flew through earth and water, or displayed themselves to little groups of worshipful virtual humans. Chu glimpsed his mother in one of these worship groups, but then she was gone.

Chu watched the worship group a bit longer anyway. The Mirrorworlder in the center was like a woman of smooth light; she was preaching about how great she was; she said she was an angel. Noticing Chu peeking at her, she pointed at him, which made him uneasy. He pulled away, although he would have liked to have seen where his mother had gone.

“The Mirrorworlders have always been around,” said the smart mushroom, reporting more info from her data-mining. “People have never been sure if they’re real; they called them elves or fairies or demons or spirits or other things. Mostly they called them angels. Mirrorworlders usually disappear if you watch them closely—or if you ask them a lot of questions. It decoheres them. But thanks to our quantum-computing orphids, the orphidnet can show the angels without melting them away.”

“Can I go to the Mirrorworld and visit?” asked Chu. That would teach Nektar a lesson for yelling at him about wetting his pants while he was being a cuttlefish. He’d run away to another world.

“Maybe,” said the smart mushroom. “Traveling to the Mirrorworld would be an—encryption problem. It’s something you’d do with your own mind. Like what you call teleportation? You get your mind into a special state and encrypt yourself into a superposition capable of tunneling to the Mirrorworld.”

“Encryption!” exclaimed Chu. “I like breaking codes. Tell me more.”

“To travel between the two worlds, a Mirrorworlder turns off self-observation and spreads out into an ambiguous superposed state, and then she observes herself in such a way so as to collapse down into the Mirrorworld or into our world.”

“What part of that is encryption?” asked Chu.

“The encryption lies in the way in which the Mirrorworlder does the self-observation,” said the mushroom. “It’s a quantum-mechanical operator based on a specific numerical pattern. The encryption code.”

“Goody,” said Chu. “Let’s figure out the code right now. We’ll use a timing channel attack.”

“It’s fun working with you,” said the mushroom.

9.

Ond took a circuitous route towards his house in the leafy Rose Garden district of San Jose. Whenever his enemies got too close, the orchids would warn him and he’d make another detour.

Meanwhile the new world of the orchidnet was opening up around him. Every word, thought or feeling brought along a rich association of footnotes and commentary. He could see, after a fashion, with his eyes closed. Every single object was physically modeled in the orchidnet: not just the road around him, but the insides of the houses, the people inside them, the contents of the people’s pockets, and their bodies under their clothes.

Ond wasn’t alone in the orchidnet. There were other people, quite a few of them, many wanting to harangue, threaten, interview, or congratulate him. And, just as Ond had hoped, artificial intelligences were emerging in the orchidnet as spontaneously as von Karman vortex streets of eddies in a brook, as naturally as three-dimensional Belusouv-Zhabotinsky scrolls in an excitable chemical medium. Maybe he’d call them beezies.

The beezies were talking to him, offering their information services. They wanted to share whatever intellectual adventures Ond could cook up. The scroll-shaped AIs looked like colored jellyfish and they spoke in compound glyphs that Ond's brain turned into words.

As he rode the bicycle and dodged his pursuers, Ond began organizing a workspace for himself in the orphidnet. His self-image was like a tree trunk with his thoughts branching off it. With the orphidnet agents helping him, he effortlessly combined all his digital documents, emails, and blogs into a single lifebox file that could automatically answer the questions people were asking him. And as he encountered people and AIs, he put links to them on his lifebox—like hanging ornaments on a Christmas tree.

Passing the Rosicrucian Egyptian museum a mile from his house, it occurred to Ond to see how things were going at home. It would be horrible if his enemies got there before him. Thank God the orphids had hidden his real address.

In his mind's eye, Ond saw his family in the orphidnet. Nektar was lying on their bed—sulking? No, a little probing showed that she too was in the orphidnet, doing something with her friend Jose from work. Ond didn't like seeing his wife with the swarthy, virile Jose. Nektar and Jose were attending some kind of virtual gathering, an impromptu religious service with a choir of orphids surrounding a luminous woman-like form upon an altar. The glowing being was definitely conscious, but she seemed neither like a human nor like an orphidnet AI. A third kind of mind? Other, similar, bright forms lay in every direction, out on the fringes of his thoughts—

Just then three virtual humans plowed into Ond's lifebox tree, distracting him. The first two wanted to kill him, but the third was his scientist-friend Mitch from MIT, already in the orphidnet from the East Coast. Ond had an intense and rewarding chat with Mitch; bandwidth was much higher in the orphidnet than in normal human conversation. Mitch formulated a theory about how the emerging orphidnet minds would scale up. Quite effortlessly, Ond and Mitch set some obliging orphidnet agents in motion to gather data to test Mitch's thesis—and awaited the results.

10.

Nektar didn't like the so-called angel at the center of the virtual temple where she'd found Jose. She'd never liked religion. Her mother had given the family's savings to a TV evangelist.

The angel was saying that she and her race were like gods compared to humans, and that we should be grateful to them. Same old line you always heard in church. Nektar figured these angels were just some kind of aliens or AIs. The angel could hear Nektar thinking this, but the angel wasn't mad—she thought Nektar was

funny.

“Take your friend and do what you will, little doubter,” said the angel, sending a shower of sparks that settled down onto Nektar and Jose like pixie dust. “All is permitted in the new world.”

The sparks energized Jose; he stopped staring at the angel and tugged Nektar into a side room whose walls were covered by special marble slabs which were patterned in slowly flowing scrolls and swirls. Nektar and Jose laid down and made love. It was over too soon, like a wet dream.

The marble room morphed into Jose’s apartment. The real Jose was sitting up, eyes open, trying to keep talking to Nektar. Jose was puzzled why Nektar wasn’t actually there. He began freaking out. He couldn’t remember things right. He said now that he’d seen an angel, maybe he should kill himself and go to heaven for good. Nektar told him to please wait, she was going to come there in the flesh, and that he hadn’t felt anything like the real heaven yet.

And then she too was sitting up, eyes open, alone in her bedroom. She couldn’t remember all the details of what had just happened. But she knew two things. She needed to go be with Jose in his apartment on Santa Clara Avenue. And she needed to leave Ond forever. She would never forgive him for ruining the cozy, womany world and making life into a giant computer game. Quickly she packed a suitcase with her essentials. She felt odd and remote, as if her head were inside a glass bubble. She didn’t want to face what she was about to do. Better to think of Jose.

Jose wasn’t a world-wrecker. She could save him; together they could make a new life. Why had he wanted to kill himself just now? A strong, sweet man like that. Nektar shook her head, feeling that same mixture of tenderness and contempt that she always felt when confronted by men’s wild, unrealistic ideas. She’d give Jose something to live for. He’d appreciate her. Ond wouldn’t miss her one bit.

But, oh, oh, oh, what about Chu? Leaving her bedroom, Nektar regarded her son, lying on the rug. He wasn’t trembling anymore; he looked content, his eyes closed, his lips moving. The orphidnet was catnip for him. If she interrupted him, he’d probably have a tantrum. Was it really possible to leave him here?

She leaned close to kiss Chu goodbye. Little Chu, her own flesh, how could she abandon him? He twisted away, muttering about numbers and cuttlefish. Oh, he’d do fine with Ond; he was much more like Ond than like Nektar. Ond would be home any minute to watch over him.

The invisible bubble around Nektar’s head felt very tight. If she didn’t leave right now, she was going to lose her mind. Tears wetting her face, she ran out to her car and headed for Jose. She passed Ond on his bike without even slowing down.

Hurry home, Ond, and take care of our Chu. I can't do it anymore. I'm bad. I'm sorry. Good-bye.

A mob of some kind was blocking the street a few blocks further on. Nektar went down some side streets to avoid the jam.

11.

While Ond and Mitch waited for the agents to return, Ond sent a virtual self to check on Nektar. She wasn't in that cultish group gathering anymore. She and Jose were in a marble room and—Ond was interrupted again. A real-world dog was chasing his bike, barking and baring his teeth as if he meant to bite Ond's calf. Ond snapped fully into the material plane, hopped off the bike, and picked up some gravel to throw at the dog, which was sufficient to send him skulking back into the shadows. Standing there, Ond had the strange realization that he could hardly remember any of the things he'd just been doing in the orphidnet. The memories weren't in his head; they were out—there. Just now Nektar had been doing—what? And Ond had been talking to—who? About what? When he was offline, Ond's memories of the orphidnet were like Web links without a browser to open them.

On his bike, Ond let his mind expand again. Ah, yes, his investigations with Mitch. The results were coming in. There was indeed an upward cascade of intelligences taking place in the orphidnet; each eddy was a part of a larger swirl, up through a few dozen levels, and ending with a single inscrutable orphidnet-spanning super-beezie at the top. Quite wonderful.

As for those luminous humanoid beings—the AIs now reported that these were so-called angels from a parallel sheet of reality that had recently been named the Mirrorworld. Viewing alien angels in the orphidnet seemed both mind-boggling and natural. It made a kind of sense that the quantum-computing mental space of the orphidnet could serve as a meeting ground between two orders of being.

But before Ond could begin considering this more deeply, he was distracted by a news feed saying that the courts had dropped charges against him. The orphidnet beezies proudly told him they'd hacked the system to get Ond out of trouble. But there was still the matter of the torch-bearing lynch-mob pushing towards Ond's current location. By now, even the dimmest bulbs had figured out how to see Ond on the orphidnet.

An urgent message popped up from Jeff Rojas, the guy who'd lent Ond the bicycle. Jeff was on his way in his car to offer Ond a fresh means of escape.

Ond sped the last few blocks towards home.

12.

Just as Chu had hoped, the quantum-mechanical operator at the heart of the angels' world-to-world teleportation method involved raising a numerical representation of a given object, such as a cuttlefish, to a certain exponential power K , producing an encrypted result of the form *cuttlefish* K . The actual value of K was the secret code needed to break the encryption.

Chu and the mushrooms were able to deduce digit after digit of K by delving into the ftp.exaexa.org/merzboat data stream. First of all they figured out how to represent each of the disappeared cephalopods as a number. And then they deduced exactly how long the encryption of each missing cuttlefish had taken. A delicate web of number theory led back from the time intervals to the digits of K . This timing channel attack was a big problem, a heavy crunch, but the orphidnet made it feasible.

Pretty soon Chu had the integer K tidily laid out as a pattern in the orphidnet. And with access to K , he now knew how to teleport back and forth between the two worlds.

K turned out to be several millions of digits long, by the way. Chu relished the fact that the orphidnet allowed him to visualize a gigundo number like that, to smoothly revolve it in his mind. He was starting to realize that, while he was online, a lot of his thinking was happening outside of his physical brain.

For the sake of elegance, Chu and the AIs transformed the giant code number K into a picture and a sound: blue spaghetti with chimes. Even this condensed pattern was too big to fit conveniently into even Chu's brain. When he "looked" at the pattern, he was really accessing a link to an orphidnet storage location. Chu gloated over the link, happy with the knowing. Although, hmm, given a little time, maybe he could find a deeper pattern that would allow him to memorize the entire code.

A glowing shape approached him, bright and solemn, speaking in a woman's voice: a Mirrorworlder, the same one he'd seen in the temple before.

"You shouldn't pry into our affairs," she said. "We don't want you pushing into our land. We're gods compared to you. Worship me and forget your stolen wisdom."

"No!" said Chu, holding tight to his hard-won code.

The angel woman held up her index finger and glared at Chu. Poking him as if he were dough, she probed into the core of his brain, rooting around, trying to erase the link. Chu began twitching all over. He found his voice and screamed for Nektar. She didn't come.

As Ond neared the house, he could see the lynch-mob only a block behind him. He felt for Nektar in the orphidnet and was surprised to discover that she'd left

their house in her car and had driven right past him and, for that matter, past the mob. He hadn't noticed. And now when he contacted her mind, he learned she was on her way to be in the physical presence of her friend Jose—and that she was leaving him for good. Before he could say anything, she'd pushed his connection away.

For the first time, Ond accepted that he might have made a mistake in releasing the orphids.

In his house at last, he found little Chu convulsing on the living-room floor. Ond cradled the boy in his arms, reaching into his mind to stabilize him. To his dismay, he found one of those Mirrorworld angels poking around in his son's head.

Sensing something quantum-mechanical about the alien being, Ond set to work decohering her. He knew that the best way to destroy a complicated quantum state is to closely observe it, that is, to ask a lot of questions about it. Ond subjected the alien to a barrage of questions and measurements, pinning down her sex, mass, energy, age, skin color, background, family size, voice timbre, food preferences, past ailments, education.... Finally, with a sound like a locust's abrupt chirp, the angel flipped from our world back to the Mirrorworld she'd come from.

“Are you okay, Chu?”

“I still have the link to the chimes and the blue spaghetti,” said the boy weakly. “Here.” Ond absorbed Chu's message containing the link. There was a huffer-muffer of voices approaching. Outside someone was honking a car horn.

“That's my friend,” said Ond. “We've got to leave right away. We'll go back to Jil's boat.”

“I'd like that,” said Chu. “Do you want to hear about the cuttlefish and how I found the angels' teleportation code?”

“I heard a little from the orphidnet AIs,” said Ond, carrying his son to the door. “I call them beezies.” How fragile the boy seemed, how precious.

“The beezies are good,” said Chu. “But that angel woman was being mean to me. I wouldn't let go of the link to her secret code. I almost have a way to learn the code by heart.”

“Strong Chu,” said Ond. “I want to hear all the details. We're going to need them. But you rest now. Tell me on the boat. Don't think about anything hard. I got really scared, seeing you shaking like that. If the angels come for you again, remember to drive them away by asking lots of nosy questions. You have to keep after them, is all.”

“Okay,” said Chu.

Down the street, people were yelling and running toward them. Moving faster than he would have thought possible, Ond got himself and Chu into the back seat of Jeff’s car, a fast and sporty model. Jeff peeled out just before the crowd reached them, following up with a high-speed doughnut move to shake a couple of cars trying to tail them.

On the way to the boat, Chu felt dozy. He slouched against his father in the car’s back seat. He wanted to sleep, but before he knew it, he was in the orphidnet yet again. He reached out to find Momotaro and Bixie. They were running around on the *Merz Boat* playing with a neat new toy called Happy Shoon. Jil had just now made it out of smart plastic. Chu joined in; Happy Shoon and the kids could see him. They played a kind of hide and seek game called Ghost In The Graveyard.

The game felt a little creepy because there were a few angels following Chu around. They couldn’t get at him right now because he’d learned from Ond to ask them lots of questions. But that was hard. Would life ever be easy again?

13.

After her initial half hour of panic, Jil relaxed and started using the orphidnet, dipping in and out. When she went in, it was like sleeping, as if the orphidnet users were dreamers pooling together in the collective unconscious of the hive mind. Jil began directing her dreamy visions for a purpose: she wanted to find out how to market Yoon Shoon.

Yesterday Mr. Kim, the chief of marketing at Yoon Shoon, had emailed Jil about their need for a “beloved logoman,” and Jil hadn’t even understood what the hell he wanted. But now the orphid AIs helped her; they searched the global namespace to figure out Mr. Kim’s request. A “logoman” was meant to be a little animated figure to symbolize the Yoon Shoon company: a Michelin Man, a Reddy Kilowatt, a Ronald McDonald, a Mickey Mouse, like that.

The orphidnet was teeming with helpful AI agents. They resembled flexible umbrellas patterned with eyes. After telling Jil what Mr. Kim thought a logoman was, the smart umbrellas began helping her design one. The AIs twisted themselves into diverse shapes, modeling possible Yoon Shoon logoman designs. Jil picked the versions she liked; the other agents contorted themselves into variations of the chosen shapes; Jil picked again; and so on. In a few minutes she’d evolved a lovable logoman that she decided to call Happy Shoon. Happy Shoon was a mix resembling a smiling athletic shoe, a dog with a floppy tongue, and a two-toothed Korean baby.

The orphidnet agents instantiated Happy Shoon by loading his mesh onto a handy lump of Craigor’s piezoplastic—and right away Happy Shoon began hopping and rolling around deck. Jil snapped out of the orphidnet to be all there for this.

Bixie tossed a wooden block; Happy Shoon bounced over to retrieve it, his motions clownish enough to send the kids into gales of laughter.

Although it was getting late, nobody felt like going to sleep. Momotaro and Bixie started playing hide and seek with Happy Shoon, and a virtual version of Chu showed up to join them.

Moving around the deck rearranging things in the dark, Craigor watched the kids play. “The orphidnet is a locative planetary brain,” Craigor told Jil. “My possessions are embodied thoughts.” He paused, watching the orphidnet AIs. “The orphidnet doesn’t have to be alienating. You can use it as a way to pay very close attention to the world. Its whole strength is that it’s based on physical reality.”

While Craigor talked, Jil had made two more plastic Happy Shoon figures. And she launched a bunch of virtual Happy Shoons onto the net. Some of them stuck around to play hide and seek with Bixie, Momotaro, the plastic Happy Shoons, and Chu.

Craigor loved feeling the real and the unreal swirling around him. After a bit, virtual Chu went away, replaced by Ond in the orphidnet. Ond had a favor to ask.

“What?” said Craigor.

“Can I come back there with Chu?” asked Ond. “Physically? I’m not safe in town. Everyone knows where I am all the time. They want to lynch me.”

“What about Nektar?” asked Craigor.

“She—she left me for another man. She hates me for the orphids.”

“Poor Ond,” interjected Jil, who was listening in as well. “The orphids aren’t all bad.”

“Can you please send the dinghy now?” said Ond. “We’re almost at the Alviso dock. I’m being followed, but don’t worry, I’ll leave the boat before there’s any danger to you. Chu and I just need a minute to catch our breath. And then we’ll go—someplace else.”

“I’m loving the orphidnet,” said Craigor. “I have this sense of resonance and enrichment.”

“You’re not seeing the flaming angels?” asked Ond. “From a parallel world?”

An odd, unsettling question, that. As Craigor waited for the dinghy to return with Ond and Chu, he indeed started noticing shiny humanoid shapes. One second they’d be perched in the rigging of the boat, and the next they’d be lurking amid the

cluttered boxes on the deck.

“They’re like those things you think you see out of the corner of your eye,” Craigor said to Jil. “And when you turn your head, nothing’s there. Are you getting that too?”

“I see them,” said little Bixie, peering across the water at the dinghy coming in. “I see the angels following Chu’s little boat.”

“They built our world,” said Craigor, the words jumping unbidden into his head. “Oh, that’s creepy. They told me to say that.”

“We built *their* world,” shot back Jil, quick as a knife. “I said that. Don’t let them get to you, Craigor.” She had a quick mental image of two sheets of reality moving through each other; each of the parallel planes sparking the other with a flood of light.

“Chu calls the angels’ world the Mirrorworld,” said Bixie. “He messaged me a magic spell for going there.” Bixie stood on tiptoe and called out to Chu in the dinghy. “Try and catch me, Chu!”

The air flickered and Bixie disappeared.

14.

“She’s in the Mirrorworld!” shouted Chu, climbing aboard the boat. “I have to go help her!”

“What. Are. You. Talking about!” said Jil, grabbing the boy and shaking him. “What did you do to her?”

“Back off,” said Ond, coming to his son’s defense. He pried Jil’s hands from Chu, who slid down to sit limply on the deck.

“The angels live in the Mirrorworld,” said Chu, looking up at them. “They’ve always been coming here, but now we can see them better—thanks to the orphids. I found out how to teleport a person to the Mirrorworld. I didn’t mean for Bixie to—”

“How?” said Craigor grimly. “Tell us how!”

“The orphidnet AIs and I did a timing channel attack on the disappearing cuttlefish,” began Chu. “And—”

“More of your nonsense about cuttlefish?” snapped Jil, towering over him. “Where’s Bixie, damn you!”

“Hysteria isn’t going to help,” said Ond. “Chu already gave me a link to the teleportation code. It looks like blue spaghetti and it sounds like chimes. I’ll message the link to you right now, Jil. Got it? All right then. Now let Chu finish telling us how the code works.”

“The angels stop thinking about themselves for a second,” said Chu, looking very small and uncomfortable amidst the grown-ups’ legs. “And then they concentrate on the code and—”

Chu disappeared too.

“You stay here, Craigor,” said Jil. “Take care of Momotaro. And Ond, you come with me. This is all your fault, you know. You ruined the world and now I’ve lost my little girl. People are right to want to lynch you.”

As if echoing Jil’s words, some people began yelling for Ond from the shore. An outboard motor sputtered and roared into life. Spotlights lit the water.

“Yes, I’ll come to the Mirrorworld,” said Ond. “That was my plan anyway. To hide there with Chu.”

“So, okay then, Doctor Ubergeek,” said Jil, relenting a bit. “We space out and we slam the code? Like meditating before doing a line of pseudocoke, huh?”

Jil began trying to make the jump. She could see the tangled blue spaghetti and hear the ringing of the chimes. But she remained stubbornly aboard the *Merz Boat*.

“We have to let go of our internal monologues,” suggested Ond. “Focus on the spaces between our thoughts.”

Normally, that wouldn’t be all that hard for Jil, but just now, sick with worry about Bixie, it was tough. Desperately casting about, she thought of the Zen koan where the teacher holds up a stick and says, “If you call this a mere stick, you deny its Buddha nature. If you don’t call it a stick, you’re lying. What do you call it? Quick!”

Jil broke the stick. She was neither here nor there, neither now nor then, not inside, not out. The chiming blue spaghetti buried her and—hello!

She was in the Mirrorworld, with Chu and Ond beside her, floating amidst gauzy white mist. Yes, the place looked like heaven, with mounds and castles of clouds and pyramidal rays of light, but the three of them were the only angels here. Had they died? Where were the Mirrorworlders? And where was Bixie?

Over and over Jil called her daughter’s name until finally—

“I’m right here,” came the sweet voice from a cute, puffy cloud directly overhead. A moan of relief escaped Jil; she stretched up her arms and Bixie dropped into her embrace.

“It’s fun here,” said Bixie, nestling on Jil’s shoulder, just the right size. “I can fly. I’m glad you came, Mommy. I was lonely.”

“I want to take you home now,” said Jil, hoping this was possible. The orphids on Jil’s skin were inactive, if they were still present at all. Certainly the links to Earth’s orphidnet weren’t working here. So how would she access that magic blue spaghetti code?

Anxiously Jil regarded Ond and Chu. They were peering down through a hole in the clouds at a landscape not all that far below them.

“Hi, Bixie,” said Chu, glancing over at them. He favored Bixie with one of his rare smiles.

“Can we go back?” Jil asked Chu.

“Probably,” said Chu. “I know the code by heart now. I simplified it. The blue spaghetti pattern was just a special kind of knot.” He rummaged in his pants pocket and found a piece of string. “I can make the knot. It’ll take a minute.”

Leaning over the gap in the clouds, Jil saw a town something like San Jose, California, as if seen from an airplane heading in for a landing. The south San Francisco Bay geography was the same, but the city sprawl was gone. Grassy paths had replaced the freeways; the buildings were organic shapes like giant sea shells and thick-trunked trees. And, although it was hard to be sure from up here, in their home world the “angel” Mirrorworlders looked to be regular people in colorful clothes.

“I’m thinking they have a completely different style of technology from us,” mused Ond. “Genomics and psionics instead of mechanics and electronics. I bet they grow their houses from seeds, and that they’re in telepathic contact with each other. We’ll fly down and check it all out, Chu.”

“Won’t they chase after us?” asked Chu. His fingers were weaving his piece of string into an intricate Celtic-style knot.

“Symmetry indicates that *we’ll* be the ones who look like angels in the Mirrorworld,” said Ond. “Glowing, hovering, hard to see. We’ll haunt the locals, we’ll make some heavy appearances. First of all we pay back that Mirrorworlder who was poking you, Chu. Teach her some religion! We’ll get concessions, make some live-and-let-live deals. I figure to spend a few years here—till things back home calm down. Will you keep me company, son?”

“Okay,” said Chu, slowly. “But I’ll miss the orchidnet a lot. I liked being so smart. I liked the bee-zies.” Clasp-ing the partly knotted string, he held his fingers up close to his eyes. “Our skin-or-phids aren’t doing anything anymore.”

“Fine structure constant!” exclaimed Ond. “A different value here. Good-bye electronics; farewell, molecular quantum computers.”

“Boring,” said Chu.

“Hey, but we’re angels now,” said Ond. “Angels kick butt.”

“Maybe,” said Chu, working one end of the string over and under a series of loops. “But we mustn’t listen too much if the Mirrorworlders ask us things. They might decohere us and flip us back to Earth.”

“We’re *good* at not listening,” said Ond, patting his son’s shoulder. “We’re geeks.”

“Can Bixie and I go home now?” said Jil. “Craigor and Momotaro will be worried sick.”

“I hope you’re not angry about the orphids covering Earth,” said Ond. “Maybe they were a mistake. For what it’s worth, I’m sorry.”

“Oh, don’t beat yourself up,” said Jil, feeling pity for the awkward man and his odd son. “We’ll all adjust. People never really change. Is your magic knot ready, Chu?”

“Ready,” said Chu, delicately tying together the two loose ends of his intricately woven loop of string. “Stare at this as if it were the blue spaghetti. And feel it with your fingers. That’ll take the place of the chimes.”

“Me first,” said Bixie.

Chu smiled, holding out his knot for her to touch.

“See you later.”

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