

Year's Best SF 04

EDITED BY
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To Henry G. Hartwell (1907-1998), a good father, who died in 1998. He was an electrical engineer proud of his MIT degree, in his youth a passionate radio ham who never trusted Hugo Gernsback's magazines because some of the technology didn't work well. He did not often read fiction for pleasure until late in life. I got love of science and technology from him.

Acknowledgments

This part has not changed since last year. The existence of *Locus* and *Tangents* makes doing an annual anthology easier and I thank them both for their devotion to considering the short fiction published each year in the SF field. Secondly, I am grateful to the publishers of the SF magazines for continuing the uphill battle to stay in business and publish fiction in 1998.

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Introduction

It has been another exciting year in the SF field for short fiction. In my survey of the works published, more good original collections cropped up from England and Australia and Canada than in any previous year. And the fiction magazines each had a bunch of good stories. So I must make my usual disclaimer, with perhaps more force than usual: this selection of science fiction stories *represents* the best that was published during the year 1998. In my opinion I could perhaps have filled two or three more volumes this size and then claimed to have nearly all of the best—though not all the best novellas.

Regular readers of this anthology will notice the absence of several familiar names, so let me point out that they have neither stopped writing nor is the quality of their work any less excellent than in other years. I believe that representing the best, while it is not physically possible to encompass it all in one even very large book, also implies presenting some substantial variety of excellences, and I left some writers out in order to include others in this limited space.

Next, my general principle for selection: this book is full of science fiction—every story in the book is clearly that and not something else. I have a high regard for horror, fantasy, speculative fiction, and slipstream and postmodern literature. But here, I chose science fiction. It is the intention of this year's best series to focus entirely on science fiction, and to provide readers who are looking especially for science fiction an annual home base.

After what I perceived as a mediocre year for novellas in 1997, 1998 was a strong year—there were fifteen or more good novellas—but '98 was at least as satisfying in all the shorter forms. *SF Age* had another strong year, as did *Asimov's*; they are unquestionably at the top of the field, and have quite similar tastes in the fiction they publish. There was less SF in *F&SF* and in *Interzone*, but some dynamite stuff in each, and some top-notch stories in the newly revived *Amazing*. *Analog* was uneven, publishing some of the best, and some of the worst stories. *On Spec*, from Canada, and *Eidolon*, from Australia, are generating some first-class writers with excellent stories, too, sometimes SF and sometimes horror or fantasy, as in *Interzone*.

Notable SF original anthologies include *Starlight 2*, edited by Patrick Nielson Hayden (probably the single strongest fantasy and SF collection of the year); *Bending the Landscape: Science Fiction*, edited by Nicola Griffith and Stephen Pagel (another very strong collection, of stories billed as gay and lesbian

writing); *Dreaming Down Under*, edited by Jack Dann and Janeen Webb (an impressive showcase of the best new Australian fantasy and SF writers, in time for this year's World SF convention in Melbourne); *Arrowdreams*, edited by John Dupuis and Mark Shainblum (devoted to alternate history SF about Canada); the latest volume in the *Mankzin Wars* series edited by Larry Niven; and the latest volume in the *Writers of the Future* series.

In summary, it was another year in which there were more than sixty or seventy, perhaps over a hundred, really good SF stories published, certainly enough to fill several year's best volumes, providing me with a rich diversity of selection for this one. For more information, including extensive monthly discussion of many fine individual stories, you are referred to Mark Kelly's excellent short fiction review columns in *Locus*.

Sadly, *Tangents*, the other main venue for short fiction reviews and commentary, was late and irregular in 1998, though a new online site has recently been established for the magazine where reviews may begin to be posted in a timely way.

I will make further observations on trends and themes in SF and remarks on the individual excellences of the contents of this book in the notes to the stories, that follow immediately. So here we go, into the best of the year. Follow me.

—David G. Hartwell

Market Report ALEXANDER JABLOKOV

Alexander Jablovkov published his first short story in 1985 and his first novel, *Carve the Sky*, in 1991. He is one of the most interesting SF writers to come to prominence in the 1990s. He has published five novels to date (his latest is *Deepdrive*, 1998), and occasional short stories. Some of his best work is collected in *The Breath of Suspension* (1994). He is part of the Boston-area SF writers workshop chaired by David Alexander Smith, the group that produced the collaborative original anthology, *Future Boston* (1994). The *Encyclopedia of Science Fiction* calls his work "both rounded and exploratory, and...generates the sense that an important SF career has gotten well underway." This story appeared in *Asimov's* and is the first of several in this book from that magazine, which seemed to me to publish a slightly higher percentage of SF, as opposed to fantasy of various sorts, again this past year. It was a particularly strong year for *Asimov's*. This was Jablovkov's only short fiction this year.

I slid out of the rental car's AC, and the heat of the mid-western night wrapped itself around my face like a wet iguana. Lightning bugs blinked in the unmown grass of my parents' lawn, and cicadas rasped tenaciously at the subdivision's silence. Old Oak Orchard was so new it wasn't even on my most recent DeLorme map CD-ROM, and it had taken me a while to find the place.

My father pulled the door open before I could ring the bell.

"Bert." He peered past me. "Ah. And where is—"

"Stacy's not with me." I'd practiced what to say on the drive from the airport, but still hadn't come up with anything coherent. "We...well, let's just say there have been problems."

"So many marriages are ended in the passive voice." His voice was carefully neutral. "Come along back, then. I'll set you up a tent."

Dad wore a pair of once-fashionable pleated linen shorts and a floppy T-shirt with the name of an Internet provider on it. His skin was all dark and leathery, the color of retirement. He looked like he'd just woken up.

"I told Mom when I was coming...."

“Sure.” He grabbed my suitcase and wrestled it down the hall. “She must have nailed the note to a tree, and I didn’t see it.”

I didn’t know why I always waited a moment for him to explain things. He never did. I was just supposed to catch on. I had spent my whole life trying to catch on.

“Lulu!” he called out the back slider. “Bert’s home.”

I winced as he dragged my leather suitcase over the sliding door tracks into the backyard. A glowing blue North Face tent sat on the grass. A Coleman lantern pooled yellow on a picnic table stolen from a roadside rest area. The snapped security chain dangled down underneath.

“Lulu!” he yelled, then managed a grin for me. “She must be checking the garden. We get...you know...slugs. Eat the tomatoes.”

The yard didn’t end in a garden. Beyond the grass was a dense growth of trees. Now and then headlights from the highway beyond paled the undersides of the maple leaves, but they didn’t let me see anything.

“Sure.” I sat down at the picnic table. “So how are you, Dad?”

He squinted at me, as if unsure whether I was joking. “Me? Oh, I’m fine. Never better. Life out here agrees with me. Should have done it a long time ago.”

Clichés were my father’s front defensive line. He was fortifying quickly, building walls in front of questions I hadn’t even asked yet.

“Trouble?” I said. “With Mom?” Being subtle is a nonstarter in my family.

“And how is your fast-paced urban lifestyle?” he asked.

“We’re working a few things out. A bit of a shake-down period, you might call it.”

My parents’ entire marriage had been a shakedown period. I was just an interim project that had somehow become permanent. I swear, all through my childhood, every morning they had been surprised to see me come downstairs to breakfast. Even now, my dad was looking at me as if he wasn’t entirely sure who I was.

“Well, to start with, Dad, I guess the problems Stacy and I have been having stem from being in the same profession—”

“You know,” Dad said, “your mother still has the darkest blue eyes I have ever seen.”

“She does have lovely eyes.”

“Cornflower blue, I always thought. Her eyes are cornflower blue.”

Stacy’s eyes were brown, but I guessed my father wasn’t interested in hearing about that. “Cornflowers are not the flowers on corn.” It had taken me years to figure that out.

“That’s right.”

“Someone once told me,” I said, “that you can hear corn growing at night. It grows so fast on hot summer nights. A night like tonight.”

“You need quiet to hear it,” he said. “You don’t like quiet, do you, Bert?” He was already looking for an

argument. “You can't market quiet.”

“That's where you're wrong,” I said. “There's an ambient recording you can buy of corn growing. Cells dividing. Leaves rustling. Bugs, I don't know, eating the leaves. That little juicy crunch. Call it a grace note.”

“And so you play it over your Home Theater system. With subwoofer, side speakers, the works? Pour yourself a single-malt, sit back, relax?”

“You don't *listen* to ambient, Dad. You let it wash over you. Through you. The whole point of modern life is never giving your full attention to any one thing. That gets boring. So you put the corn in the CD stack with the sound of windblown sand eroding the Sphinx, snow falling on the Ross Ice Shelf, the relaxing distant rattle of a horde of lemmings hitting the ocean, pop open your Powerbook to work some spreadsheets, and put a football game on the giant TV. You'll get the Oneness thing happening in no time.”

“Are you getting it?” he asked softly. It wasn't like his regular voice at all.

“What?”

“The Oneness. Whatever it is you're looking for.”

“There was a time when I was so close I could taste it...”

“Bertram! There you are!” Had my mother just come out of the woods? She was knotting the sash of a fluffy white terrycloth robe, as if she'd just stepped from the bathroom. Her gray hair was cut close to her scalp. She looked great. She always had. Even rubbing sleep out of her eyes, her feet bare. She still painted her toe-nails, I noticed, and they weren't even chipped. “Franklin, weren't you going to go get him a tent?”

“I was,” my dad said.

She hugged me, then tugged at the sleeve of my jacket. “Isn't it a little hot for wool?”

“It's tropic weight,” I said. “Gabardine.”

“The tropics have nothing on Illinois in August.” With that last shot, my dad disappeared into the garage.

“Franklin's right. Here.” An antique steamer trunk stood on end next to where the house's air-conditioning unit poked out of the rhododendrons.

Then my jacket was off, my tie was gone, and I was sitting at the picnic table with an iced glass of cranberry juice in my hand. Mothers do card tricks with comfort. All Dad had offered me was an argument—but then that was his way of letting me know I was home.

“Did the power go out, Mom?” I said.

She laughed. “Oh, no. How do you think I made the ice cubes? It's just the way we live now. Out here in the country.”

Now that I had a chance to relax, I could see that the other backyards visible had encampments in them too: tents, tables, meat smokers, greenhouses, even a Port-O-Let or two. I could hear people talking quietly, even at this hour, and smell the smoke of banked cook-fires. Something was wrong, seriously wrong, with this exclusive residential community. I should have known it as soon as my mom gave me the

cranberry juice. Her comfort meant that something was not right.

There were times in my childhood when everything had been stable. For a couple of years, for example, my dad had worked in a regular pet store, selling neon tetras and spaniels to wide-eyed children who would lose interest in them as soon as they got them home. We'd lived in a suburban house with a yard, all that, and I'd been able to tell the other kids what my dad did for a living. The TV shows I watched seemed to be intended to be watched by people living the life I then lived.

But during that time my mother had barely paid attention to me. TV dinners had been the order of the day, and I remembered a lot of drive-thru eating. She thought I was safe, then, and could take care of myself.

It was times like when my dad tried to build a submerged house at the bottom of an abandoned water-filled quarry and stock the water with ornamental piranha that my mother would bake me apple cobbler and paint farm scenes with smiling cows on the riveted bulkhead in my room. She had always intervened to keep the panic in my memories on a perfectly even keel.

"I should have known," I said.

Ice cubes clinked in my empty glass and she refilled it. "Known what, Bertram?"

"That you and Dad could turn the most wholesome of carefully planned and secure communities into something disturbing. And here I thought, while driving around, that you two had finally settled down, so that I could visit you without fear. Nice neighborhood, Old Oak Orchard."

She looked off at the glowing tents of the neighbors. "It is a nice neighborhood. Do you smell roasting joints from oxen and goats hissing fat on ancient sacrificial stones? Hear the minor-key chants of the priests as they rip open the jugulars of bellowing kine with their bronze blades? Does that make you afraid?"

"Lulubelle." My father broke a branch on a forsythia as he wrestled a heavy bundle out of the garage. My mother winced. "You're frightening the boy with all this pseudo-biblical 'kine' stuff. That's cows, Bert, if you don't know. Herefords, Black Angus. Besides, Lulu, you know our whole concept's not really about...that sort of thing. That's not the point."

"I thought we had agreed to disagree on the point, Franklin." I noticed that my mother had scratches up and down her arms, and that one of her little fingers was in a splint. Both Dad and I heard the danger in her tone.

He held up the tent. "It's canvas, Bert. White duck. Heavy as hell. You know, I saw some hunters out in the Gila with one of these once. They packed in on horses, and fried up a mess of potatoes in a cast-iron pan two feet across. My friend and I ate some kind of reconstituted gunk out of a plastic bowl. They were hunting elk with black-powder rifles. The things looked like cannon."

He'd told me the story before, but the actual physical tent was a new element. It was as if he now needed some real substance behind the memory. My father swore under his breath as he put the thing up. I knew better than to try and help him. It had all sorts of complicated ribs and locking joints. He pinched some skin and got real quiet. You could hear him breathing through his nostrils.

"Oh, come on, Bertram." My mother chuckled. "You won't see any animal-headed gods in the Lopezes' backyard, so quit staring. I was just...kidding."

She was really being hard on me. She'd noticed Stacy's absence, but wasn't going to ask about it. I was

sure it pleased her, though.

“It's late, Lu.” My father looked hungrily at my mother. Men should not look at their own wives that way, and particularly not at the mothers of their sons.

“Yes,” she said. “It's time for bed.”

It was a peacemaking gesture of some sort. They'd been at war, but my arrival had brought them together. My mother smiled at me over her shoulder as she followed him into their dome tent. It was the same old story. My parents had always disappeared behind their locked bedroom door, sometimes in the middle of the day, sometimes when I was sitting down in the living room with uncomfortable shoes on, waiting to go to some relative's house, and I wasn't even allowed to turn the TV on.

I woke up. I hadn't really slept. It was quiet. Still dark. I was thirsty. I walked across the lawn to the back door. The cut ends of the grass tickled my bare feet. It was a great feeling, a suburban feeling. The stars were weirdly bright. The Milky Way was something you wanted to wipe off with a sponge.

The sliding glass door to the kitchen wasn't locked. As a child, I'd always asked for kitchen water rather than bathroom water. My mother would go downstairs for me. The stairs creaked and I would hear her and know that she loved me. My father would go into the bathroom, make a lot of noise so I knew he hadn't gone anywhere, even flush the toilet, and then come back and tell me that it was the finest kitchen water there was. If I was thirsty enough, I would believe him.

The kitchen was dark. I felt the edge of a Corian countertop. I worked my way toward the sink. I saw the high faucet silhouetted against the window. Wet on my fingers. Something was soaking in the full sink. The water did not feel soapy. The glasses would be in this cabinet over here.

Something hissed at me. For a second I thought it was air-conditioning after all, despite how hot it was in the kitchen. Then I saw the eyes.

“What is that thing he's got in his mouth?” my father said. He peered up above the cabinets, into the shadows cast by the lamp. “A vole? Do we have voles? Or is that a star-nosed mole? Native or...recreated?”

“Franklin,” my mother said.

From a cookie jar shaped like a squat Chrysler Building she gave me a Tollhouse cookie. It couldn't have been baked more than a couple of hours before, probably about the time I was landing at O'Hare. The chocolate chips were still a little liquid. They unfurled themselves across my tongue. I lay on the textured floor. I didn't want to get up.

A magnet on the white dishwasher said CLEAN. The symbol for CLEAN was the smoking rubble of a city. I reached up and turned it over. DIRTY was that city whole, veiled in a haze of smog. A typical example of one of my father's deep ecology jokes. Smog is one of those antique sixties-type symbols he's always using as if they were arguments.

This time my father heard the warning in my mother's voice. He squatted down next to me. His knees cracked.

“Sorry, Bert,” he said. “I guess I should have told you.”

“Told me what? That you have animals in your sink?”

“It was a fisher.”

I caught glimpses of the creature as it snaked its way across the tops of the cabinets, some kind of rodent limp in its mouth. It looked like a big weasel. Its eyes gleamed down at me in the lantern light. Its eyes...

“A fisher?” I didn't look at it. Frogs made a low thrumming noise in the sink. An owl hooted out in the living room. Things examined us from outside the circle of light. When I was little, and wouldn't go get a drink of water myself, this was what I had known it was really like out there.

“Actually, it's an extinct species of mustelid,” he said. “This one vanished about the time the ice sheets left North America. It's part of a controlled breeding experiment, the reason we've moved here to Old Oak Orchard. We regress the DNA of animals that went extinct around the Pleistocene and implant it in related ova.”

“Oh, God, Dad. Remember that time you raised insulated sea turtles to give rides at that Aleutian beach resort?”

The resort had been run as some government benefit for impoverished Aleuts. All I remembered of the experience was thick clouds, rocks, and giant lumbering shells covered with barnacles, all roughly the same shade of gray. I didn't remember the turtles having any heads. My only entertainment had been working on a seaweed collection. It had all climaxed in a riot by the disillusioned locals, who had invested heavily in beach front cabanas and glitzy casinos, and blamed my father for the fact that sea turtle rides through choppy ice water failed to draw more tourists. Most of the turtles had been stewed in their own shells on the rocky beach in a drunken feast. Sea lions had barked their approval somewhere out in the mist, which glowed orange with the burning cabanas as we pulled away in our fiberglass *bidarka*. My mother had made my very favorite chili mac while we were there, and tucked me into bed every night with a sweet lullaby in a foreign language.

“We were undercapitalized, that's all.” My dad was irritated at having it brought up. “The failure wasn't biological.”

“No, they never are—”

“You're cranky, Bertram.” My mother supported my shoulders, and I sat up. “Not enough sleep.”

She had an almost suntan lotion smell, even though it was still dark. Some kind of collagen replacement cream. It was a comfort, to realize that my mother wanted to stay young. It was something to hold on to. The extinct mustelid slunk into shadows and did not come back out.

The lighter and fluffier my mom's scrambled eggs, the worse things were—a classic rule. This morning, with the innocent light streaming in through the kitchen windows, they were like clouds. I had looked around the house, but most of its nocturnal dwellers seemed to have hidden themselves in the cupboards and cabinets.

“Is Dad driving you crazy?” I asked. The orange juice was metallic, from concentrate, so maybe there was some hope.

“Since when hasn't he?” She smiled. “But this time I'm driving *him* crazy too. I came here under protest—who wants to move out to one of these bland compounds out in the middle of nowhere, even to raise extinct fauna? Really, that's no different than playing golf until you die, don't you think?”

I didn't tell her how happy I had been to see the place, to feel its stolid normality. Sodden, heavy scrambled eggs would have been a small price to pay to know that I was, at last, safe.

"But I've found things to do. I've found ways to enjoy this little place. And that, as you can guess, drives your dad bananas. I'm using it *wrong*, you see. I'm not enjoying it the proper way." She produced a day-labeled pillbox, and started filling it with red, yellow, and green pills. Sunday through Saturday. Her week was set up.

"And how are you enjoying it, Mother?"

She held up a deep-green lozenge. "Do you think my body used to produce this, and then stopped? What gland do you suppose made it?" The pill had a particularly hard gleam, like a liquid-oxygen tank on a Pixar-generated spacecraft in an SF movie.

"I don't know."

"You know how all these Pleisto-kooks got together? They all used to belong to the same Internet newsgroup. They'd trade breeding tips, give each other heads-up on available DNA sequencers and incubators. Then, a bunch of them decided to live together and work on a big project. They bought into Old Oak Orchard en masse. Some of these people were quite wealthy."

"It's the latest thing, you know," I said. "The transformation of virtual communities into real ones. One of those wonderful retrogressive steps that makes my job so much fun."

She sighed. "I know mothers can never explain their children's jobs right nowadays, and it always drives the kids crazy. But if you'd only have normal jobs, like, I don't know, accountant, or wrestler, or weatherman, or something..."

"Wrestler?"

"Then we could just *say* it, and people would know what we meant."

"I've *told* you what Stacy and I do. Call us experimental demographers. That's close enough."

"There, I'd brought up the dread name. My mom pursed her lips, but maybe it was because she didn't like the OJ either. "That's not really what you are, is it?"

"No, Mom." I knew she could hear the sadness in my voice. "That's not really what I am. Not anymore."

"Oh, Bertram." Her eyes filled with tears. "I don't know who pushed whom, but she's gone, isn't she?"

"As gone as it gets. And my job along with her."

"She meant so much to you..." She'd never liked Stacy, but she knew what hurt her son.

"The last job we did..." I said. "Stacy soloed, I only advised. She was good, real good. I'd taught her how to spot potentially self-defined groups...she found a little community of interest among teenagers. A disaffected layer in a lot of high schools, all across the country. People think it's all mass marketing, but that's not where the real value-added stuff comes in, not any more. These kids didn't identify themselves as any sort of group, but I could—Stacy could tell from what they bought, the kind of magazines they read, the web sites they hit, and music they listened to, and the street drugs they took, that they were looking for something. Something they hadn't found yet. So she gave it to them."

"What?" My mother was interested despite herself.

“The past. The real deep past. It just took a little marketing push, and they started mail-ordering flint blanks for spear points, birth-control dispensers in the shape of Paleolithic fertility figurines, ink-jet-sprayed wall paintings to conjure up mammoths. It was just this group, but they were really into it. Their rooms at home must have looked like Altamira or Lascaux. When the trend tanks you won't be able to *give* that Acheulean stuff away, but that's off in...the future.”

My mother stood up and ran gnarled fingers through her short gray hair. She didn't look young. I wouldn't pretend that. She was old, she was my mother. But she had more light in her eyes than she'd had in years. She also had scratches on her hands, and calluses on her palms, like she'd been working hard somewhere outdoors for quite some time. My mother had never been a gardener and, in fact, there was no trace of any garden in the yard. I'd looked for it.

“You think you're so smart, don't you?” Her tone was bitter.

“Mom, I—”

“Talk to your dad. I mean, really talk to him. I think you still need a few lessons in what life is really like.”

She walked out of the kitchen. A few minutes later I heard the door to the yard ease open. I craned my head out the kitchen window, but couldn't see where she went. I sat down to another cup of coffee. Something that looked a lot like a badger poked its head out from under the sink, saw me, and pulled back. The little door clicked back onto its magnet.

“Dad,” I said. “I think you got some problems.” Mom had gotten me thinking about the possible consequences of his new project. I felt like I was back on the job. It bugged me how much I liked that feeling.

“You're telling me?” He spent some time putting the ball on his tee. “I thought your mother and I could work together on this. Instead, she made a bunch of new girlfriends and now spends her time hunting ungulates in the woods with spears. Is that anything a woman her age should be doing?” He swung at the ball with his driver. It sliced viciously, off into the dark woods that bordered the course. In all our years together, this was the first time he'd ever taken me golfing. I already didn't like it.

“I...well, actually, you know, Dad, it's really about time. It's good for her to do something like that.”

“God, I knew you'd take her side.”

“I'm not taking her side!”

“Deer liver. I'm talking deer liver for supper, with forest mushrooms, fiddleheads, all sorts of sick hunter-gatherer crap. She just doesn't seem to get the *post*-technological nature of our enterprise. She's a woman who skulks with the foxes.” He left the course and started hacking his way through the underbrush. I followed.

“Dad,” I said. “Are we chasing after her? Bugging her?”

“Eh?” I'd caught him. He scratched the back of his head. “Not at all. A golf course is a good place to work out a few intellectual problems. That's all. Golf is the perfect combination of mathematics and frustration.”

“Let her be, Dad. She has a right to do what she wants.” Even if it was some up-market version of an old mid-teen trendlet. No wonder she'd gotten irritated with me. “You're doing what you want, aren't you?”

“I don't know. I don't know. I had a different idea when I came here...it doesn't work without Louise.” He never called my mother Louise. Lulu, Lulubelle, Looly, all sorts of things. She never liked her given name. “You know, she spends all night out sometimes. Getting nocturnal on me. Pretty soon, her eyes will grow a tapetum and reflect in the headlights. And I'll never see her again.”

“Dad, that's just not true, and you know it.”

“I want you to help me talk to your mother.” His voice was quiet now, matching the hush of the dense forest in which I was already completely lost. “That's all.”

“Not here, Dad,” I pleaded. “Don't try to talk to her here.”

“I have to. I can't stand it anymore. Back me up, will you, son?”

They created me as a ref. Both of them. I might as well have been born with a black-and-white striped shirt on and a whistle in my mouth. I was the go-between in all their arguments.

“Dammit.” He tripped over a thick tree root. “Where do you suppose that thing's gone? It was a good one, Titleist.”

He was maintaining the imposture, even though we'd now been wandering in this thick jungle for a quarter of an hour. He'd occasionally brush some wild sarsaparilla or poison ivy aside with his iron, but he never actually looked at the ground underneath for his ball.

“Dad,” I said. “Do you remember when you used to take me camping?”

“Eh?” That caught him by surprise. “Sure, of course I do.”

“Why did you stop?”

“Stop?”

“Stop taking me!”

“You didn't like it.”

“How did you know that?”

“Know what?”

That took a deep breath. “That I didn't like it.”

“You just didn't that's all. It was hard, you got blisters, we got rained on, the food was always kind of grainy or lumpy. Don't you remember? Those trails, mud where they weren't trippy rocks, bugs, and nothing, nothing to do except walk and look at stuff.”

I didn't remember hating it. Oh, sure, I bet there were times when I had been a real pain in the butt, not wanting to poop in a trench, or unwilling to get out of a warm sleeping bag to greet the icy dawn, or whining over my blisters. But I remembered happiness when I would wake up in the middle of the night, moonlight streaming through the mosquito netting, trees rustling in the breeze, my father's heavy bulk snoring next to me. The mountains at sunrise had looked something like heaven.

“You shouldn't have stopped taking me, Dad,” I said. “You love it.” He still went every year, with his increasingly creaky friends he'd been going with since high school. “It's something to share.”

“You can say that, but you didn't have to put up with you. All the questions, all the suggestions. Sometimes it was technical—ways of packing more efficiently, that sort of thing. But sometimes it was, I don't know, spiritual or something. How we could enjoy ourselves better. How we could be more ourselves. I tell you, Bert, that's a little hard to take when all you want to do is go on a hike.”

He and his friends Bill and Frank had been the sort of limited demographic I later made my career out of satisfying. They weren't high-intensity rock-face-sleeping types. I did vaguely remember trying to figure out why they liked what they did, and how they could like it better. My dad's gear had even been pretty lame. For example, the waterproofing had come off the bottom of his tent and it always got a little wet.

I was starting to remember now. A fight. Not even on the trail, but before. I'd hauled his tent out of the garage, where he'd packed it up wet, cleaned all the dirt and grass off of it, and re-waterproofed the bottom. It had taken me all afternoon, patiently coating every square inch with the goo. While I was at it, I sealed all the seams. My father never really understood that they sold you the tent with the seams unsealed, so rain had always run down the stitching. When I was done you could have used that tent as a boat. I stood back, hands on my hips, and admired it as it stood in the backyard.

“What are you doing?” my father had said behind me, and I turned to explain.

I didn't remember the anger itself. All I remembered was his car driving away, his friends Bill and Frank sitting in it instead of me, both of them incredibly embarrassed. I had solved a problem for him, and that was something he just couldn't stand. All of my mother's entreaties had been useless. I had to stay behind. I was too young, he said. Too much trouble to take along. Maybe when I was older... That had been the last time.

“Maybe we can just go for a hike sometime,” I said.

“Let's count this as a start.”

For a moment we moved in synch through the trees, as if we were together, heading for the same place.

“Let me take advantage of your expertise for a moment, Bert,” he said. My dad had always known exactly what I did, though he had never approved of it. “Could you find us? I mean, if you were back in your office. Without knowing anything about us, would we pop up when you searched for unusual patterns in purchases?”

“Sure.” I'd already been thinking about it. “This operation can't just bootstrap up from nothing. You had to have bought all sorts of things, gotten all sorts of technical information. All of that can be traced.”

“But that's not so bad, is it? All you'd want to do is sell us more things. My dinner of antelope and tree bark will be interrupted by a call from someone trying to offer me a zone electrophoresis setup or a subscription to an Embryo of the Month club. Free samples of restriction enzymes and mammoth kibble in the mail. Right?”

He wanted me to reassure him. This was my territory.

I couldn't do it.

“You know, Dad, when I met Stacy, she was just a research assistant. Not mine, understand, just in the department. But she was eager to learn. She had a Ph.D. in sociology, but thought her whole life would be studying something like the distribution of ethnic first names in middle-class households. I showed her the ropes.”

“She seemed... I don't know, Bert. She never seemed like your type. Dumb word, I know. Not clear at

all. But what upset your mother was that, when you visited, you never seemed...yourself. Now, that's natural when you're starting out, I guess....”

“I worked it, Dad. I mean, I really worked it. You have no idea how far I went. I wanted her...at first it was just sort of ambition. She was beautiful, right? But that wasn't all. She was so sharp, so crisp. So *focused*. For a while she focused on me. I melted. I resisted, that wasn't my plan, but it happened before I knew it. I don't know...I don't know? if *she* ever did. There comes that moment, you know? Where the other person...melts. I always deluded myself into thinking it had happened. My game just wasn't good enough.”

“Your mother, for example, was very resistant.” Dad was reminiscent. “Somehow, my line of nonsense didn't particularly charm her. Imagine that! But one day, we went out canoeing. There were a lot of toppled cottonwoods in the river, and several times we had to pull the canoe over them. It was hot, and there were a lot of bugs. It should have made us cranky with each other, but instead, each drag across made us more of a team. I fell in the mud, more than once. Your mother wore white shorts and a light blue blouse with a collar. I remember her staying completely clean, she remembers herself getting covered with drying mud. That was all fine, it was a step forward. Mosquito bites and all, it was something we'd shared. Then, just as we were getting ready to turn around and go home, a water moccasin swam slowly out to us. Now, I knew a thing or two about poisonous snakes at the time—I had a Pentecostalist friend who made a great living at county fairs—and I was able to...hypnotize it, I guess you'd say. It fell asleep on my paddle, eyes still open, and your mother stroked its head. She wasn't afraid. She trusted me. Then she looked at me and...I knew it had happened. Nothing would ever be the same again. After that—”

“Dad—” He was pushing it.

“Oh, no details, no details. Not about the rest of that day, anyway. But after that, we got married and I started a viper ranch. I saw it as fate. Your mother helped raise the money to start it. After a year or two, it failed, and we had to let the snakes go. It still gives me a tear to remember the black mamba slithering across the parking lot toward the drainage ditch by the highway...But, you know, your mom never faltered. She always stood by me. And she was already pregnant with you, by then. Given the amount of venom she encountered during her pregnancy, I'll bet you're immune to a wide range of toxins.”

“I've never really had the chance to check that out. But Stacy...I suppose it was a cliché man/woman relationship, mentor and pupil. But she was so sharp! It was like no one had ever listened to me before—”

“You know, son, I've been meaning to work on that, really I have....”

“That doesn't matter! For the first time, someone focused her full attention on me. It's an incredible rush. I never knew.... We fell in love. You know the rest. We became a team. I molded her, taught her everything.”

My father cleared his throat. “For what it's worth, Bert, I think she really did...love you. That one time you visited...maybe she didn't melt. But you got her as close to it as anyone possibly could.” He shook his head. “Your mother would kill me if she heard me telling you that.”

I blinked my eyes and looked around. “Boy, this place really is a jungle.”

“Yeah. They've gone too far, is all I can say. We get together, try to recreate a few species, just a gentle hobby, like miniature trains or building ships in bottles...and these guys go completely berserk. That's life in the exurbs for you. All sense of social control is lost. Your mom has to be somewhere around here....”

My dad pulled a machete out of his golf bag and hacked at the trailing vines and lianas. Leaves flew around him, but he didn't make much headway. He'd had muscle once. I remembered him mowing the lawn with his shirt off. He'd insisted on a push mower. It was an old one he'd bought at a yard sale. Being my father, he'd never lubricated it right, and the blades were so dull they sort of folded the grass instead of cutting it. But I remembered his delts and back muscles gleaming with sweat as he struggled and swore and dug gouges in the lawn. In later years, Mom would have me borrow an incredibly noisy and smelly power mower from the Hendersons next door and cut the grass while he was away for the day. If my father ever noticed anything, he didn't think it worth mentioning, and eventually he stopped using the push mower. He left it outside by the side of the house and it rusted into a solid lump of metal.

But now his skin sagged down over slack muscle. I could tell his joints hurt by the clumsy way he swung the blade. Tomorrow he'd be awake before the first light of day with a rotator cuff on fire, slathering on the BenGay. And he hadn't sharpened the damn blade. Some things never change.

“Dad.”

“What?”

“Could I do that?”

He looked at me over his shoulder. “You ever handle a machete?”

“Just let me try it. Come on.”

“It's not a toy, Bert. It's a very specialized tool, regardless of what you might have seen in some damn blowgun epic—ouch, dammit!”

The blade rebounded from a particularly resistant vine and the blunt trailing edge bounced off his forehead. I caught him under the arms as he fell backward. The machete embedded itself dramatically into a rotting tree stump and stood there, cracked Bakelite handle up.

He looked up at me. He'd have a bruise, but he hadn't broken the skin.

“Bert,” he said. “What finally happened?”

“With Stacy?”

“With whatever.”

I helped him to his feet. He'd lost a lot of muscle but he didn't feel any lighter. Without any objection from him, I pulled the machete out of its tree stump and started hacking at the vines. It was harder than it looked. A lot harder. Blowgun epics...I couldn't remember ever seeing any of those, no late-night TV viewings of *Yamomano!* or *Death on the Amazon*, but I suppose there could be such things, made on virtual soundstages in Malaysia.

“She was smarter even than I thought. Or maybe I was a better teacher than I ever imagined. You see, I'd marketed myself. I'd created an interest group for her, found what she'd secretly wanted, and gave it to her. Mom was right. I wasn't myself. I was an ad for myself. A good one, much better than the actual product. So she finally figured out. By then she was good, better than I was at what I do. We had our last fight when I said I could *become* my ad, really be what I had for so long pretended. She'd never know the truth, I told her. She would be living with the man she'd always thought I was. I was pathetic.”

It was hard, remembering her contempt. I'd taught her to see clearly and here I was trying to get her to put blinders on again. I think it was that anger that drove her to what she did next. In the aftermath, I was

forced to submit my resignation.

“She left the company when she left me and moved on to the *Interrogator On-Line* TV show. She uses what she learned for tabloid TV segments. She spots and exposes incipient cults, weird social groups, fads, that sort of thing. It's the coming thing. There are more bizarre groups all the time. And the first group she outed was us, my company. A bunch of paranoid megalomaniacs who think that they control the private interests and identities of millions of Americans.”

“Us,” he said. “Isn't that right? You're saying she's after *us*.”

My old man wasn't so stupid after all. That was exactly what I was saying, I realized. I just hadn't known it myself. My dear Stacy could be floating above us right now in one of the media's black helicopters, scanning us, getting ready to drop a camera team down and expose this place on national TV. That fisher wouldn't make much of an image, but there had to be something more interesting around here....

“Dad—”

“Look out!” He knocked me over.

I went down. The tawny shape of the springing animal blurred over us. It hit, turned quickly...but did not leap to finish us off. Instead, it sat back on its haunches.

It was a big cat, like a lion or a tiger. Except—I had to look again. I didn't know a lot of biology, but I did know that there wasn't anything in a zoo that looked like a tiger but had tusks like a walrus. It made a low rumble I could feel in my chest, and lashed its tail. In knocking me over, my father had twisted my ankle. All I could feel down there was that pressure that was the shadow of future pain.

“They're pretty near-sighted,” my father said. “I don't think we should move.”

“What the hell is that thing?”

“Eh? Oh. It's a smilodon. Call it a saber-toothed tiger, though that's not very accurate.”

“Whatever it is, it's opening its mouth at us. I don't think I can move.”

“If it's anything like a tiger, that's called fleshmen. It's using its vomeronasal organ—trying to smell us. Which way is the wind blowing?”

I looked up at the leaves to see if I could tell, and found myself mesmerized by the sky. The trees stretched what seemed hundreds of feet up, and their gigantic crowns spread out against the placid blue. Birds flew back and forth up there. I could smell the thick loam under my head, and a single shaft of sunlight pierced through the upper stories and lay on the side of my face, as warm as a mother's kiss. Lacy-winged insects flickered through and were gone.

“Are you all right?” My father was so close I could feel his breath as he spoke.

“I don't know. My ankle...”

My father prodded at it, which actually did make it hurt.

“I have something to tell you,” he said.

“What's that?”

“I have no idea whether it's broken or not. I don't know what to look for.”

The saber-toothed tiger, as if puzzled by our incompetence, lay down completely and yawned again.

“I’m sorry, boy.”

“That’s okay, Dad.”

“No it’s not. I shouldn’t have brought you here. It’s between your mother and me.”

“It’s between all of us,” I said.

“Will she...will Stacy find us, do you think?”

“If you’ve been buying the gear and subscribing to the magazines I think you have, yeah. I doubt the next development over buys as much as a single cloning setup a year, even as a gift.”

“You got that right,” he said. “The Menhir Manors people are mostly shamanistic fire worshippers. I think your mother has some bridge-playing friends over there. Buy briquettes by the truckload, but no restriction enzymes.”

“Oh, God.” I rubbed my forehead. “Another Internet newsgroup that decided to settle down in the exurbs?”

“Actually, I think most of them got a number to call off photocopied announcements on the walls of tattoo parlors. Traditionalists, the lot of them. But even they have to put gas-stack scrubbers on those big brazen idols of theirs, or they’ll catch an EPA raid. But what can we do, Bert?”

Did the weight of his need make me feel lighter, or heavier? I wasn’t sure.

“Franklin.” My mother’s voice, from somewhere off in the underbrush. “What are you doing here?”

“Lulu!” He shouted, even though she wasn’t more than a few feet away. “It’s important.”

“Go away. I’ll see you at dinner.”

“Please! And Bert’s twisted his ankle. That damn giant kitty...”

“Don’t fuss about the smilodon. She doesn’t hurt anyone. Besides, she hunts large game. Those teeth aren’t any use against something as puny as a human being.”

A rustle in the leaves, and five women appeared, my mother among them. There was nothing remarkable about them, really. They ranged in age from their midtwenties to at least their sixties, and my mother wasn’t even the oldest. Several carried composite bows with pulleys on them. One had a dead rabbit hanging from her belt. They could have been students at some Adult Extension class.

A woman in her early thirties, with wild black hair, knelt down next to me. After silently examining my ankle, she pulled an instant-cold pack out of her bag and cracked the inside partition. Then she attached it to my ankle with an Ace bandage.

“RICE,” she said. “Rest, ice, compression, elevation. Can you handle it?”

“Sure. Particularly the rest part.”

I could smell the stink of her crudely cured buckskins, but somehow that did not make her seem less attractive. Her face looked like she’d spent a lot of time squinting into the sun.

“Stacy!” My mother shrieked at what my dad told her. “I knew it.” She knelt by me. “Oh, baby. I’m sorry. I know she meant a lot to you. You loved her.”

“Don’t embarrass him, Looly.”

“I’m not...am I embarrassing you, Bert?”

“Yes, Mom, you are.”

She sat back. “Well! Try to show a little maternal warmth—”

“He knows that, Lu. You know he does. But he has other things on his mind.”

“What? He’s a refugee, Franklin. When your marriage ends...you’ve lost your country. Your native language. Everything. And he’s come here to us....”

Was that what had happened? I wasn’t sure any more. Sometimes what seems like free will is only the following of the deepest patterns, the ones you can no way resist. Stacy didn’t need me, and in the aftermath of her departure, it seemed that no one did. Except here.

“Ladies!” I said. “Do you mind if I explain a few things to you?”

“Of course not.” The black-haired woman patted my hand. “We know what helps a man relax.”

“Don’t patronize me. This is serious. I’ll give you the information, and you can decide what you want to do with it. Now, imagine if Old Oak Orchard was on the cover of *Time*, the subject of three tabloid news shows, and had tiger-striped tour busses coming through to look at the fauna. What would that mean to your lives?”

That got their attention, big time. They sat around me in a circle and watched me closely.

“You’ve concealed yourselves pretty well. From outside, you look just like any other exurban residential community centered on a golf course. Kudos for that. But, and this is even more important, all of your purchases can be tracked.” I told them how they could be found, how, in fact, I would have found them a few months before, if that had been my job.

I felt a sudden surge of power as I spoke. I had no idea why changing from predator to prey felt so liberating, but it did.

“But there’s one thing they aren’t used to, those searchers after fads. They aren’t prepared for a deliberate deception. They aren’t ready for someone to be on to their game. Fake purchases, odd magazine subscriptions, anomalous hits on Internet sites. If we massage the statistics just right, we can send them buying off after entire demographic shoals of red herrings.”

And a brilliantly specific deception came to me in a flash. A play with excavation equipment rental, freeze-dried food supply purchases, air recirculation systems, self-tanning gels...the works. It would show an incipient self-defining group. Call it Bomb Shelter Chic. Late-middle-age security-minded exurbanites moving into underground palaces. Stacy and her compadres would eat that up. The kitschy paranoia of the past made for the cool trends of the future. A few Morlock Madness Midnights at the local mall, and we’d have everyone from Malaysian marketeers to *Hardcopy* video journalists looking desperately for something that did not exist.

And that was only the beginning. Canned calves brains packed in caul fat on the Upper West Side of Manhattan, hyena-print sarongs in northern Minnesota, and sophisticated digital recording equipment in

Shreveport would send the entire system wobbling on its axis. Old Oak Orchard would vanish into an Antarctica of white noise. We could survive.

The smilodon watched me carefully as I spoke. Did it know I was protecting it from exposure? Perhaps it would not have approved. Maybe it wanted to be in commercials. The woman with the buckskins and the bow—maybe she wanted to get the endorsements, like a beach volleyball star. But, no. The essence of the new marketing paradigm was that not everyone wants the same thing, no matter how much easier that made production.

Those women gave me a standing ovation. It felt good. I was here. I was at work. Then they picked up their bows and faded back into the woods.

I looked around for my father. He had passed the ball to me, and I wondered how he felt about it. At some level, of course, he had hoped, all the way along, that I would solve his problems for him. Still, it couldn't have been easy. I did remember that he had taken that damn waterproofed tent on that camping trip with his friends. I was sure he'd stayed dry.

He talked quietly with my mother. I wondered if either of them had paid any attention at all to my worldbeater speech.

“Hey,” I said. “Could I get a little help here?”

With their support, I managed to limp along, one arm on each of their shoulders.

“That woman,” I said. “The one who fixed my ankle...”

“Jennifer?” my mother said.

“Her name is Jennifer?”

“Look, Bertram, having a popular first name is not the kiss of death. But you wouldn't be interested in her.”

“Why not?”

“Well, she's really a bit of a tomboy.”

“Mom, you run around the woods hunting deer with bow and arrow.”

“Really, Bertram, as if that's relevant. Jennifer is not your type.”

“Do we have any lasagna at home?” my father asked.

“Some of the spinach,” my mother said.

“Spinach? None of the sausage?”

“We finished that on Tuesday. Is the spinach a problem?”

“No, of course not.”

“I can make some sausage up fresh.”

“Oh, no...no, don't take the trouble.”

“It's no trouble.” She shook her head. “Jennifer. Imagine.”

“Give the boy a break.”

“Please, Dad.” I hated the way they talked about me right in front of me. “That’s not important.”

“That was quite a speech. Thanks for saving our saggy polyester-clad butts, son.”

He made me laugh, even though my mom didn’t seem to think it was funny.

“You’re welcome, Dad.”

Why was my mom working so hard at trying to make Jennifer seem interestingly forbidden? Was she make Jennifer seem interestingly forbidden? Was she really learning more about how her son’s mind worked, even at this late date? That was a scary thought. I was more part of my family than I had thought.

“Your mother’s lasagna will set you back on your feet in no time,” my father said. “Even if it is spinach.”

“I told you, I can *make* sausage....”

Impossible creatures lurked in the underbrush, but I knew I was home.

A Dance to Strange Musics

GREGORY BENFORD

Gregory Benford is a plasma physicist and astrophysicist, and one of the leading SF writers of the last twentyfive years. He is a science columnist for F&SF, and in February 1999 published his first popular science book, *Deep Time*. In the last few years he has formed a group, with Greg Bear and David Brin, Reading for the Future, that advocates science fiction reading in junior and senior high schools. One of the chief spokesmen of hard SF of the last twenty years, Benford is articulate and contentious, and he has produced some of the best fiction of recent decades about scientists working, and about the riveting and astonishing concepts of cosmology and the nature of the universe. His most famous novel is *Timescape*, his most recent, *Cosm* (1998). In 1998 he published this story in two versions, in the small press magazine *Age of Wonders* and in *SF Age*. This text is the second, and longer, version. “A Dance to Strange Musics” is like a compressed Benford novel, with all the ideas, characters, speculations, and imaginative surprises packed into an episodic 8,500 words—much of the pleasure of a whole book in only a half an hour of reading.

Section 1

The first crewed starship, the *Adventurer*, hung like a gleaming metallic moon among the gyre of strange worlds. Alpha Centauri was a triple-star system. A tiny flare star dogged the two big suns. At this moment in its eternal dance, the brilliant mote swung slightly toward Sol. Even though it was far from the two bright stars it was the nearest star to Earth: Proxima.

The two rich, yellow stars defined the Centauri system. Still prosaically termed A and B, they swam about each other, ignoring far Proxima.

The *Adventurer*’s astronomer, John, dopplered in on both stars, refreshing memories that were lodged deep. The climax of his career loomed before him. He felt apprehension, excitement, and a thin note of

something like fear.

Sun B had an orbital eccentricity of 0.52 about its near-twin, with the extended axis of its ellipse 23.2 astronomical units long. This meant that the closest approach between A and B was a bit farther than the distance of Saturn from Sol.

A was a hard yellow-white glare, a G star with 1.08 the Sun's mass. Its companion, B, was a K-class star that glowed a reddish yellow, since it had 0.88 times the Sun's mass. B orbited with a period of 80 years around A. These two were about 4.8 billion years of age, slightly older than Sol. Promising.

Sun A's planetary children had stirred *Adventurer's* expedition forth from Earth. From Luna, the system's single Earth-class planet was a mere mote, first detected by an oxygen absorption line in its spectrum. Only a wobbly image could be resolved by Earth's kilometersized interferometric telescope, a long bar with mirroreyes peering in the spaces between A and B. Just enough of an image to entice.

A new Earth? John peered at its shrouded majesty, feeling the slight hum and surge of their ship beneath him. They were steadily moving inward, exploring the Newtonian gavotte of worlds in this two-sunned ballroom of the skies. Proxima was so far away, it was not even a wallflower.

The Captain had named the fresh planet Shiva. It hung close to A, wreathed in water cirrus, a cloudball dazzling beneath A's simmering yellow-white glare. Shimmering with promise, it had beckoned to John for years during their approach.

Like Venus, but the gases don't match, he thought. The complex tides of the star system massaged Shiva's depths, releasing gases and rippling the crust. John's many-frequency probings had told him a lot, but how to stitch data into a weave of a world? He was the first astronomer to try out centuries of speculative thinking on a real planet.

Shiva was drier than Earth, oceans taking only 40 percent of the surface. Its air was heavy in nitrogen, with giveaway tags of 18 percent oxygen and traces of carbon dioxide; remarkably Earth-like. Shiva was too warm for comfort, in human terms, but not fatally so; no Venusian runaway greenhouse had developed here. How had Shiva escaped that fate?

Long before, the lunar telescopes had made one great fact clear: The atmosphere here was far, far out of chemical equilibrium. Biological theory held that this was inevitably the signature of life. And indeed, the expedition's first mapping had shown that green, abundant life clung to two well-separated habitable belts, each beginning about 30 degrees from the equator.

Apparently the weird tidal effects of the Centauri system had stolen Shiva's initial polar tilt. Such steady workings had now made its spin align to within a single degree with its orbital angular momentum, so that conditions were steady and calm. The equatorial belt was a pale, arid waste of perpetual tornadoes and blistering gales.

John close-upped in all available bands, peering at the planet's crescent. Large blue-green seas, but no great oceans. Particularly, no water links between the two milder zones, so no marine life could migrate between them. Land migrations, calculations showed, were effectively blocked by the great equatorial desert. Birds might make the long flight, John considered, but what evolutionary factor would condition them for such hardship? And what would be the reward? Why fight the jagged mountain chains? Better to lounge about in the many placid lakes.

A strange world, well worth the decades of grinding, slow, starship flight, John thought. He asked for the full display and the observing bowl opened like a flower around him. He swam above the entire disk of the Centauri system now, the images sharp and rich.

To be here at last! *Adventurer* was only a mote among many—yet *here*, in the lap of strangeness. Far Centauri.

It did not occur to him that humanity had anything truly vital to lose here. The doctrine of expansion and greater knowledge had begun seven centuries before, making European cultures the inheritors of Earth. Although science had found unsettling truths, even those revelations had not blunted the agenda of ever-greater knowledge. After all, what harm could come from merely looking?

The truth about Shiva's elevated ocean only slowly emerged. Its very existence was plainly impossible, and therefore was not at first believed.

Odis was the first to notice the clues. Long days of sensory immersion in the data-streams repaid her. She was rather proud of having plucked such exotica from the bath of measurements their expedition got from their probes—the tiny, speeding, smart spindle-eyes that now cruised all over the double-star's realm.

The Centauri system was odd, but even its strong tides could not explain this anomaly. Planets should be spherical, or nearly so; Earth bulged but a fraction of a percent at its equator, due to its spin. Not Shiva, though.

Odis found aberrations in this world's shape. The anomalies were far away from the equator, principally at the 1,694-kilometer-wide deep blue sea, immediately dubbed the Circular Ocean. It sat in the southern hemisphere, its nearly perfect ring hinting at an origin as a vast crater. Odis could not take her gaze from it, a blue eye peeking coyly at them through the clouds: a planet looking back.

Odis made her ranging measurements, gathering in her data like number-clouds, inhaling their cottony wealth. Beneath her, *Adventurer* prepared to go into orbit about Shiva.

She breathed in the banks of data-vapor, translated by her kinesthetic programming into intricate scentinventories. Tangy, complex.

At first she did not believe the radar reflections. Contours leaped into view, artfully sketched by the mapping radars. Calibrations checked, though, so she tried other methods: slow, analytical, edious, hard to do in her excitement. They gave the same result.

The Circular Ocean stood a full 10 kilometers higher than the continent upon which it rested.

No mountains surrounded it. It sat like some cosmic magic trick, insolently demanding an explanation.

Odis presented her discovery at the daily Oversight Group meeting. There was outright skepticism, even curled lips of derision, snorts of disbelief. “The range of methods is considerable,” she said adamantly. “These results cannot be wrong.”

“Only thing to resolve this,” a lanky geologist said, “is get an edge-on view.”

“I hoped someone would say that.” Odis smiled. “Do I have the authorized observing time?”

They gave it reluctantly. *Adventurer* was orbiting in a severe ellipse about Shiva's cloud-wrack. Her long swing brought her into a side view of the target area two days later. Odis used the full panoply of optical, IR, UV, and microwave instruments to peer at the Circular Ocean's perimeter, probing for the basin that supported the round slab of azure water.

There was none. No land supported the hanging sea.

This result was utterly clear. The Circular Ocean was 1.36 kilometers thick and a brilliant blue. Spectral evidence suggested water rich in salt, veined by thick currents. It looked exactly like an enormous, troubled mountain lake, with the mountain subtracted.

Beneath that layer there was nothing but the thick atmosphere. No rocky mountain range to support the ocean-in-air. Just a many-kilometers gap.

All other observations halted. The incontrovertible pictures showed an immense layer of unimaginable weight, blissfully poised above mere thin gases, contradicting all known mechanics. Until this moment Odis had been a lesser figure in the expedition. Now her work captivated everyone and she was the center of every conversation. The concrete impossibility yawned like an inviting abyss.

Lissa found the answer to Shiva's mystery, but no one was happy with it.

An atmospheric chemist, Lissa's job was mostly done well before they achieved orbit around Shiva. She had already probed and labeled the gases, shown clearly that they implied a thriving biology below. After that, she had thought, the excitement would shift elsewhere, to the surface observers.

Not so. Lissa took a deep breath and began speaking to the Oversight Group. She had to show that she was not wasting their time. With all eyes on the Circular Ocean, few cared for mere air.

Yet it was the key, Lissa told them. The Circular Ocean had intrigued her, too: so she looked at the mixture of oxygen, nitrogen, and carbon dioxide that apparently supported the floating sea. These proved perfectly ordinary, almost Earth-standard, except for one oddity. Their spectral lines were slightly split, so that she found two small spikes to the right and left of where each line should be.

Lissa turned from the images she projected before the Oversight Group. "The only possible interpretation," she said crisply, "is that an immensely strong electric field is inducing the tiny electric dipoles of these molecules to move. That splits the lines."

"An *electric* shift?" a grizzled skeptic called. "In a charge-neutral atmosphere? sure, maybe when lightning flashes you could get a momentary effect, but—"

"It is steady."

"You looked for lightning?" a shrewd woman demanded.

"It's there, sure. We see it forking between the clouds below the Circular Ocean. But that's not what causes the electric fields."

"What does?" This from the grave captain, who never spoke in scientific disputes. All heads turned to him, then to Lissa.

She shrugged. "Nothing reasonable." It pained her to admit it, but ignorance was getting to be a common currency.

A voice called, "So there must be an impossibly strong electric field *everywhere* in that 10 kilometers of air below the ocean?" Murmurs of agreement. Worried frowns.

"Everywhere, yes." The bald truth of it stirred the audience. "Everywhere."

Tagore was in a hurry. Too much so.

He caromed off a stanchion but did not let that stop him from rebounding from the opposite wall, absorbing his momentum with his knees, and springing off with a full push. Rasters streaked his augmented vision, then flickered and faded.

He coasted by a full-view showing Shiva and the world below, a blazing crescent transcendent in its cloud-wrapped beauty. Tagore ignored the spectacle; marvels of the mind preoccupied him.

He was carrying the answer to it all, he was sure of that. In his haste he did not even glance at how blue-tinged sunlight glistened from the Circular Ocean. The thick disk of open air below it made a clear line under the blue wedge. At this angle the floating water refracted sunlight around the still-darkened limb of the planet. The glittering azure jewel heralded dawn, serene in its impudent impossibility.

The youngest of the entire expedition, Tagore was a mere theorist. He had specialized in planetary formation at university, but managed to snag a berth on this expedition by developing a ready, quick facility at explaining vexing problems the observers turned up. That, and a willingness to do scutwork.

“Cap'n I've got it,” he blurted as he came through the hatch. The captain greeted him, sitting at a small oak desk, the only wood on the whole ship—then got to business. Tagore had asked for this audience because he knew the effect his theory could have on the others; so the captain should see first.

“The Circular Ocean is held up by electric field pressure,” he announced. The captain's reaction was less than he had hoped: unblinking calm, waiting for more information.

“See, electromagnetic fields exert forces on the electrons in atoms,” Tagore persisted, going through the numbers, talking fast. “The fields down there are so strong—I got that measurement out of Lissa's data—they can act like a steady support.”

He went on to make comparisons: the energy density of a hand grenade, contained in every suitcase-sized volume of air. Even though the fields could simply stand there, as trapped waves, they had to suffer some losses. The power demands were *huge*. Plus, how the hell did such a gargantuan construction *work*?

By now Tagore was thoroughly pumped, oblivious to his audience.

Finally the captain blinked and said, “Anything like this ever seen on Earth?”

“Nossir, not that I've ever heard.”

“No natural process can do the stunt?”

“Nossir, not that I can imagine.”

“Well, we came looking for something different.”

Tagore did not know whether to laugh or not; the captain was unreadable. Was this what exploration was like—the slow anxiety of not knowing? On Earth such work had an abstract distance, but here...

He would rather have some other role. Bringing uncomfortable truths to those in power put him more in the spotlight than he wished.

Captain Badquor let the Tagore kid go on a bit longer before he said anything more. It was best to let these technical types sing their songs first. So few of them ever thought about anything beyond their own warblings.

He gave Tagore a captainly smile. Why did they all look so young? “So this whole big thing on Shiva is artificial.”

“Well, yeah, I suppose so...”

Plainly Tagore hadn't actually thought about that part very much; the wonder of such strong fields had stunned him. Well, it was stunning. “And all that energy, just used to hold up a lake?”

“I'm sure of it, sir. The numbers work out, see? I equated the pressure exerted by those electric fields, assuming they're trapped in the volume under the Circular Ocean, the way waves can get caught if they're inside a conducting box—”

“You think that ocean's a conductor?” Might as well show the kid that even the captain knew a little physics. In fact, though he never mentioned it, he had a doctorate from MIT. Not that he had learned much about command there.

“Uh, well, no. I mean, it is a fairly good conductor, but for my model, it's only a way of speaking—”

“It has salt currents, true? They could carry electrical currents.” The captain rubbed his chin, the machinery of his mind trying to grasp how such a thing could be. “Still, that doesn't explain why the thing doesn't evaporate away, at those altitudes.”

“Uh, I really hadn't thought...”

The captain waved a hand. “Go on.” *Sing for me.*

“Then the waves exert an upward force on the water every time they reflect from the underside of the ocean—”

“And transfer that weight down, on invisible waves, to the rock that's 10 kilometers below.”

“Uh, yessir.”

Tagore looked a bit constipated, bursting with enthusiasm, with the experience of the puzzle, but not knowing how to express it. The captain decided to have mercy on the kid. “Sounds good. Not anything impossible about it.”

“Except the *size* of it, sir.”

“That's one way to put it.”

“Sir?”

A curious, powerful feeling washed over the captain. Long decades of anticipation had steeled him, made him steady in the presence of the crew. But now he felt his sense of the room tilt, as though he were losing control of his status-space. The mind could go whirling off, out here in the inky immensities between twin alien suns. He frowned. “This thing is bigger than anything humanity ever built. And there's not a clue what it's for. The majesty of it, son, that's what strikes me. Grandeur.”

John slipped into his helmet and Shiva enclosed him. *To be wrapped in a world*—His pov shifted, strummed, ached with busy fretworks—then snapped into solidity, stabilized.

Astronomy had become intensely interactive in the past century, the spectral sensoria blanketing the viewer. Through *Adventurer's* long voyage he had tuned the system to his every whim. Now it gave him a nuanced experience like a true, full-bodied immersion.

He was eager to immerse himself in the *feel* of Shiva, in full 3-D wraparound. Its crescent swelled below like a ripe, mottled fruit. He plunged toward it. A planet, fat in bandwidth.

For effect—decades before he had been a skydiver—John had arranged the data-fields so that he accelerated into it. From their arcing orbit he shot directly toward Shiva's disk. Each mapping rushed toward him, exploding upward in finer detail. *There*—

The effect showed up first in the grasslands of the southern habitable belt. He slewed toward the plains, where patterns emerged in quilted confusions. After Tagore's astonishing, theory about the Circular Ocean—odd, so audacious, and coming from a nonscientist—John had to be ready for anything. Somewhere in the data-fields must lurk the clue to who or what had made the ocean.

Below, the great grassy shelves swelled. But in places the grass was thin. Soon he saw why. The natural grass was only peeking out across plains covered with curious orderly patterns—hexagonals folding into triangles where necessary to cover hills and valleys, right up to the muddy banks of the slow-moving brown rivers.

Reflection in the UV showed that the tiles making this pattern were often small, but with some the size of houses, meters thick.... and moving. They all jostled and worked with restless energy, to no obvious purpose.

Alive? The UV spectrum broke down into a description of a complex polymer. Cross-linked chains bonded at many oblique angles to each other, flexing like sleek micro-muscles.

John brought in chemists, biologists in an ensemble suite; Odis and Lissa chimed in the scientific choir. In the wraparound display he felt them by the shadings they gave the data.

The tiles, Lissa found, fed on their own sky. Simple sugars rained from the clotted air, the fruit of an atmosphere that resembled an airy chicken soup. *Atmospheric electro-chemistry seems responsible, somehow*, Lissa sent. Floating microbial nuggets moderated the process.

The tiles were prime eaters. Oxidizing radicals the size of golf balls patrolled their sharp linear perimeters. These pack-like rollers attacked invader chemicals, ejecting most, harvesting those they could use.

Lissa brought in two more biologists, who of course had many questions. *Are these tiles like great turtles?* one ventured, then chuckled uneasily. They yearned to flip one over.

Diurnal or nocturnal? *Some are, most aren't.*

Are there any small ones? *a few.*

Do they divide by fission? *No, but....* Nobody understood the complicated process the biologists witnessed. Reproduction seems a tricky matter.

There is some periodicity to their movements, some slow rhythms, and particularly a fast Fourier-spectrum spike at 1.27 seconds—but again, no clear reason for it.

Could they be all one life form?—could that be?

A whole planet taken over by a tiling-thing that coopts all resources?

The senior biologists scoffed. How could a species evolve to have only one member? And an ecosystem—a whole world!—with so few parts?

Evolution ruled that out. Bio-evolution, that is. But not social evolution.

John plunged further into the intricate matrices of analysis. The endless tile-seas cloaking mountains and valleys shifted and milled, fidgety, only occasionally leaving bare ground visible as a square fissioned into triangles. Oblongs met and butted with fevered energy.

Each hemisphere of the world was similar, though the tiles in the north had different shapes—pentagonals, mostly. Nowhere did the tiles cross rivers but they could ford streams. A Centauri variant of chlorophyll was everywhere, in the oceans and rivers, but not in the Circular Ocean.

The ground was covered with a thin grass, the sprigs living off the momentary sunlight that slipped between the edges in the jostling, jiggling, bumping, and shaking. Tiles that moved over the grass sometimes cropped it, sometimes not, leaving stubs that seemed to have been burned off.

The tiles' fevered dance ran incessantly, without sleep. Could these things be performing some agitated discourse, a lust-fest without end?

John slowed his descent. The tiles were a shock. Could these be the builders of the Circular Ocean? Time for the biologists to get to work.

The computer folk thought one way, the biologists—after an initial rout, when they rejected the very possibility of a single entity filling an entire biosphere—quite another.

After some friction, their views converged some-what. A biologist remarked that the larger tiles came together like dwarf houses making love...gingerly, always presenting the same angles and edges.

Adventurer had scattered micro-landers all over the world. These showed only weak electromagnetic fringing fields among the tiles. Their deft collisions seemed almost like neurons in a two-dimensional plan.

The analogy stirred the theorists. Over the usual after-shift menu of beer, soy nuts, and friendly insults, one maven of the digital realm ventured an absurd idea: Could the planet have become a computer?

Everybody laughed. They kidded the advocate of this notion...and then lapsed into frowning silence. Specialists find quite unsettling those ideas that cross disciplines.

Could a species turn itself into a biological computer? The tiles did rub and caress each other in systematic ways. Rather than carrying information in digital fashion, maybe they used a more complex language of position and angle, exploiting their planar geometry. If so, the information density flowing among them was immense. Every collision carried a sort of Euclidean talk, possibly rich in nuance.

The computer analogy brought up a next question—not that some big ones weren't left behind, perhaps lying in wait to bite them on their conceptual tail. Could the tiles know anything more than themselves? Or were they strange, geometroid solipsists? Should they call the tiles a single It?

Sealed inside a cosmos of Its own making, was It even in principle interested in the outside world? Alpha

Centauri fed It gratuitous energy, the very soupy air fueled it: the last standing power on the globe. What reason did it have to converse with the great Outside?

Curiosity, perhaps? The biologists frowned at the prospect. Curiosity in early prehumans was rewarded in the environment. The evolving ape learned new tricks, found fresh water, killed a new kind of game, invented a better way to locate those delicious roots—and the world duly paid it back.

Apparently—*but don't ask us why just yet!* the biologists cried—the game was different here. What reward came from the tiles' endless smacking together?

So even if the visiting humans rang the conceptual doorbell on the tile-things, maybe nobody would answer. Maybe nobody was home.

Should they try?

John and Odis and Lissa, Tagore and the captain, over a hundred other crew—they all pondered.

Section 2

While they wrestled with the issue, exploration continued.

A flitter craft flew near the elevated ocean and inspected its supporting volume with distant sensors and probing telescopes. Even Shiva's weather patterns seemed wary of the Circular Ocean. Thunderclouds veered away from the gap between the ocean and the rugged land below. In the yawning height clouds formed but quickly dispersed, as if dissolved by unseen forces.

Birds flew through the space, birds like feathery kites.

Somehow they had missed noticing this class of life. Even the micro-landers had not had the speed to capture their darting lives. And while the kite-birds did seem to live mostly on tiny floating balloon-creatures that hovered in the murky air of the valleys, they were unusually common beneath the Circular Ocean.

John proposed that he send in a robo-craft of bird size, to measure physical parameters in the heart of the gap. Captain Badquor approved. The shops fabricated a convincing fake. Jet-powered and featuring fake feathers, it was reasonably convincing.

John flew escort in a rocket-plane. The bird-probe got 17 kilometers inside and then disappeared in a dazzling blue-white electrical discharge. Telemetry showed why: The Circular Ocean's support was a complex weave of electrical fields, supplying an upward pressure. These fields never exceeded the breakdown level of a megavolt per meter, above which Shiva's atmosphere would ionize. Field strength was about a million volts per meter.

The robo-craft had hit a critical peak in the field geometry. A conductor, it caused a flashover that dumped millions of watts into the bird within a millisecond.

As the cinder fell, John banked away from his monitoring position five kilometers beyond the gap perimeter. There was no particular reason to believe a discharge that deep within the gap would somehow spread, engulfing the region in a spontaneous discharge of the enormous stored energies. Surely whoever—no, whatever—had designed the Circular Ocean's supports would not allow the electromagnetic struts to collapse from the frying of a mere bird.

But something like that happened. The system responded.

The burned brown husk of the pseudo-bird turned lazily as it fell and sparks jumped from it. These

formed a thin orange discharge that fed on the energy coursing through the now-atomized bird. The discharging line snaked away, following unerringly the bird's prior path. It raced at close to the speed of light back along the arc.

The system had *memory*, John realized. He saw a tendril of light at the corner of his vision as he turned his flitter craft. He had time only to think that it was like a huge, fast finger jabbing at him. An apt analogy, though he had no time to consider ironies. The orange discharge touched the flitter. John's hair stood on end as charge flooded into the interior.

Ideally, electrons move to the outer skin of a conductor. But when antennae connect deep into the interior, circuits can close.

Something had intended to dump an immense charge on the flitter, the origin of the pseudo-bird. Onboard instruments momentarily reported a charge exceeding 17 coulombs. By then John had, for all intents and purposes, ceased to exist as an organized bundle of electrical information.

John's death did yield a harvest of data. Soon enough Lissa saw the true function of the Circular Ocean. It was but an ornament, perhaps an artwork.

Ozone fizzed all around it. Completely natural-seeming, the lake crowned a huge cavity that functioned like a steady, standing laser.

The electrical fields both supported the Ocean and primed the atoms of the entire atmosphere they permeated. Upon stimulus—from the same system that had fried John—the entire gap could release the stored energy into an outgoing electromagnetic wave. It was an optical bolt, powerful and complex in structure—triggered by John.

Twice more the ocean's gap discharged naturally as the humans orbited Shiva. The flash lasted but a second, not enough to rob the entire ocean structure of its stability. The emission sizzled out through the atmosphere and off into space.

Laser beams are tight, and this one gave away few of its secrets. The humans, viewing it from a wide angle, caught little of the complex structure and understood less.

Puzzled, mourning John, they returned to a careful study of the Shiva surface. Morale was low. The captain felt that a dramatic gesture could lift their spirits. He would have to do it himself.

To Captain Badquor fell the honor of the first landing. A show of bravery would overcome the crew's confusions, surely. He would direct the complex exploring machines in real-time, up close.

He left the landing craft fully suited up, impervious to the complex biochem mix of the atmosphere.

The tiles jostled downhill from him. Only in the steep flanks of this equatorial mountain range did the tiles not endlessly surge. Badquor's boots crunched on a dry, crusty soil. He took samples, sent them back by runner-robo.

A warning signal from orbit: The tiles in his area seemed more agitated than usual. A reaction to his landing?

The tile polygons were leathery, with no obvious way to sense him. No eyes or ears. They seemed to

caress the ground lovingly, though Badquor knew that they tread upon big crabbed feet.

He went forward cautiously. Below, the valley seemed alive with rippling turf, long waves sweeping to the horizon in the twinkling of an instant. He got an impression of incessant pace, of enthusiasm unspoken but plainly endless.

His boots were well insulated thermally, but not electrically; thus, when his headphones crackled he thought he was receiving noise in his transmission lines. The dry sizzle began to make his skin tingle.

Only when the frying noise rose and buried all other signals did he blink, alarmed. By then it was too late.

Piezoelectric energy arises when mechanical stress massages rock. Pressure on an electrically neutral stone polarizes it at the lattice level by slightly separating the center of positive charge from the negative. The lattice moves, the shielding electron cloud does not. This happens whenever the rock crystal structure does not have a center of structural symmetry, and so occurs in nearly all bedrock.

The effect was well known on Earth, though weak. Stressed strata sometimes discharged, sending glow discharges into the air. Such plays of light were now a standard precursor warning of earthquakes. But Earth was a mild case.

Tides stressed the stony mantle of Shiva, driven by the eternal gravitational dance of both stars, A and B. Periodic alignments of the two stars stored enormous energy in the full body of the planet. Evolution favored life that could harness these electrical currents that rippled through the planetary crust. This, far more than the kilowatt per square meter of sunlight, drove the tile-forms.

All this explanation came after the fact, and seemed obvious in retrospect. The piezoelectric energy source was naturally dispersed and easily harvested. A sizzle of electric micro-fields fed the tiles' large, crusted footpads. After all, on Earth fish and eels routinely use electrical fields as both sensors and weapons.

This highly organized ecology sensed Badquor's intrusion immediately. To them, he probably had many of the signatures of a power-parasite. These were small creatures like stick insects that Badquor himself had noticed after landing; they lived by stealing electrical charge from the tile polygons.

Only later analysis made it clear what had happened. The interlinked commonality of piezo-driven life moved to expel the intruder by overpowering it—literally.

Badquor probably had no linking of how strange a fate he had met, for the several hundreds of amperes caused his muscles to seize up, his heart to freeze in a clamped frenzy, and his synapses to discharge in a last vision that burned into his eyes a vision of an incandescent rainbow.

Lissa blinked. The spindly trees looked artificial, but weren't.

Groves of them spiraled around hills, zigzagged up razor-backed ridges and shot down the flanks of denuded rock piles. Hostile terrain for any sort of tree that earthly biologists understood. The trees, she noted, had growing patterns that bore no discernible relation to water flow, sunlight exposure, or wind patterns.

That was why Lissa went in to see. Her team of four had already sent the smart-eyes, rugged robots, and quasi-intelligent processors. Lightweight, patient, durable, these ambassadors had discovered little. Time

for something a bit more interactive on the ground.

That is, a person. Captain Badquor's sacrifice had to mean something, and his death had strengthened his crew's resolve.

Lissa landed with electrically insulated boots. They now understood the piezoelectric ecology in broad outline, or thought they did. Courageous caution prevailed.

The odd beanpole trees made no sense. Their gnarled branches followed a fractal pattern and had no leaves. Still, there was ample fossil evidence—gathered by automatic prospectors sent down earlier—that the bristly trees had evolved from more traditional trees within the past few million years. But they had come so quickly into the geological record that Lissa suspected they were “driven” evolution—biological technology.

She carefully pressed her instruments against the sleek black sides of the trees. Their surfaces seethed with electric currents, but none strong enough to be a danger.

On Earth, the natural potential difference between the surface and the upper atmosphere provides a voltage drop of a hundred volts for each meter in height. A woman two meters tall could be at a significantly higher potential than her feet, especially if her feet had picked up extra electrons by walking across a thick carpet.

On Shiva this effect was much larger. The trees, Lissa realized, were harvesting the large potentials available between Shiva's rocky surface and the charged layers skating across the upper reaches of the atmosphere.

The “trees” were part of yet another way to reap the planetary energies—whose origin was ultimately the blunt forces of gravity, mass and torque—all for the use of life.

The potential-trees felt Lissa's presence quickly enough. They had evolved defenses against poachers who would garner stray voltages and currents from the unwary.

In concert—for the true living entity was the grove, comprising perhaps a million trees—they reacted.

Staggering back to her lander, pursued by vagrant electrical surges through both ground and the thick air, she shouted into her suit mike her conclusions. These proved useful in later analysis.

She survived, barely.

Section 3

When the sum of these incidents sank in, the full import became clear. The entire Shiva ecology was electrically driven. From the planet's rotation and strong magnetosphere, from the tidal stretching of the Centauri system, from geological rumblings and compressions, came far more energy than mere sunlight could ever provide.

Seen this way, all biology was an afterthought. The geologists, who had been feeling rather neglected lately, liked this turn of events quite a bit. They gave lectures on Shiva seismology which, for once, everybody attended.

To be sure, vestigial chemical processes still ran alongside the vastly larger stores of charges and potentials; these were important for understanding the ancient biosphere that had once governed here.

Much could be learned from classic, old-style biology: from samples of the bushes and wiry trees and leafy plants, from the small insect-like creatures of ten legs each, from the kite-birds, from the spiny,

knife-like fish that prowled the lakes.

All these forms were ancient, unchanging. Something had fixed them in evolutionary amber. Their forms had not changed for many hundreds of millions of years.

There had once been higher forms, the fossil record showed. Something like mammals, even large tubular things that might have resembled reptiles.

But millions of years ago they had abruptly ceased. Not due to some trauma, either—they all ended together, but without the slightest sign of a shift in the biosphere, of disease or accident.

The suspicion arose that something had simply erased them, having no further need.

The highest form of life—defined as that with the highest brain/body volume ration—had vanished slightly later than the others. It had begun as a predator wider than it was tall, and shaped like a turtle, though without a shell.

It had the leathery look of the tile-polygons, though.

Apparently it had not followed the classic mode of pursuit, but rather had outwitted its prey, boxing it in by pack-animal tactics. Later, it had arranged deadfalls and traps. Or so the sociobiologists suspected, from narrow evidence.

These later creatures had characteristic bony structures around the large, calculating brain. Subsequent forms were plainly intelligent, and had been engaged in a strange manipulation of their surroundings. Apparently without ever inventing cities or agriculture, they had domesticated many other species.

Then, the other high life forms vanished from the fossil record. The scheme of the biosphere shifted. Electrical plant forms, like the spindly trees and those species that fed upon piezoelectric energy, came to the fore.

Next, the dominant, turtle-like predators vanished as well. Had they been dispatched?

On Shiva, all the forms humans thought of as life, plant and animal alike, were now in fact mere...well, maintenance workers. They served docilely in a far more complex ecology. They were as vital and as unnoticeable and as ignorable as the mitochondria in the stomach linings of *Adventurer's* crew.

Of the immensely more complex electrical ecology, they were only beginning to learn even the rudiments. If Shiva was in a sense a single interdependent, colonial organism, what were its deep rules?

By focusing on the traditional elements of the organic biosphere they had quite missed the point.

Then the Circular Ocean's laser discharged again. The starship was nearer the lancing packet of emission, and picked up a side lobe. They learned more in a millisecond than they had in a month.

A human brain has about 10 billion neurons, each connected with about 100,000 of its neighbors. A firing neuron carries one bit of information. But the signal depends upon the path it follows, and in the labyrinth of the brain there are 1,015 pathways. This torrent of information flows through the brain in machine-gun packets of electrical impulses, coursing through myriad synapses. Since a single book has about a million bits in it, a single human carries the equivalent of a billion books of information—all riding around in a twokilogram lump of electrically wired jelly.

Only 1 to 10 percent of a human brain's connections are firing at any one time. A neuron can charge and discharge at best a hundred times in a second. Human brains, then, can carry roughly 1,010 bits of information in a second.

Thus, to read out a brain containing, 1,015 bits would take 100,000 seconds, or about a day.

The turtle-predators had approximately the same capacity. Indeed, there were theoretical arguments that a mobile, intelligent species would carry roughly the same load of stored information as a human could. For all its limitations, the human brain has an impressive data-store capability, even if, in many, it frequently went unused.

The Circular Ocean had sent discrete packets of information of about this size, 1,015 bits compressed into its powerful millisecond pulse. The packets within it were distinct, well bordered by banks of marker code. The representation was digital, an outcome mandated by the fact that any number enjoys a unique representation only in base 2.

Within the laser's millisecond burst were fully a thousand brain-equivalent transmissions. A trove. What the packets actually said was quite undecipherable.

The target was equally clear: a star 347 light years away. Targeting was precise; there could be no mistake. Far cheaper, if one knows the recipient, to send a focused message, rather than to broadcast wastefully in the low-grade, narrow bandwidth radio frequencies.

Earth had never heard such powerful signals, of course, not because humans were not straining to hear, but because Shiva was ignoring them.

After Badquor's death and Lissa's narrow escape, *Adventurer* studied the surface with elaborately planned robot expeditions. The machines skirted the edge of a vast tileplain, observing the incessant jiggling, fed on the piezoelectric feast welling from the crusted rocks.

After some days, they came upon a small tile lying still. The others had forced it out of the eternal jostling jam. It lay stiff and discolored, baking in the double suns' glare. Scarcely a meter across and thin, it looked like construction material for a patio in Arizona.

The robots carried it off. Nothing pursued them. The tile-thing was dead, apparently left for mere chemical processes to harvest its body.

This bonanza kept the ship's biologists sleepless for weeks as they dissected it. Gray-green, hard of carapace, and extraordinarily complex in its nervous system—these they had expected. But the dead alien devoted fully a quarter of its body volume to a brain that was broken into compact, separate segments.

The tile-creatures were indeed part of an ecology driven by electrical harvesting of the planetary energies. The tiles alone used a far higher percentage of the total energetic wealth than did Earth's entire sluggish, chemically driven biosphere.

And deep within the tile-thing was the same bone structure as they had seen in the turtle-like predator. The dominant, apparently intelligent species had not gone to the stars. Instead, they had formed the basis of an intricate ecology of the mind.

Then the engineers had a chance to study the tile-thing, and found even more.

As a manifestation of their world, the tiles were impressive. Their neurological system fashioned a skein of interpretations, of lived scenarios, of expressive renderings—all apparently for communication outward in well-sculpted bunches of electrical information, intricately coded. They had large computing capacity and ceaselessly exchanged great gouts of information with each other. This explained their rough skins, which maximized piezo connections when they rubbed against each other. And they “spoke” to each other through the ground, as well, where their big, crabbed feet carried currents, too.

Slowly it dawned that Shiva was an unimaginably huge computational complex, operating in a state of information flux many orders of magnitude greater than the entire sum of human culture. Shiva was to Earth as humans are to beetles.

The first transmissions about Shiva's biosphere reached Earth four years later. Already, in a culture more than a century into the dual evolution of society and computers, there were disturbing parallels.

Some communities in the advanced regions of Earth felt that real-time itself was a pallid, ephemeral experience. After all, one could not archive it for replay, savor it, return until it became a true part of oneself. Real-time was for one time only, then lost.

So increasingly, some people lived instead in worlds made totally volitional—truncated, chopped, governed by technologies they could barely sense as ghostlike constraints on an otherwise wide compass.

“Disposable realities,” some sneered—but the fascination of such lives was clear.

Shiva's implication was extreme: An entire world could give itself over to life-as-computation.

Could the intelligent species of Shiva have executed a huge fraction of their fellow inhabitants? And then themselves gone extinct? For what? Could they have fled—perhaps from the enormity of their own deeds?

Or had those original predators become the tile-polygons?

The *Adventurer* crew decided to return to Shiva's surface in force, to crack the puzzles. They notified Earth and descended.

Shortly after, the Shiva teams ceased reporting back to Earth. Through the hiss of interstellar static there came no signal.

After years of anxious waiting, Earth launched the second expedition. They too survived the passage. Cautiously they approached Shiva.

Adventurer still orbited the planet, but was vacant.

This time they were wary. Further years of hard thinking and careful study passed before the truth began to come.

Section 4

[—John/Odis/Lissa/Tagore/Cap'n—]

—all assembled/congealed/thickened—

—into a composite veneer persona—
—on the central deck of their old starship,
—to greet the second expedition.

Or so they seemed to intend.

They came up from the Shiva surface in a craft not of human construction. The sleek, webbed thing seemed to ride upon electromagnetic winds.

They entered through the main lock, after using proper hailing protocols.

But what came through the lock was an ordered array of people no one could recognize as being from the *Adventurer* crew.

They seemed younger, unworn. Smooth, bland features looked out at the bewildered second expedition. The party moved together, maintaining a hexagonal array with a constant spacing of four centimeters. Fifty-six pairs of eyes surveyed the new Earth ship, each momentarily gazing at a different portion of the field of view, as if to memorize only a portion, for later integration.

To convey a sentence, each person spoke a separate word. The effect was jarring, with no clue to how an individual knew what to say, or when, for the lines were not rehearsed. The group reacted to questions in a blur of scattershot talk, words like volleys.

Sentences ricocheted and bounced around the assembly deck where the survivors of the first expedition all stood, erect and clothed in a shapeless gray garment. Their phrases made sense when isolated, but the experience of hearing them was unsettling. Long minutes stretched out before the second expedition realized that these hexagonally spaced humans were trying to greet them, to induct them into something they termed the Being Suite.

This offer made, the faces within the hexagonal array began to show separate expressions. Tapes of this encounter show regular facial alterations with a fixed periodicity of 1.27 seconds. Each separate face ratched, jerking among a menu of finely graduated countenances—anger, sympathy, laughter, rage, curiosity, shock, puzzlement, ecstasy—flickering, flickering, endlessly flickering.

A witness later said that it was as if the hexagonals (as they came to be called) knew that human expressiveness centered on the face, and so had slipped into a kind of language of facial aspects. This seemed natural to them, and yet the 1.27 second pace quickly gave the witnesses a sense of creeping horror.

High-speed tapes of the event showed more. Beneath the 1.27 frequency there was a higher harmonic, barely perceptible to the human eye, in which other expressions shot across the hexagonals' faces. These were like waves, muscular twitches that washed over the skin like tidal pulls.

This periodicity was the same as the tile-polygons had displayed. The subliminal aspects were faster than the conscious human optical processor can manage, yet research showed that they were decipherable in the target audience.

Researchers later concluded that this rapid display was the origin of the growing unease felt by the second expedition. The hexagonals said nothing throughout all this.

The second expedition crew described the experience as uncanny, racking, unbearable. Their distinct impression was that the first expedition now manifested as like the *tile-things*. Such testimony was often followed by an involuntary twitch.

Tapes do not yield such an impression upon similar audiences: they have become the classic example of having to be in a place and time to sense the meaning of an event. Still, the tapes are disturbing, and access is controlled. Some Earth audiences experienced breakdowns after viewing them.

But the second expedition agreed even more strongly upon a second conclusion. Plainly, the *Adventurer* expedition had joined the computational labyrinth that was Shiva. How they were seduced was never clear; the second expedition feared finding out.

Indeed, their sole, momentary brush with [—John/Odis/Lissa/Tagore/Cap'n...—] convinced the second expedition that there was no point in pursuing the maze of Shiva.

The hostility radiating from the second expedition soon drove the hexagonals back into their ship and away. The fresh humans from Earth felt something gut-level and instinctive, a reaction beyond words. The hexagonals retreated without showing a coherent reaction. They simply turned and walked away, holding to the four centimeter spacing. The 1.27 second flicker stopped and they returned to a bland expression, alert but giving nothing away.

The vision these hexagonals conveyed was austere, jarring...and yet, plainly intended to be inviting.

The magnitude of their failure was a measure of the abyss that separated the two parties. The hexagonals were now both more and less than human.

The hexagonals left recurrent patterns that told much, though only in retrospect. Behind the second expedition's revulsion lay a revelation: of a galaxy spanned by intelligences formal and remote, far developed beyond the organic stage. Such intelligences had been born variously, of early organic forms, or of later machine civilizations which had arisen upon the ashes of extinct organic societies. The gleam of the stars was in fact a metallic glitter.

This vision was daunting enough: of minds so distant and strange, hosted in bodies free of sinew and skin. But there was something more, an inexpressible repulsion in the manifestation of [—John/Odis/Lissa/Tagore/Cap'n...—].

A 19th-century philosopher, Goethe, had once remarked that if one stared into the abyss long enough, it stared back. This proved true. A mere moment's lingering look, quiet and almost casual, was enough. The second expedition panicked. It is not good to stare into a pit that has no bottom.

They had sensed the final implication of Shiva's evolution. To alight upon such interior worlds of deep, terrible exotica exacted a high cost: the body itself. Yet all those diverse people had joined the *syntony* of Shiva—an electrical harmony that danced to unheard musics. Whether they had been seduced, or even raped, would forever be unclear.

Out of the raw data-stream the second expedition could sample transmissions from the tile-things, as well. The second expedition caught a link-locked sense of repulsive grandeur. Still organic in their basic organization, still tied to the eternal wheel of birth and death, the tiles had once been lords of their own world, holding dominion over all they knew.

Now they were patient, willing drones in a hive they could not comprehend. But—and here human terms undoubtedly fail—they loved their immersion.

Where was their consciousness housed? Partially in each, or in some displaced, additive sense? There was no clear way to test either idea.

The tile-things were like durable, patient machines that could best carry forward the first stages of a grand computation. Some biologists compared them with insects, but no evolutionary mechanism seemed capable of yielding a reason why a species would give itself over to computation. The insect analogy died, unable to predict the response of the polygons to stimulus, or even why they existed.

Or was their unending jostling only in the service of calculation? The tile-polygons would not say. They never responded to overtures.

The Circular Ocean's enormous atmospheric laser pulsed regularly, as the planet's orbit and rotation carried the laser's field of targeting onto a fresh partner-star system. Only then did the system send its rich messages out into the galaxy. The pulses carried mind-packets of unimaginable data, bound on expeditions of the intellect.

The second expedition reported, studied. Slowly at first, and then accelerating, the terror overcame them.

They could not fathom Shiva, and steadily they lost crew members to its clasp. Confronting the truly, irreducibly exotic, there is no end of ways to perish.

In the end they studied Shiva from a distance, no more. Try as they could, they always met a barrier in their understanding. Theories came and went, fruitlessly. Finally, they fled.

It is one thing to speak of embracing the new, the fresh, the strange. It is another to feel that one is an insect, crawling across a page of the *Encyclopedia Britannica*, knowing only that something vast is passing by beneath, all without your sensing more than a yawning vacancy. Worse, the lack was clearly in oneself, and was irredeemable.

This was the first contact humanity had with the true nature of the galaxy. It would not be the last. But the sense of utter and complete diminishment never left the species, in all the strange millennia that rolled on thereafter.

The Year of the Mouse

NORMAN SPINRAD

Norman Spinrad is one of the most interesting of all SF writers, a major force in the field from the 1960s to the present. He has lived in Paris, France, for the last ten years or more. He grew up in New York, worked in high school on the same literary magazine that Samuel R. Delany did later, hung out in Greenwich Village with the beatniks, then worked at the Scott Meredith literary agency, sold fiction to John W. Campbell at *Analog*, but also was a sparkling figure in the new wave and published his major, controversial novel, *Bug Jack Barron*, in *New Worlds*, moved to California in the late '60s and wrote a *Star Trek* script...you get the idea. He has been a commentator on SF for decades, and a leading critic in *Asimov's* in recent years. In 1998 *Asimov's* finally got its own web site and is posting Spinrad's *On Books* columns there after initial magazine publication. He once told me an anecdote about being arrested in Disneyland and taken to the Mickey Mouse jail. That may or may not have something to do with the genesis of this story, or with his feelings about the Disney organization. This work was originally commissioned and published by the French national newspaper *Liberation*, then published in *Asimov's*. It is Spinrad's only SF story in the last couple of years. This is first-rate satire, extending that tradition that flowered in the 1950s, that was perhaps the center of '50s SF, into the late '90s.

“Mess not with the Mouse.”

“*Mess not with the Mouse?* We fly you to California *business* class and install you in a luxurious hotel in Anaheim and when you are summoned to give an account of the situation, you spout degenerate Taoist crypticisms?”

Xian Bai managed to resist the impulse to tug at the tight collar of his dress shirt, so uncomfortable after two weeks in Southern California, where even high level executives felt free to attend meetings in casual attire.

“This is not a Taoist epigram,” he explained. “It is a precept common in high American corporate circles, where it is thought highly unwise to arouse the ire of the Disney Corporation.”

Had the Deputy Minister for Overseas Cultural Relations been a Long Nose, his pale white skin would no doubt have turned crimson with rage. Despite the handicap of the lack of this Caucasian ability, he managed to make his displeasure clear enough by banging his hand on the desk with sufficient force to rattle the tea service.

“And what is the People's Republic of China, some Banana Republic owned by the United Fruit Corporation?” the Deputy Minister shouted. “We are a billion and a quarter people! We are the largest and fastest growing market in the world! We have the world's largest army! We have nuclear missiles! How dare the Mouse presume so outrageously to mess with *us!*”

He calmed himself with a sip of tea and regarded Xian Bai with a colder species of outrage. “You *did* make this clear with sufficient force?”

“Indeed I did!” Xian Bai was constrained to reply firmly.

But he was dissembling. Two weeks in Anaheim to obtain a meeting with a Vice President in charge of overseas marketing and the results of that conversation had been enough to convince him that such force did not exist.

“Get real, Xian,” that individual had advised him. “The idea that the Yellow Peril was gonna storm the beaches at Orlando went out with Ronald Reagan. What are you gonna do, nuke *Pirates of the Caribbean?*”

“But China is the largest consumer market in the world—”

“And you guys have been screwing us out of it since that Dalai Lama film dust-up that cost Ovitz his job and us a bundle for the golden parachute! You guys made a real bad career move.”

The Disney Vice President glanced heavenward.

“You pissed Michael off.”

“And this film is your vengeance?”

The Disney Vice President grinned like the Lion King.

“The bottom line,” he said, “is always the best revenge.”

The minions of the Mouse had not been reticent in allowing Xian Bai to attend a preview screening of *The Long March*, though at the reception afterward—white wine, simple dim sum, lo mein noodles,

barbecued spare ribs—a disgruntled American reporter had complained that this was the “B-list” screening, those privileged to enjoy “A-list” prerogatives being treated to lobster, caviar, and champagne.

This mattered not to Xian Bai, since the film itself had quite destroyed his appetite—being an animated cartoon version of the heroic Long March of the Chinese Revolution, dripping with syrupy music, festooned with Busby Berkeley Choreography, and featuring Chou En Lai as a fox, Chiang Kai Shek as a mongoose, the People's Army as happy ants, and starring *Chairman Mao* himself as a grinning and rather overweight panda.

“You *do* realize that the premiere of this atrocity in the United States will result in the immediate and permanent closure of the Chinese market to all your enterprises,” Xian Bai informed the Disney Vice President as he was instructed to do.

“No problem, guy, you want us to premiere *The Long March* in China, you've got it.”

“You cannot seriously expect to ever release this film in China!”

“Better inside the tent pissing out, than outside the tent pissing in, in the immortal words of Lyndon Johnson.”

“This means what...?”

“It means that one way or the other, we *will* crack open the Chinese market, but we don't need it to make the numbers golden. *The Long March* cost less than fifty million to make, negative and promo costs still keep the total under a hundred, and we've already laid off twice that on the merchandising rights! So the film's in the money before we even release it. We figure Mao the stuffed panda alone will gross enough this Christmas to cover the whole production budget!”

“You...you plan to market *Chairman Mao* as stuffed panda?” Xian Bai considered himself an apolitical modern Chinese pragmatist, but this was too much even for him.

“The kids we ran the marketing tests on *loved* it. Mao Tze Tung's gonna be ten times more popular as a panda doll than he ever was in the flesh.”

The Disney Vice President leaned closer. “If I let you in on something *really* hot, can you keep a secret?” he said conspiratorially.

“I can make no such commitment...”

The Disney Vice President shrugged. “Well, what the hell, it's a fait accompli anyway. We've decided to stop renting out our characters to front other people's fast food franchises, and get into the business ourselves. Mickey and Donald and the old gang are tied up in long term contracts, but Mao the Panda—”

“You cannot be serious!”

“I *know* what you're thinking, dumb move, the market's oversaturated with hamburger and pizza and taco and fried chicken chains already. But...*nobody's doing Chinese!* Panda Pagodas in every shopping mall in the world! Fronted by Mao the Panda himself! We'll hang poor Ronald McDonald from his own Golden Arches!”

Even the edited and explicated version of this conversation was difficult for the Deputy Minister for Overseas Cultural Relations to comprehend.

“How can they expect to get away with this affront to the Middle Kingdom?” he demanded. “How can the American government permit this? You did make it clear that we may retaliate against other American corporations as well?”

Xian Bai nodded miserably.

“And?” demanded the Deputy Minister.

Xian Bai took a deep breath, fixed his gaze upon the desktop. “They...they issued their own ultimatum.”

“*An ultimatum?*” whispered the Deputy Minister, clearly dumbfounded.

“The People's Republic of China must allow *The Long March* to open simultaneously in no less than one thousand theaters nationwide with Disney to retain sixty percent of the gross, must cede the necessary real estate for the establishment of no less than one thousand Panda Pagodas, plus Disneyworlds in Shanghai, Peking, and Hong Kong, and grant a one hundred percent tax abatement for a period of fifty years on these properties, or...”

“Or?”

“Or, I was told, the Mouse shall roar, Uncle Scrooge will dip into his money bin, Dumbo will fly, and the Big Bad Wolf will huff and puff and blow our house down!”

At first, it appeared that vast black storm-fronts were approaching China from several directions, then trepidation turned to bemused delight as the black clouds resolved into thousands upon untold thousands of kites.

Black kites. All identical.

All in the form of the happily grinning face of the world-famous Mouse.

No, not kites—

“Balloons!” shouted the Deputy Minister For Overseas Cultural Affairs. “Millions upon millions of them floating gently down from the skies all over China!”

“Amusing,” said Xian Bai, “but I don't—”

“*Amusing!*” screamed the Deputy Minister, reaching into a pocket and extracting a deflated version of the apparently offending item. “They deflate in a moment to the size of a poor man's wallet! They reinflate with a few puffs of air!”

This ability he then proceeded to demonstrate, producing an example of the head of the famous Mouse somewhat larger than a soccer ball.

“Do you realize what this is, you imbecile?” he demanded.

Xian Bai regarded the grinning balloon face in perplexity. All seemed quite ordinary, except for the bulb at the end of the long white rodent's muzzle, which, instead of the traditional black ball, seemed to be a small silvery packet of some sort of electronic circuitry....

“*This,*” said the Deputy Minister, poking Xian Bai's nose with that of Mickey, “is a satellite television antenna!”

If somewhere the spirit of Chairman Mao might be scowling down unhappily on this spectacle, surely that of Deng Shao Ping would approve, Xian Bai told himself, and at any rate Mao the Panda smiled down benignly on his enterprise from atop the steeped entrance as he cut the ribbon to open his fifth Panda Pagoda.

After all, as Lenin himself had pointed out, you can't make a revolution without breaking eggs, though in this case the standard recipes supplied in *Mao the Panda's Little Red Book* were admirably parsimonious with this relatively expensive ingredient.

Xian Bai, partly as punishment, and partly because there was no one more experienced to dispatch, had been sent back to Anaheim to confront the minions of the Mouse. This time, however, it was a cut-rate charter flight and a grim motel in Santa Ana, and when he finally penetrated the bureaucratic layers to the Vice Presidential level, he found himself dealing with the legal department, with what the natives called a "Suit," a hard-eyed fellow replete with tie and wire-rim glasses.

"No international laws, treaties, or conventions were violated," Xian Bai was told firmly. "The balloon antennas were released in international airspace."

"And just *happened* to drift en masse over China?"

The Suit shrugged. "An act of God," he said. "You could try suing the Pope, I suppose—I could give you my brother-in-law's card—but you'll get nowhere with us."

"Even though the only channel the balloon antennas will receive is the Disney Channel? Which just *happens* to have begun broadcasting in Mandarin and Cantonese?"

"The satellite is in geosynchronous orbit, which is international territory. We have a legal right to broadcast whatever we like in whatever languages we choose."

"But it's illegal for Chinese citizens to own satellite dishes. It's illegal for Chinese citizens to watch foreign broadcasts!"

The Suit displayed a porcelain crocodile grin that was a perfect example of the Beverly Hills dentist's art. "That's *your* problem," he said. "'Our problem is your refusal to allow us to release *The Long March* in China and rake in the profits from the merchandising tie-ins and Panda Pagodas."

The grin vanished, but the crocodile remained.

"And unless *our* problem evaporates by the film's international release date," said the Suit, "*your* problem is going to get a lot worse."

"Worse....?" stammered Xian Bai.

How could it get worse? There was no way to confiscate the millions of balloon antennas—at the approach of the police, they were just deflated and hidden away, to be redeployed the moment it was safe. Millions upon millions of Chinese were watching broadcasts from the Disneyworlds, cartoons and feature-length animated films, endless trailers for *The Long March*, endless commercials for the tie-in merchandising, endless promotions for the Panda Pagodas. The demand for the opening of China to the minions of the Mouse was building to a frenzy.

According to the latest public opinion polls, fortyone million Chinese people already believed that Mao Tze tung had been born with black and white fur.

“*Much* worse,” said the Suit. “We could give free air time to the Dalai Lama. We could broadcast clips of the Tien An Mien massacre with music by Nine Inch Nails. We could subject your people to reruns of old Charlie Chan movies. And if none of that worked, there's always the ultimate weapon....”

“The....ultimate weapon....?”

“We broadcast the first twenty minutes of *The Long March* in clear, scramble the rest of it, force everyone in China to buy expensive decoders to see it, and blame the Communist Party.”

The crocodile grin returned.

“Do you *really* believe any government could retain the Mandate of Heaven after that?”

“Mess not with the Mouse....” sighed Xian Bai.

“Not a good career move at all,” agreed the Suit. “On the other hand, in return for say five percent of the gross, I could aid *you* in making a sweet one. In the words of Mao the Panda, one hand washes the other.”

Well, the Chinese people had not survived several thousand years of turbulent history without paying due attention to the sacred bottom line. Indeed one might argue that the bottom line, like most else, had been a Chinese invention. Especially when there was rich profit to be made in convincing yourself that it was true.

And for those Panda Pagoda franchisees who had trouble swallowing that one, *Mao the Panda's Little Red Book*, in return for the Mouse's thirty percent of the gross, provided more than standard recipes and accounting procedures, it provided an ideological rationale.

Fast food was, after all, a Chinese invention itself. Dim sum, wonton soup, noodles, and stir-fried vegetables with a bit of meat, were quicker to make, tastier, ecologically more benign, and far more nutritious than hamburgers, pizzas, and greasy fried chicken parts.

And since the ingredients were much cheaper, the profit margin was higher too.

Today China, tomorrow the world, promised Chairman Mao the Panda.

And what did it matter if *Mao the Panda's Little Red Book* had appropriated the epigram from Confucius or Lao Tze or the Buddha himself if Chairman Mao the Panda's words had the ring of truth?

The wise man does well by doing good.

It was enough to keep Xian Bai smiling all the way on his frequent visits to the bank.

The Day Before
They Came

MARY SOON LEE

Mary Soon Lee grew up in London, got an MA in mathematics, and later an MS in astronautics and space engineering. “I have since lived in cleaner, safer, quieter cities,” she says, “but London is the one that I miss.” She moved to Cambridge, Massachusetts, in 1990 and then to Pittsburgh, Pennsylvania, where she splits her time between writing short stories and acting as a computer consultant to an artificial intelligence company. She has published more than thirty stories in the 1990s. She also runs a local writing workshop, the Pittsburgh Worldwrights. This story is from *Interzone*, a source for nearly a

quarter of the stories in this book this year, and as this is written, the work is nominated for the British Science Fiction Association Award for best short SF story of 1998. It is a concise, effective piece of storytelling by misdirection, an evocation of the everyday anxiety of living in the future.

The morning before the aliens came, Molly Harris busied herself preparing her son's lunch-box. Since it was a Friday, Justin would be going to school in person for his social skills classes. Molly put a generous handful of cherries into the lunch-box. Even the vat-grown cherries cost more than she could really afford, but she wanted Justin to have a treat to swap with the other second-graders.

Most of the younger mothers Molly knew worried when their kids went to school, checking the germ count hourly, scared their children might come home with a bruise, or a scrape, or a runny nose. But Molly had been 53 when Justin was born, and she remembered when classroom violence meant knives and guns, the way her heart had thudded during the weekly bomb drill.

So instead of worrying about Justin on Fridays, Molly worried about him on Monday through Thursday. She would peek into his bedroom as she moved around the apartment. No matter how absorbed Justin looked, the tip of his tongue sticking out as the computer led him through a problem, Molly couldn't convince herself that it was right for a child to spend hours on end netted-in.

A terrible din erupted from Justin's bedroom: screeches and bleats, neighs and howls and squawks. Molly slapped her hands over her ears. She had bought Justin the Noah's Ark alarm clock for his sixth birthday, a year ago.

The din subsided for a moment, but Molly wasn't fooled. She kept her hands pressed to her ears as the alarm clock exploded into the deep bass trumpet of the elephants. In the silence that followed, Molly wiped her hands on her apron, then reached for the peanut butter jar.

Sounds of hasty splashing came from the bathroom, followed by bare feet running toward her. Two thin brown arms, somehow sticky despite the bathroom expedition, wrapped themselves around Molly's waist.

"Morning, Mom."

"Good morning, Justin." She stared down at the top of her son's head, pressed tight against her stomach, his fine black hair tousled.

"It's my birthday tomorrow."

"Really? I don't believe you."

Justin let go of her, and rolled his eyes exaggeratedly. "Yes, you do. You do, you do."

"I do," said Molly, wishing he had hugged her a little longer. "Tomorrow's your birthday and we're going to the water park. But today you have to go to school."

"Uh huh." Justin poured the milk onto his cereal, holding the milk carton with both hands, and managing not to spill any.

Breakfast took less than five minutes, and then Justin clattered down the staircase ahead of her, down the four flights to the porch to wait for the school bus.

The bus came early. One quick hug, and Justin scrambled on board.

The afternoon before the aliens came, Molly went birthday shopping. The city tax paid for glass roofs over the downtown streets. Molly told herself she approved of such a sensible precaution against the ultraviolet, but the enclosed air seemed stale despite the constant whirl of fans, and the filtered sunlight seemed somehow flatter.

Molly spent half an hour choosing new swimming trunks for Justin. She couldn't decide between a pair covered with dapper penguins and another pair with plain blue and yellow stripes. Six months ago she would have bought the penguins without hesitation, but perhaps Justin would think them too childish now.

She tried to remember what his best friend, Adam, had worn the last time she took the two of them to the water park. Something simple she thought. She paid for the blue and yellow striped trunks, secretly yearning for the penguins.

Outside again, the air temperature fixed at the calculated summer optimum, warm but not hot. Perversely Molly wished the system would break down, even for an hour or two, just long enough for a mini heat wave. She paused for a minute, remembering playing on the beach one summer holiday. The sun had burnt the back of Molly's neck, too hot, too bright. Her face had stung from blowing sand. And yet everything sparkled, the very air buoyant, as if she breathed in tablespoons of undiluted joy.

People surged past Molly as she stood there on the downtown street. She pulled herself together with a shrug. She would have loved to take Justin to the beach, but no use dwelling on it now.

She set off again, heading for the AI store. She knew how much Justin wanted a pair of AI shoes, but even though most of his class had them by now, he had only asked for them once. When Molly had told him they cost too much for her to buy, he bit his lip and never asked again.

So two months ago, Molly had canceled her subscription to the interactives, making do with ordinary TV, and she thought she had saved enough to buy Justin his shoes.

Entering the AI store, Molly blinked. The floor, ceiling, and walls were velvet black. Glowing holograms danced to either side, marking the corridors. Molly took one cautious step forward.

“Can I be of assistance?” A caterpillar-shaped mechanical appeared in front of her. The mechanical raised the front of its long body until its head was level with her chest, its silvered skin gleaming.

“I'm looking for AI shoes.”

“Please follow me.” The mechanical started down a corridor, turning its head to check she was following. It stopped by a vast array of shoes. “First select a shoe style, and then I will demonstrate our selection of AI personalities.”

Molly nodded, trying to look as if she came to shops like this every day. Sandals and ballet shoes, ice-skates and boots and babies' booties stretched before her. After a long pause, she pointed at a pair of orange sneakers.

“How much are those ones?”

“Eighty dollars, without any program installed. Did you have a particular AI personality in mind for the shoes?”

“No. They're for my son. He's turning seven.”

“Perhaps an educational supplement?” The mechanical lifted its forelegs to a small keyboard, and typed in a command.

The left sneaker twitched. “What’s two times twenty-six?” asked the orange shoe.

Molly said nothing. The mechanical made throatclearing noise, thought she knew it didn’t really have a throat. “Fifty-two,” said Molly.

“That’s right!” said the shoe. “What a clever girl!”

The right shoe twitched beside it. “Two times twenty-six is fifty-two, and do you know how many states there are in America?”

“Fifty-two,” said Molly. She looked at the mechanical. “I wanted something a little more fun.”

The mechanical keyed in another command.

“Let’s all sing to the sing-along-song,” sang the two orange sneakers.

Molly shook her head. “Definitely not.”

She declined the next dozen offerings. The cops and robbers program amused her, but she had overheard Justin and Adam discussing how old-fashioned police games were. Finally she settled on a program with no gimmicks at all. The left shoe and the right shoe just chatted away as if they were children; the left shoe, Bernie, was a little bossier, the right shoe, Alex, seeming shyer.

The mechanical wrapped up the shoes in orange tissue paper inside an orange box, explained how to switch off Alex and Bertie’s voices, and assured her the program automatically deactivated during school hours.

Molly clutched the gift-wrapped shoe-box to her all the way home on the bus, picturing Justin’s reaction the next morning.

The evening before the aliens came, Justin was hyperactive, overexcited about his coming birthday. Molly gave him a mug of hot milk, hoping it might calm him. But still Justin scaled Mount Everest (the sofa and the shelves beside it), using his scarf and six kitchen forks as equipment.

“But what if my birthday doesn’t come?” demanded Justin, as he sat triumphantly atop the mountain peak, having retraced Sir Edmund Hillary and Tenzing Norgay’s route along the Southeast Ridge.

“Of course your birthday will come, silly.”

“What if there’s a fire, and my presents are burned?”

“There won’t be a fire,” said Molly, lifting Justin up and sitting him on her lap, back down at first camp.

“But if there were a fire, I’d get you more presents. I promise. And now it really is time for bed.”

“Just five more minutes, Mom. Please.”

“Okay,” said Molly, and watched him set off on a second ascent of Everest. She would have liked to have someone to share Justin with, to sit beside on the sofa while Justin played, to talk to when Justin fell asleep. Justin had aunts and uncles, but that wasn’t the same.

Molly had waited till she was past 50 before she realized Mr. Right might never arrive. Her sister had accompanied her to the family planning clinic, waited patiently while the official checked that Molly hadn't already used up her one-child quota. Then Molly and her sister picked a father from the database, a gentle-eyed biochemist, with long fingers and a talent for playing the cello.

Molly knew it was silly, but from time to time she dreamed about Justin's father, wanting to tell him all about his son. She checked her watch. "Time to sleep."

She tucked Justin into bed, read him a chapter from *Watership Down*, kissed him once, trying to hold onto the moment as she had tried to hold onto every moment of his childhood, forcing herself to let go until the morning.

The night before the aliens came, Molly watched two mediocre comedy programs on TV, then got up to make a mug of cocoa as the late night news came on. She heard something about a group of meteors detected by the deep solar tracking system. Half-curious, thinking about the shooting stars she'd seen one night a decade ago, she wandered back to the living room.

A triangular formation of blue and green dots flickered on the TV screen, somewhere out past Saturn, according to the newscaster. *Past Saturn*. For a moment, Molly rolled the words around in her mind; it sounded like the start of a fairy tale, "Far, far away..."

With a shake of her head, Molly turned off the TV. Time for bed. She knew Justin would be up early tomorrow. She paused by Justin's room, opened the door a crack for one last peek at her son, fast asleep. Silently she closed the door.

This Side of
Independence

ROB CHILSON

Rob Chilson has been publishing SF for more than thirty years. He sold his first SF in 1968 to John W. Campbell at *Analog*, and has published seven SF novels, of which *The Shores of Kansas* (1976) is perhaps the best known. He is a knowledgeable and talented craftsman who writes thoroughly professional science fiction. This story first appeared in *F&SF*, which had a strong year as well (though much of the strongest fiction was fantasy), and provided three of our selections this year. It is a tale of the distant future, when humanity is no longer tied to the planet Earth. It is an interesting comparison, in respect to its vision of the distant future of humanity, to the Geston story, below.

They were taking up Kansas in big bites.

Geelie hovered above, detached, observing. Stark night cloaked the world under a shrunken sun, save for the pit, where hell glared. Magma glowed in the darkness where the rock, hectares wide, crumbled in the gravitor beam. Shards of the world upreared, uproared, black edged with glowing red, and lofted into the groaning air, pieces of a broken pot. The bloody light spattered on the swag-bellied ships that hung above—crows tearing at the carcass with a loud continuous clamor. Pieces of the planet fell back and splashed in thunder and liquid fire, yellow and scarlet. Old Earth shuddered for kilometers around.

The glare, the heat, the tumult filled the world. But from a distance, Geelie saw, it was reduced to a cheerful cherry glow and a murmur of sound, lost in the endless night. In her long view, Kansas was a vast sunken plain of contorted rock, dusted with silent snow under a shaded sun.

“Aung Charah in *Tigerclaw* to Goblong Seven,” Geelie's speaker said.

“Goblong Seven to Aung Charah,” she said.

“Geelie, take a swing around the south side of the working pit and look at the terraces there. I think the magma is flowing up on them.”

“Hearing and obedience.”

Kansas was a hole walled with stairsteps of cooled lava, terraced for kilometers down to the pit of hell. As fast as the rock froze, it was torn off in hectare-sized chips, to feed the hungry space colonies.

Geelie swung her goblong and swooped down and around the work site. She peered intently in dimness, blinded by the contrast. The magma was definitely crawling up on the lower terrace of cooled rock.

“It's slow as yet,” she reported, sending the teleview to Aung Charah.

“We'll have to watch it, however, or we'll have another volcano. Check on it frequently,” he told her.

“Hearing and obedience,” Geelie said. She leaned forward to peer up through the windscreen.

The Sun was a flickering red candle, the cherry color of the magma. As she watched, it brightened; brightened; brightened again, to a dazzling orange. Then it faded, paused, recovered—briefly showed a gleam of brilliance that glimpsed the black rock below, streaked with snow. Then it faded, faded further, almost vanished.

The Sun was a candle seen through a haze of smoke. But each drafting mote was a space colony with solar panels extended, jostling in their billions jealously to seize the Sun. One by one, the planets of old Sol had been eaten by the colonies, till only Earth was left, passed into the shades of an eternal night.

And now the Old World's historical value had been overridden by the economic value of its water, air, and rock. Also, its vast gravity well was a major obstacle to space traffic.

Noon, planetary time, Geelie thought.

She took her goblong in a long sweep around the work site, occasionally touching the visual recorder's button. Her Colony, Kinabatangan, was a member of The Obstacle-Leaping Consortium; she was part of Kinabatangan's observer team.

A gleam of light caught her eye, and she looked sharply aside. East, she realized. Puzzled, she looped the goblong back again more slowly and sought for the gleam. She found it, but it immediately winked out.

That was odd, she thought. A bright light, yellow or even white—surely artificial—on the highlands to the east. That was disputed land, it was not yet being worked. Perhaps, she thought, observers had set up a camp on the planet.

She called Aung Charah and reported, got permission to check it out. “If I can find it,” she said. “The light is gone again; door closed, perhaps.”

“I'm having Communications call; I'll keep you informed,” Aung Charah said.

She acknowledged and cruised as nearly straight as she could along the beam she'd seen. Presently the land mounted in broken scarps before her, vaguely seen in the wan bloody light of the Sun. Vast masses of shattered rock, covered with snow or capped with ice, tumbled down from the highlands. Missouri, that was what its uncouth name had been, Geelie saw, keying up her map.

At this point there'd been a great sprawling city, Kansas City by name, more populous than a dozen colonies. The parts which had straggled over the border had been mined and the once vertical scarp had collapsed. East of the line, everything this side of Independence on her map had fallen into the hole that was Kansas.

“Aung Charah in *Tigerclaw* to Geelie in Goblong Seven,” said her speaker. “Communications reports no contact. We have no report of anyone in that area. Behinders?” Dubiously.

“Unlikely. However, I am checking. Goblong seven out.”

It was three hundred years since stay-behind planetarians had been found on the mother world. Considering how bleak it now was, Geelie considered them extremely unlikely, as by his tone did Aung Charah.

She cruised slowly over the tumbled mounds of snow-covered rubble that marked the old city. Kilometers it extended, and somehow Geelie found that more oppressive even than the vast expanse of riven rock behind her. She could not imagine the torrents of people who must have lived on this deck. The average Colony had only a hundred thousand.

She peered into the dimness. The rubble showed as black pocks in the blood-lit snow. Presently she came to hover and pondered.

Possibly she'd seen a transitory gleam off a sheet of transpex or polished rock or metal in the old city, she thought. But the color was wrong. No. She'd seen a light. Perhaps there were commercial observers here from a different consortium—not necessarily spying on The Obstacle-Leaping Consortium. There might be many reasons why commercial observers would want to keep secret.

Infrared, she thought. The goblong wasn't equipped with IR viewers, but Aung Charah had given her a pair of binox. She unharnessed and slipped into the back for them. And a few minutes later she saw a plume of light against the chill background.

It leaked in two dozen points from a hill of rubble a kilometer away. Geelie got its coordinates and called Aung Charah to report.

“I'm going to go down and request permission to land.”

“Of course this ‘Missouri’ is not part of our grant,” Aung Charah said. “They—whoever they are—will probably have a right to refuse. Do nothing to involve us legally.”

“Hearing and obedience.”

Geelie sloped the goblong down, circled the mound, presently found a trampled place in the thin snow and kicked on her lights. Aiming them down, she saw footprints and a door in an ancient wall made of clay brick, a wall patched with shards of concrete glued together. The mound was a warren, a tumble of broken buildings run together, with forgotten doors and unlighted windows peering from odd angles under a lumpy, snow-covered roof.

She sent back a televue, saying, “I wonder if this is an observers' nest after all.”

“Any answer on the universal freqs?”

“One moment.” She called, got no answer. “I'm going to land without formal permission and bang on the door.”

“Very well.”

Geelie landed the goblong, leaving its lights on, and slipped into the back. She pulled her parka hood forward, drew on her gloves, and opened the door. A breath of bitter cold air entered, making her gasp. Ducking out, she started for the door.

Movement caught her eye and she looked up, to see a heavily bundled figure standing atop a pile of rubble by the wall.

“Hello!” she called.

“Hello,” came a man's voice. He was not twice as thick as a normal human, she saw—he was simply wearing many layers of cloth against the biting cold.

Geelie exhaled a cloud of vapor, calming herself. So crudely dressed a man had to be a hinderer—and who knew how he would react?

“I-I am Geelie of Kinabatangan Colony, a member of The Obstacle-Leaping Consortium. Permission to land?”

“What? Oh, granted. That would be you, working over there in Kansas?” His tone was neutral, if guarded. His accent was harsh, rasping, but not unintelligible.

“Yes.”

“What brings you here? Will you now begin on Missouri?”

“No,” she said. “Missourah,” carefully pronouncing it as he had, “is disputed by a number of consortiums and wrecking companies. It will be years before they have settled that dispute.”

“That's good to hear,” said the other, and moved. With a dangerous seeming scramble, he slid down from the rubble pile.

Confronting her, he was a head taller than she, and very pale, a pure caucasoid type, in the light from her goblong. He even had the deep blue eyes once confined to caucasoids, and his beard was yellow.

“Name's Clayborn,” he said, proffering his hand. “Enos Clayborn.”

She squeezed and shook it in the European fashion. “Pleased to meet you, U—er, Mr. Clayborn.”

“Won't you come in out of the cold?” he asked, gesturing toward the door.

“Thank you.” She followed him gratefully. The bleakness more than the cold chilled her.

The door opened, emitting a waft of warm air that condensed into fog. Geelie stepped in, inhaling humidity and the smell of many people, with an undertone of green plants. It was like, yet unlike, the air of a Colony; more people, less plants, she thought; not so pure an air. She was standing in a vestibule with wooden walls covered with peeling white paint; overhead a single square electrolumer gave a dim yellowish light.

Clayborn fastened the door behind her and stepped past her to open the other door, gesturing her through it. Pushing her hood back, Geelie opened her parka as she entered a room full of tubs of snow, slowly melting; piles of wooden boards; piles of scrap metal; shelves full of things obviously salvaged from the ruins; an assortment of tools. Beyond this was yet another door, opening into a large, brightly lit room full of furniture and people.

“Enos is ba—Enos has brought someone!” “Enos has brought a stranger!” “A strange woman!” The exclamations ran through the room quickly, and a couple of people slipped out. Moments later, they and several others returned.

“Folks, this is Geelie of—of—?” Clayborn turned to her.

“Kinabatangan Colony,” Geelie said. Old people, she thought. “Observer of The Obstacle-Leaping Consortium.”

“Those are the ones mining Kansas,” Clayborn said. “Geelie tells me that they won't start mining Missouri” (pronouncing it differently, she noticed) “for quite a few years yet.”

Clayborn in his mid-twenties was the youngest person in the room, she saw. The next youngest were four or five hale middle-aged sorts with gray in their hair, perhaps twice his age, and ranging up from there to a frail ancient on a couch, big pale eyes turned toward her and a thin wisp of cottony hair on a pillow. A dozen and a half at most.

“How long have you been here?” she asked, marveling.

“Forever,” said one of the white-haired oldsters drily. “We never been anywheres else.”

Geelie smiled back at their smiles. “I am awed that you have survived,” she said simply, removing her parka and gloves.

“This is our leader, Alden,” said Clayborn, pulling up a chair for her.

“The last hundred years was the worst,” said Alden.

The behinders, having overcome their shyness, now crowded forward and Clayborn introduced them. Geelie bowed and spoke to all, shook with the bolder ones. When she seated herself, one of the women handed her a cup on a European saucer. She looked at them with awe, reflecting that they must be a thousand years old.

“Brown,” she heard them murmur. “Brown. Beautiful—such a nice young woman. Such beautiful black hair.”

She sipped a mild coffee brew and nodded her thanks. “The last hundred years?” she said to Alden. “Yes, it must have been.”

For over nine hundred years Earth had been in partial shadow and permanent glaciation, but the Sun still shone. Then the greedy colonies broke their agreements and moved massively into the space between the Old World and the Sun. Earth passed into the shadows, and shortly thereafter they began to disassemble it.

“Course, our ancestors laid in a good supply of power cells and everything else we'd need, way back when Earth was abandoned by everybody else,” Alden said. “No problems there. But how much longer will the air last?”

“Oh, maybe another hundred years,” she said, startled. “Freezing it for transport is a slow process.”

“And the glaciers? They came down this way back when the Sun shone bright.”

Geelie smiled, shook her head. “It's so cold now that even the oceans are freezing over, so the glaciers can't grow by snowfall. Also, frankly, the glaciers were the first to be mined; that much fresh water was

worth plenty. Of course the oceans are valuable too, and they have been heavily mined also.”

“The snowfall gets thinner every year,” said Clayborn. “We have to go farther and farther to get enough. Soon we’ll be reduced to thawing the soil for water.”

Geelie’s response was interrupted by the discreet beeping of her wrist radio. She keyed it on. “Aung Charah in *Tigerclaw* to Geelie in Gobloug Seven,” it said in a tiny voice, relayed from the gobloug.

“Geelie to Aung Charah,” she said into it. “I have received permission to land and am with a group of native Earthers.”

“Behinders,” said Alden drily.

She flashed him a smile and said, “Behinders, they call themselves.”

“Er—yes,” said Aung Charah, sounding startled. “Er—carry on. Aung Charah out.”

“Hearing and obedience. Geelie out.”

“Carry on?” Alden asked.

Geelie sobered. She had been excited and amazed at meeting these people and had not thought ahead. “Well,” she said. “He represents the Consortium and dares not commit it. You are not his problem.”

“We never thought of ourselves as anybody’s problem,” said Alden mildly. “More coffee?”

Geelie bowed to Lyou Ye, who stood to respond, then reseated herself behind her desk and frowned.

“Behinders,” she said. “They must be the very last. It’s been what, three hundred years since any have been found, that lot in Africa.” She looked sharply at Geelie. “Aung Charah is right, they’re the problem. They live in ‘Missouri,’ however it’s pronounced, outside our grant. They’re the problem of the Missouri Compact.”

“But those people won’t settle their disputes for years, possibly decades,” said Geelie. “We can’t just let these behinders die.”

Lyou Ye glanced aside, frowning, and tapped her finger. She’d come a long way, Geelie knew, in a short time. A very beautiful woman, ten years older than Geelie, with waving masses of dark red hair and the popular tiger-green eyes contributed by gene-splicing, she was commonly called Ma Kyaw, “Miss Smooth.” But she was intelligent and fully aware of the power of public opinion.

“Very well, if you can find a Colony willing to sponsor them, I’ll authorize shipping to lift them out,” Lyou Ye said abruptly. “It won’t take much, fortunately, by your description. Declining population ever since the Sun was shaded, I take it, with only this ‘Enosclayborn’ in the last generation. They’d have ended soon enough. You found them just in time for him,” she added. “He’s probably still a virgin.”

“I’d personally like to thank Geelie for all the time and trouble she’s put in for us, her and all her folks,” said Alden.

Geelie flushed with pleasure as they applauded her.

“Now, I'll just ask for a show of hands,” Alden continued. “All them that's in favor of flyin' off into space to a colony, raise your hand.”

Geelie leaned forward eagerly.

There was a long pause. The behinders turned their faces to each other, Geelie heard a whisper or two, some-one cleared a throat. But no one looked at her.

Alden stood looking around, waited a bit, then finally said, “Don't look like there's anybody in favor of the city of Independence movin' into a colony. But that don't mean nobody can go. Anybody that wants to is naturally free to leave. Just speak to me, or to Miss Geelie here.”

Shocked, horrified, Geelie looked at them. Someone coughed. Still no one looked at her. She turned a stricken gaze on Enos Clayborn. He looked thoughtful but unsurprised. And he had not raised his hand.

So silent was the room that the purring of a mother cat, entering at the far side with a squirming kitten in her mouth, seemed loud.

Alden turned to her. “New ideas, like flyin' space, sometimes is hard to take in,” he said kindly. “We had since yesterday to talk it over, but still it's a new idea. Enos, you might take the little lady back to Gretchen's nest and give them kittens a little attention.”

Enos smiled at her, and faces were turned from the cat to her, smiling in relief. “She's bringing her kittens out,” Geelie heard them murmur. “They're old enough for her to introduce them around.”

Numbly she followed the tall young man back through the warren of abandoned passages to the warm storage room where the cat had her nest.

When he evidently intended merely to play with the kittens, she said, “Enos, why—why didn't they vote to go?”

“Well, we're used to it here. As Alden said, it takes time to get used to new ideas.” He handed her a kitten. “This is the runt—the last born of the litter. We named her Omega—we'll give them all shots in another month or two; she'll be the last cat born on Earth.”

Absently she took the purring kitten, a tiny squirming handful of fur. “But you'll all die if you don't go!”

“Well, we'll all die anyway,” he said mildly. “Ever notice most of us are old folks? A lot aren't so far from dying now. They'd just as soon die in a place they know. We've been here a long time, you know.”

“But—but—you're not old! And your parents, and Alden's daughter Aina, and Camden—”

“I wouldn't know how to act, anywhere but here,” he said mildly. He smiled down at the proudly purring mother cat.

Geelie, Lyou Ye, and Aung Charah sat in the small conference room.

Lyou Ye grimaced. “So that was their reaction? I'll admit it wasn't one I'd foreseen. All the other behinders in history agreed to go. Some of them signaled to us.”

Geelie shifted her position uneasily, cross-legged on a pillow, and nodded unhappily. “I even offered to send them to a european Colony, so they'd be among familiar seeming people, but that didn't help.”

Aung Charah shook his head. "We're getting a lot of publicity on this," he said. "The newsmedia are not hostile yet. But what will they say when the behinders' refusal becomes known?"

Lyou Ye frowned. "They'll blame us, depend upon it. Have any of them interviewed the behinders?"

Aung Charah shook his head. "They have to get permission from the Missouri Compact, which is very cautious. These planetarians have rights too. Invasion of their privacy..." He shook his head again.

"If we leave them here to die, we'll certainly be blamed," said Lyou Ye. "I'm tempted to order Consortium Police in to evacuate them forcibly."

Geelie sipped her tea, looking at "Ma Kyaw." That's your sort of solution, she thought. Direct, uncompromising, get it done, get it over with. And somebody else can pick up the pieces, clean up the mess.

"Alden would certainly complain if that were done," she said, speaking up reluctantly. "The media attention would be far worse. Violation of planetary rights... they may even have some claim to the old city of Independence. The Missouri Compact may legally have to wait for them all to die to mine that part of its grant."

Lyou Ye grimaced again. "I suppose you're right."

Aung Charah set his cup down. "Media criticism won't hurt the Consortium if we leave them here. The criticism we'd get if we violate their rights might affect us adversely. Investors—"

Lyou Ye was a "careerman." She nodded, frowning, lips pursed.

Geelie looked around the room, so unlike the comfortably cluttered warren in which Enos lived. In one wall, a niche with an arrangement of flowers, signifying *This too shall pass*; the woven screen against another wall, with its conventional pattern of crows over tiny fields curving up in the distance; the parquet floor with its fine rich grain; the subtle, not quite random leaf pattern of ivory and cream on the walls; the bronze samovar and the fantastically contorted porcelain dragon teapot, the only ornate thing in the room.

Enos was right, she thought. He would not know how to live in a place like this.

She thought of the world that was all he had ever known, a place of snow-powdered rock and brooding, perpetual night, a red-eyed Sun blown in the wind. A bare, harsh, bleak place without a future. For him in the end, it could only mean tending the old "folks" as one by one they died, and then the penultimate generation, the generation of his parents, as they also grew old. At last he would be left alone to struggle against the darkness and the cold until he too lay dying, years of solitude and then a lonely death.

"There's no help for it," said Lyou Ye broodingly. She looked at Geelie. "You'll have to seduce Enosclayborn."

Geelie swept snow from a rock onto a dustpan, dumped it into a bucket.

"Don't get it on your gloves," Enos said. "It's a lot colder than it looks."

"How much do you have to bring in each day?"

"Not much; I usually overdo it. I enjoy being outside. The air is clean and cold, and I can see so far."

Geelie shivered, looking around the lands of eternal night. "Doesn't the shaded sun bother you?"

“It's always been like that.” He looked around at the dim, tumbled landscape, emptying his bucket into the tub. “It's always been like this. Okay, that should be enough. Take the other handle and we'll carry it in.”

In the vestibule they put the tub of snow in the row of tubs, and shed their parkas. Despite the slowly melting snow here, it seemed warm and steamy after the sharp cold air outside. Still, remembering the bleak world without, Geelie shuddered. She would have moved close to Enos even if she had not planned to do so. He put an arm around her, not seeming particularly surprised.

“You'll soon get used to it yourself,” he said tolerantly.

“Never,” she said, meaning it, cuddling close, her arms around him. She lifted her face for a kiss, nuzzling her breasts against his chest.

Enos put his palm on her cheek and pushed her gently aside. “Let's not start something we can't finish,” he said.

Geelie blinked up at him, uncomprehending. “In your room—or the kittens's room—out in the passages—” Independence was a maze of warm, unused, and private passages.

He cupped her face with both hands and looked fondly at her. “Thank you very much, Geelie, for you offer. I will treasure it all the days of my life. But your place is in Kinabatangan, and mine is here, and we should not start something we cannot finish.”

The pain of rejection was like a child's pain—the heavy feeling in the chest, the sharp unshed tears. Then came a more poignant grief—grief for all that she could not give him, that he would not take from her.

“Enos!—Enos!” she said, and then her sobs stopped her speech.

“O Geelie, Geelie,” he said, his voice trembling. He held her close and stroked her hair.

Alden came and sat beside her in the cozy common room of Independence, where she sat watching Jackson Clayborn and Aina Alden play checkers.

“You look a little peaked,” he said quietly.

She slid her chair back and spoke as quietly. “I suppose so.”

“Enos will be back soon enough. He's lookin' through his things for something to fix that pump in the hydro room. Enos'd druther fix things and tinker around than play games like that.” But he was looking inquiringly at her.

“Well, someone has to keep things going,” she said wanly.

“Ye-ah.” Alden drawled the word out, a skeptical affirmative. “Someone does, though we got a few hands here can still tend to things.” Abruptly he said, “By your face and your attitudes, these last few days, I reckon you ain't persuaded Enos to go with you?”

Geelie looked sharply at him. “No,” she said shortly.

“I was afraid of that,” he said, low. Startled, Geelie leaned toward him. “Did you think I was fightin' you? No, I was hopin' you'd persuade him. God knows you got persuasions none of us can offer. *We* can't offer him nothing.”

Passionately she whispered, "Then why won't he come with us? All he says is that his place is here—and after that he won't say anything! Why?"

Alden's response was slow in coming. "I suppose he can't say why because he don't know how. Why he should feel his place is here, I don't know. *My* place is here; I'm an old man. But he don't listen to me any more than he does to you."

He shook his head. "If he stays, what'll he have? All he'll have is Independence, as long as he lives—the man from the Missouri Compact explained that. That's all. I guess," slowly, "for him, that's enough."

The kitten, Omega, jumped from Geelie's arms and began to investigate the room, not having sense enough to stay away from Lyou Ye. She was "Miss Smooth" no longer, stalking about the room and visibly trying to contain her anger.

"A flat refusal! I can't believe he refused you. Do you realize there've been over seven thousand Colonies offering them a place to live—over five thousand offering to take the whole group. And we can't get even the young one to leave Earth! What is wrong with him?"

"He says his place is there," said Geelie, nervously watching the kitten prowling.

"He's been brainwashed by those old people," Lyou Ye said.

"Not intentionally," Geelie said. "I discussed it with them, and they prefer to stay, but they would be happy to see Enos go. They know there's no future for him there."

"And for some uncommunicable reason, he thinks there's no future for him with us," said Lyou Ye, more calmly. She shook her head, ran her hands through her mass of auburn hair. "I suppose he's been unconsciously brainwashed from birth, knowing that he was the last one, that he was going to take care of them and die alone, and he's accepted that. It won't be easy to break that kind of life-long conditioning. Well." She shook Omega away from her ankle and turned to Geelie.

"Your tour as Observer is almost up. Would it be worthwhile to extend it and give you more time to work on him?"

Geelie put her hand to her chest. "No," she said, and cleared her throat. "No, it would not be worthwhile. I... can do nothing with him."

"We'll send somebody else, but I don't have much hope. These cold-hearted euros can be so inscrutable." Lyou Ye sat and examined Geelie. "You're right. It's time we got you away from Earth," she said gently.

The weather in Kinabatangan was clear and calm when Geelie returned from Earth. She pulled herself to the bubble at the axis and looked down at the tiny, idyllic fields and villages below, past the terraces climbing the domed end of the vast cylinder. She could have walked down the stairs, but took instead the elevator. At Deck level she was met by her cousins and siblings, the younger of whom rushed her and engulfed her in a mass hug, all laughing and babbling at once, a torrent of brown faces.

Half-floating in a golden mist of warmth, brilliant sunshine from the Chandelier, and love, Geelie let them lead her between the tiny fields and over the little bridges. She breathed deep of her ancient home, air redolent of the cycle of birth and death. They came presently to her small house in the edges of Lahad

Datu. Frangipani grew by its door and squirrels ran nervously across its roof. A flight of harsh black crows pounded heavily up and away from the yard, where the tables were.

They'd spread a feast for her, and she ate with them and listened while they told her of the minute but important changes that had occurred in her absence. As she floated in this supporting bubble of light and warmth, Kinabatangan came back to her. All was as if she had never been away.

Her lover had found another, in the easy way of Kinabatangan, and that night Geelie slept alone. And in sleep she remembered again the bleak black plains of nighted Earth, and the man who inhabited them, who had chosen to wander alone forever under a frozen Sun.

She awoke and had difficulty remembering whether she was in Kinabatangan, dreaming of Independence, the half-seen land of Missouri stretching stark around it—or in *Tigerclaw* dreaming of Kinabatangan. She looked around the tiny room with its paper walls, its mats, the scent of frangipani in the air—she was in Kinabatangan, in her own little house, on her own mattress on the floor, and it was over. All over.

Omega yawned, a tiny pink cavern floored with a delicately rough pink tongue. The kitten was curled on the other pillow. Geelie reached for her.

“Oh! You little devil,” she cried, flinging the kitten aside.

Startled, Omega had bitten her hand, and now stood in the middle of the room, looking at her with slit eyes.

Furious, Geelie leaped from her bed. But she could not stand, all the strength went out of her legs and she sank to the floor, sobbing. “Omega, Omega, I'm sorry, s-sorry.” Grief as great as for a planet tore at her.

Omega crept cautiously over and sat staring up at her, watching Geelie weep.

The Twelfth Album

STEPHEN BAXTER

Stephen Baxter is known as one best new hard SF writers of the '90s, the author of a number of highly-regarded novels (*The Time Ships* was a leading contender in 1996 for the Hugo Award for best novel, and he has won the Philip K.Dick Award, the John W.Campbell Memorial Award, the British SF Association Award, and others for his novels). At the same time he has in recent years managed to produce nearly ten short stories a year in fantasy, SF, and horror venues. Also in recent years, he has been attracted to the alternate history subgenre, a vein that has captured his serious interest, in a number of stories often involving the history of SF, or alternate versions of the space program of the sixties and seventies (see “Columbiad” in *Year's Best SF 3*). In 1998 he published a broad spectrum of works of SF and fantasy, not sticking to one subgenre. He appeared in most of the major magazines, sometimes twice. This is from *Interzone*, and if it is possible to say so about such a diverse writer, it is uncharacteristic of Baxter. It is pure alternate history, on the border of SF, in the tradition of Philip K.Dick's *The Man in the High Castle*.

In the bowels of a ship that would never sail again—mourning our friend Sick Note—Lightoller and I sat cross-legged on the carpet of a disused Turkish Bath, and listened to John Lennon.

“Fooking hell,” said Lightoller. “That's ‘Give Me Some Truth.’ It was on the *Imagine* album. But—”

“But what?”

Lightoller, he says now, knew there was something different about the cut from the first chord. It might even be true. That's Lightoller for you.

“Typical Lennon,” he said moodily. “He goes whole bars on a single note, a single fooking chord. Maneuvering around the harmonies like a crab. But—”

“But *what?*”

“Where's the fooking echo? Lennon solo always drowned his vocals. This is clean and hoarse. Sounds more like a George Martin production.”

Not very interested, I was staring at the ceiling. Gilded beams in crimson.

We never knew how Sick Note had managed to blag himself quarters on the ship itself, let alone the Turkish Bath.

It was a whole set of rooms, with a mosaic floor, blue-green tiled walls, stanchions enclosed in carved teak. Queen Victoria's nightmare if she'd been goosed by Rudolph Valentino. As Lightoller said, Sick Note must have been the best fooking porter in this whole floating fooking hotel.

“Of course,” Lightoller was saying, “it's plausible they'd have used this. Lennon offered it as a Beatles song during the *Let It Be* sessions in Feb '69. It was the way they worked. They were trying out songs that finished up on *Let It Be* and *Abbey Road*, even their solo albums, as far back as early 1968—”

“*Who* would have used the song for *what?*”

“The Beatles. On their next album. The twelfth.”

Compared to Lightoller, and Sick Note, I'm a dilettante. But I'm enough of a Fabs fan to spot the problem with that.

I said, “The Beatles released eleven LPs, from *Please Please Me* through *Let It Be*.”

“You're counting UK releases,” said Lightoller.

“Of course.”

“And you don't include, for instance, the *Yellow Submarine* album which was mostly a George Martin movie score, or the *Magical Mystery Tour* album they released in the US, or the EPs—”

“Of course not. So there was no twelfth Beatle album.”

“Not in this fooking world,” said Lightoller mysteriously.

John sang on, raw and powerful.

Oddly enough, Lightoller and I had been talking about other worlds even before we found the album, in Sick Note's abandoned quarters, deep inside the old ship.

You have to picture the scene.

I suppose you'd call it a wake: twenty, thirty blokes of indeterminate age standing around in the Cafe

Parisien on B Deck—loaned by the floating hotel's owners for the occasion, all tumbling trellises and ivy pots and wicker chairs—drinking beer and wine we'd brought ourselves, and looking unsuccessfully for tortilla chips.

“Morgan Robertson,” Lightoller had said around a mouthful of Monster Munches.

“Who?”

“Novelist. 1890s. Writes about a fooking big Atlantic liner, bigger than anything built before. Loads it with rich and complacent people, and wrecks it one cold April night on an iceberg. Called his ship the *Titan*—”

“Spooky,” I said dryly.

“In another world—”

“Yeah.”

Lightoller is full of crap like that, and not shy about sharing it.

But I welcomed Lightoller's bullshit, for once; we were, after all, just distracting ourselves from the fact that Sick Note was gone. What else are words for, at a time like that?

Bored, morbid, a little drunk, we had wandered off, through the ship, in search of Sick Note.

We had come through the foyer on A Deck, with its huge glass dome, the oak paneling, the balustrades with their wrought-iron scroll work, the gigantic wall clock with its two bronze nymphs. All faded and much scarred by restoration, of course. Like the ship. Like the city outside which we could glimpse through the windows: the shops and maritime museums of Albert Dock to which the ship was forevermore bolted, and the Liverpool waterfront beyond, all of it under a suitably gray sky.

I said something about it being as if they'd towed the Adelphi Hotel into Liverpool Bay. Lightoller made a ribald remark about Sick Note and the nymphs.

We had walked on, down the grand stairway from the boat deck, along the corridor where the valets and maids of the first-class passengers used to stay, past the second-class library and the third-class lounge, down the broad stairs towards steerage.

The second track was, of all things, “It Don't Come Easy.”

“Ringo,” I said.

“Yeah. Solo single in April '71.”

I strained to listen. I couldn't tell if it was different. Was the production a little sharper?

“Every Night,” the next track, was Paul: just McCartney being McCartney, pretty much as he recorded it on his first solo album.

“Sentimental pap,” I said.

Lightoller frowned. “Listen to it. The way he manages the shift from minor to major—”

“Oldest trick in the book.”

“McCartney could make the sun come out, just by his fooking chromatic structure.”

“I’ll take your word for it.”

“And it’s another track they tried out for *Let It Be*. And—”

“What?”

“I think there are extra lyrics.”

“Extra?”

The next track was quiet: Harrison’s “All Things Must Pass.”

Lightoller said sourly, “Another *Let It Be* demo. But they were still keeping George in his place. First track he’s had.”

The playing was simple and exquisite, little more than solo voice with acoustic guitar, closer to the demo George had made of the song in his Beatle days than his finished solo album version.

I didn’t recognize the next song, a Lennon track. But it got Lightoller jumping up and down.

“It’s ‘Child of Nature,’” he kept saying. “Fooking hell. They tried it out for the *White Album*. But Lennon held it back and released it on *Imagine* after the split—”

Now I recognized it. It was “Jealous Guy.” With different lyrics.

“Fooking hell,” said Lightoller. “This has appeared nowhere, not even on a bootleg. And besides, this is no demo. It’s a finished fooking production. *Listen* to it.”

That’s Lightoller for you. Excitable.

We had reached the alleyway on E Deck that Sick Note had always called Scottie Road. You could tell this was meant for steerage and crew: no carpet, low ceilings, naked light bulbs, plain white walls.

We worked our way towards the bow, where Sick Note had lived the last years of his life.

“Sick Note would never go down to the engine rooms,” Lightoller reminisced.

“Reciprocating engines,” I said, imitating Sick Note. “A revolutionary low-pressure turbine. Twentynine boilers.”

“Yeah. All nailed down and painted in primary colors to show the kiddies how a steam ship used to work. Not that they care.”

“No,” I said. “But Sick Note did. He said it was humiliating to gut a working boat like that.”

“That was Sick Note.”

Away from Scottie Road the ship was a labyrinth of rooms and corridors and ducts.

“I never could figure out my way around here,” I said.

Lightoller laughed. “Even Sick Note used to get lost. Especially after he'd had a few with the boys up in the Smoking Room. Do you remember that time he swore—”

“He found a rip in the hull?”

“Yeah. In a post room somewhere below. A rip, as if the boat had collided with something. And he looked out—”

Sick Note had found Liverpool flattened. Like the Blitz but worse, he said. Mounds of rubble. Like the surface of the Moon.

“...And he saw a sky glowing full of shooting stars,” Lightoller said.

It was one of Sick Note's favorite drunken anecdotes.

“Of course,” said Lightoller, “this old scow probably wouldn't have survived any sort of collision. The hull plates are made of brittle steel. And it was just too fooking big; it would have shaken itself to pieces as soon as a few rivets were popped—”

Lightoller can be an anorak sometimes. But he used to be an engineer, like me.

Correction. He is an engineer, like me.

At last, on F Deck, we found the Turkish Bath.

Sick Note had made this place his own: a few sticks of furniture, the walls lined with books, posters from rock concerts and Hammer horror movies and long-forgotten 1960s avant garde book stores plastered over the crimson ceiling. I found what looked like a complete run of the *International Times*. There was even a kitchen of sorts, equipped with antiques: a Hoover Keymatic washing machine and a Philco Marketer fridge-freezer and a General Electric cooker. Sick Note always did have an uncanny supply of artifacts from the '70s, or late '60s anyhow, in miraculously good condition, that the rest of us used to envy. But he'd never reveal his source.

And there were records here too: vinyl LPs, not CDs (of course), leaning up against each other all the way around the edge of the floor like toppling dominoes; the stack even curved a little to get around the corners. The odd thing was, if you looked all the way around the room, you couldn't see how they were being supported—or rather, they were all supporting each other. It was a record stack designed by Escher.

Lightoller bent to look at the albums. “Alphabetized.”

“Of course.” That was Sick Note.

“Let's find the Beatles. B for Beatles...” He grunted, sounding a little surprised. He pulled out an album with a jet-black sleeve. “Look at this fooking thing.” He handed it to me.

The cover was elementally simple: just a black field, with a single word rendered in a white typewriter font in the lower left-hand corner.

God.

Just that, the word, and a full stop.

Nothing else. No image. Not even an artist name on the cover. Nothing on the spine or the back of the sleeve; no artist photos or track listings, or even a copyright mark or acknowledgement paragraph.

The record slid into my hand inside a plain black paper inner sleeve. And when I tried to pull out the record itself—reaching inside to rest my fingers on the center label—the sleeve static-clung to the vinyl, as if unwilling to let it go.

The vinyl was standard-issue oil black. The label was just the famous Apple logo—skin-side up on what was presumably Side One, the crisp white inner flesh on Side Two. Still no track listing—in fact, not even a title.

I held the album by its rim. I turned it this way and that; the tracks shone in the light.

Sometimes I forget how tactile the experience of owning an album used to be.

“Look at that fooking thing,” breathed Lightoller “A couple of scratches at the rim. Otherwise perfect.”

“Yeah.” An album that had been played, but cared for. That was Sick Note for you.

We exchanged glances.

Lightoller lifted up the glass cover of Sick Note's deck, and I lifted on the album, settling it over the spindle delicately. Lightoller powered up the deck. It was a Quad stack Sick Note had been working on piece by piece since 1983. No CD player, of course.

When the needle touched the vinyl there was a moment of sharp crackle, then hissing expectancy.

The music came crashing out.

And that was how we found ourselves listening to a puzzlingly different John Lennon.

Side One's last track was the big song McCartney used to close *Ram*: “Back Seat of My Car.”

“Another song they tried for *Let It Be*,” Lightoller said. “And—”

“Shut up a minute,” I said.

“...What?”

“Listen to that.”

In place of the multi-track of his own and Linda's voices that McCartney had plastered over his solo version, the song was laced with exquisite three-part harmonies.

Beatle harmonies.

“Lightoller,” I said. “I'm starting to feel scared.”

Lightoller let the stylus run off, reverently.

I got up from the carpeted floor and walked around the room. There were framed photos and news clippings here, showing scenes from the ship's long history.

I couldn't mistake the pounding piano and drum beat that started Side Two.

“Instant Karma,” I said.

“A single for Lennon in February 1970.”

“In our world.”

“Great fooking opener.”

Then came a Harrison song, a wistful, slight thing called “Isn't It a Pity.”

Lightoller nodded. “Another one they tried out in early 1969, but never used. It finished up on George's first solo album—”

The next track was “Junk,” a short instrumental McCartney wrote when they were staying with the Maharishi in India. It sounded like the theme of a TV show about vets. But it was sweet and sad.

We just listened for a while.

With the gentle guitars playing, it was as if Sick Note was still there, in this cloud of possessions, the very air probably still full of a dusty haze of him.

...Here was the ship in dry dock in Belfast after her maiden voyage, with that famous big near-miss scar down her starboard flank. Here she was as a troop carrier in 1915, painted with gaudy geometric shapes that were supposed to fool German submarines. Here was a clipping about how she'd evaded a U-boat torpedo, and how she'd come about and rammed the damn thing.

“Old Reliable,” I said. “That was what Sick Note used to call her. The nickname given her by the troops she transported.”

“He loved this old tub, in his way,” said Lightoller.

“And he did love his Fabs.”

That was Sick Note for you.

The fourth track was “Wah Wah,” another Harrison song, a glittering, heavy-handed rocker with crystal-sharp three-part harmony.

Lightoller nodded. “Harrison wrote this when he stormed out during the *Let It Be* sessions. He kept it back for his solo album—”

“In our world.”

“Yeah. I guess he brought it back to the group, in the God world...” Lightoller was sounding morbid. “But there was no fooking twelfth album, was there? This must be a fake. Or an import, or a compilation, or a bootleg. Once Allen Klein and Yoko got involved they were all too busy suing each other's fooking arses off.”

I picked up the album sleeve. For a possession of Sick Note's, it was surprisingly grubby. Specked with some kind of ash. I felt obscurely disturbed by Lightoller's loss of faith in his own bullshit. “But all the Allen Klein stuff started in the spring of '69. Even after all that, they made another album together.”

“*Abbey Road*.” Lightoller nodded, and I thought the spark was back in his eyes. “Yeah. They might have hung around for one more try. But something would have had to be different.”

I kept roaming the room.

More clippings, of how White Star had merged with Cunard in 1934, and the old ship lost out to newer, faster, safer ships. She was almost sold for scrap—but then was put to work as a cargo scow in the southern Atlantic—and then, after Michael Heseltine parachuted into Merseyside after the 1981 riots, she was bought up and bolted to the dock, here at Liverpool, and refitted as a hotel, the center of what Heseltine hoped would become the regeneration of the city. Fat chance.

“So,” I said, “your theory is that this album comes from an alternate world where somebody shot Allen Klein.”

“Lightoller shrugged. “It might have been something bigger.”

“Like what?”

“I don't know. Like nuclear fooking war.”

“Nuclear war?”

“Sure. If the world was going to fooking hell, it would have touched everybody's lives, even before the Big One dropped. For the Beatles, it just kept them in the studio together a while longer.”

“Their contribution to world peace,” I said sourly.

“They used to think like that,” he said defensively. “What was that story of Sick Note's? He found some way out the back of the boat—”

I tried to remember. “Liverpool was rubble.”

The surface of the Moon. But Sick Note might have found some cellars, where things had survived—GE cookers and Philco fridges and Beatle albums—sheltered from the fire storms, preserved since 1971.

I felt scared again.

“We're running out of LP,” said Lightoller.

“So what?”

“So there are a lot of great tracks not here,” he said. “Like Lennon's ‘Love.’ Harrison's ‘My Sweet Lord’ and ‘What Is Life.’ ‘Imagine,’ for fook's sake.”

“They must have been issuing singles.”

“You're right.” I could hear the pain in Lightoller's voice. “And we'll never get to hear them.”

“But if we found the other world...”

We were silent for a while, just listening.

Lightoller said softly, “What if we couldn't find our way back?”

I shrugged. “Sick Note did.”

He eyed me. “Are you sure?”

Neither of us tried it.

The fifth track was “God,” in which Lennon, at great and obsessive length, discarded his childish idols, including Jesus, Elvis, Dylan, even the Beatles.

“Oh,” said Lightoller. “There's the compromise. What McCartney agreed, to keep Lennon on board.”

“That and not doing ‘Teddy Boy.’”

“At least Lennon didn't push for ‘Mother.’”

I tried to focus on the music. The production didn't sound to me much different from the way I'd heard it on the *Plastic Ono Band* album.

But some unruly piece of my brain wasn't thinking about the Beatles.

Sick Note had said he saw shooting stars, everywhere, over ruined Liverpool. *Oh.*

“Comets,” I said.

Lightoller said, “Comets?”

“Not nuclear war. Comets. That's it. If a comet hit the Earth, debris would be thrown up out of the atmosphere. Molten blobs of rock. They would re-enter the atmosphere as—”

“A skyful of shooting stars.”

“Yes. They would reach low orbit, keep falling for years. The air would burn. Nitrous oxides, acid rain—the global temperatures would be raised all to hell.”

“So in some alternate world a comet landed on Yoko, and the Beatles never broke up.” Lightoller laughed. “Only a true Beatles fan would lay waste to the fooking Earth to get a new album.”

“I don't think this is funny, Lightoller.”

God wound to its leaden close. The stylus hissed on the spiraling intertrack, and Lightoller and I watched it. I knew what he was thinking, because I was thinking exactly the same.

This would be the ultimate track—the twelfth track on the twelfth album.

The last new Beatles song we would ever hear.

Because, of course, by now we both believed.

It was recognizable from the first, faded-in, descending piano chords. But then the vocals opened—and it was Lennon.

“It's ‘Maybe I'm Amazed,’” I said, awed. “McCartney's greatest post-Beatles song—”

“Just listen to it,” said Lightoller. “He gave it to Lennon. *Listen* to it.”

It didn't sound like the version from our world, which McCartney, battered and bruised from the breakup, recorded in his kitchen.

Lennon's raw, majestic voice wrenched at the melody, while McCartney's melodic bass, Starr's powerful drumming, and Harrison's wailing guitar drove through the song's complex, compulsive chromatic

structure. And then a long coda opened up, underpinned by clean, thrusting brass, obviously scored by George Martin.

At last the coda wound down to a final, almost whispered lament by Lennon, a final descending chord sequence, a last trickle of piano notes, as if the song itself couldn't bear to finish.

The stylus hissed briefly, reached the run-off groove, and lifted.

Lightoller and I just sat there, stunned.

Then the magic faded, and I got an unwelcome dose of reality: a sense of place, where we were and what we had become: two slightly sad, slightly overweight, fortyish guys mourning the passing of a friend, and another little part of our own youth.

Lightoller put the album back in its sleeve, and slotted it carefully into its place.

We found our way outside, to the dock.

The old ship's stern towered over us. It was late by then, and the ship blazed with light from its big promenade decks and the long rows of portholes. Up top, I could see the four big funnels and the lacework of masts and rigging. People were crossing the permanent gangways that had been bolted to the side of the ship, like leashes to make sure she never shook loose again.

"She's an old relic," said Lightoller. "Just like Sick Note."

"Yeah."

"All fooking bullshit, of course," he said.

"Other worlds?"

"Yeah."

It was starting to rain, and I felt depressed, sour, mildly hung over. I looked up at the stern and saw how the post-Heseltine paint job had weathered. Even the lettering was running. You could still make out the registration, LIVERPOOL, but the ship's name was obscured, the I's and T's and the N streaking down over the hull, the A and C just blurred.

We turned our backs and started the walk to the bus stop.

Lightoller and I don't talk about it much.

I'd like to have heard those singles, though.

Story of Your Life

TED CHIANG

Ted Chiang has only published three SF stories prior to this one and his first, "Tower of Babylon"(1990), won the Nebula Award; another ("Understand") won the *Asimov's* Readers Award in 1991, and he won the John W.Campbell Award for Best New Writer in 1992. He is a careful and accomplished writer, and his work is distinguished by originality combined with the high quality of his re-imagining of old SF ideas. This is his fourth published story, his first in more than five years (he seems to have a satisfying

life in the Seattle area that leaves him little time for SF writing). It is the longest story in this book and may well be the best. The theme of communicating with aliens was prominent in the SF fiction of 1998, but nowhere better done than here. It appeared in *Starlight 2*. In a year that was not notable for many strong original SF anthologies, this novella helped *Starlight 2* (which contained both fantasy and SF stories) stand out.

Your father is about to ask me the question. This is the most important moment in our lives, and I want to pay attention, note every detail. Your dad and I have just come back from an evening out, dinner and a show; it's after midnight. We came out onto the patio to look at the full moon; then I told your dad I wanted to dance, so he humors me and now we're slow-dancing, a pair of thirtysomethings swaying back and forth in the moon-light like kids. I don't feel the night chill at all. And then your dad says, "Do you want to make a baby?"

Right now your dad and I have been married for about two years, living on Ellis Avenue; when we move out you'll still be too young to remember the house, but we'll show you pictures of it, tell you stories about it. I'd love to tell you the story of this evening, the night you're conceived, but the right time to do that would be when you're ready to have children of your own, and we'll never get that chance.

Telling it to you any earlier wouldn't do any good; for most of your life you won't sit still to hear such a romantic—you'd say sappy—story. I remember the scenario of your origin you'll suggest when you're twelve.

"The only reason you had me was so you could get a maid you wouldn't have to pay," you'll say bitterly, dragging the vacuum cleaner out of the closet.

"That's right," I'll say. "Thirteen years ago I knew the carpets would need vacuuming around now, and having a baby seemed to be the cheapest and easiest way to get the job done. Now kindly get on with it."

"If you weren't my mother, this would be illegal," you'll say, seething as you unwind the power cord and plug it into the wall outlet.

That will be in the house on Belmont Street. I'll live to see strangers occupy both houses: the one you're conceived in and the one you grow up in. Your dad and I will sell the first a couple years after your arrival. I'll sell the second shortly after your departure. By then Nelson and I will have moved into our farmhouse, and your dad will be living with what's-her-name.

I know how this story ends; I think about it a lot. I also think a lot about how it began, just a few years ago, when ships appeared in orbit and artifacts appeared in meadows. The government said next to nothing about them, while the tabloids said every possible thing.

And then I got a phone call, a request for a meeting.

I spotted them waiting in the hallway, outside my office. They made an odd couple; one wore a military uniform and a crew cut, and carried an aluminum briefcase. He seemed to be assessing his surroundings with a critical eye. The other one was easily identifiable as an academic: full beard and mustache, wearing corduroy. He was browsing through the overlapping sheets stapled to a bulletin board nearby.

"Colonel Weber, I presume?" I shook hands with the soldier. "Louise Banks."

“Dr. Banks. Thank you for taking the time to speak with us,” he said.

“Not at all; any excuse to avoid the faculty meeting.”

Colonel Weber indicated his companion. “This is Dr. Gary Donnelly, the physicist I mentioned when we spoke on the phone.”

“Call me Gary,” he said as we shook hands. “I’m anxious to hear what you have to say.”

We entered my office. I moved a couple of stacks of books off the second guest chair, and we all sat down. “You said you wanted me to listen to a recording. I presume this has something to do with the aliens?”

“All I can offer is the recording,” said Colonel Weber.

“Okay, let's hear it.”

Colonel Weber took a tape machine out of his briefcase and pressed PLAY. The recording sounded vaguely like that of a wet dog shaking the water out of its fur.

“What do you make of that?” he asked.

I withheld my comparison to a wet dog. “What was the context in which this recording was made?”

“I’m not at liberty to say.”

“It would help me interpret those sounds. Could you see the alien while it was speaking? Was it doing anything at the time?”

“The recording is all I can offer.”

“You won't be giving anything away if you tell me that you've seen the aliens; the public's assumed you have.”

Colonel Weber wasn't budging. “Do you have any opinion about its linguistic properties?” he asked.

“Well, it's clear that their vocal tract is substantially different from a human vocal tract. I assume that these aliens don't look like humans?”

The colonel was about to say something noncommittal when Gary Donnelly asked, “Can you make any guesses based on the tape?”

“Not really. It doesn't sound like they're using a larynx to make those sounds, but that doesn't tell me what they look like.”

“Anything—is there anything else you can tell us?” asked Colonel Weber.

I could see he wasn't accustomed to consulting a civilian. “Only that establishing communications is going to be really difficult because of the difference in anatomy. They're almost certainly using sounds that the human vocal tract can't reproduce, and maybe sounds that the human ear can't distinguish.”

“You mean infra- or ultrasonic frequencies?” asked Gary Donnelly.

“Not specifically. I just mean that the human auditory system isn't an absolute acoustic instrument; It's optimized to recognize the sounds that a human larynx makes. With an alien vocal system, all bets are

off.” I shrugged. “*Maybe* we’ll be able to hear the difference between alien phonemes, given enough practice, but it’s possible our ears simply can’t recognize the distinctions they consider meaningful. In that case we’d need a sound spectrograph to know what an alien is saying.”

Colonel Weber asked, “Suppose I gave you an hour’s worth of recordings; how long would it take you to determine if we need this sound spectrograph or not?”

“I couldn’t determine that with just a recording no matter how much time I had. I’d need to talk with the aliens directly.”

The colonel shook his head. “Not possible.”

I tried to break it to him gently. “That’s your call, of course. But the only way to learn an unknown language is to interact with a native speaker, and by that I mean asking questions, holding a conversation, that sort of thing. Without that, it’s simply not possible. So if you want to learn the aliens’ language, someone with training in field linguistics—whether it’s me or someone else—will have to talk with an alien. Recordings alone aren’t sufficient.”

Colonel Weber frowned. “You seem to be implying that no alien could have learned human languages by monitoring our broadcasts.”

“I doubt it. They’d need instructional material specifically designed to teach human languages to non-humans. Either that, or interaction with a human. If they had either of those, they could learn a lot from TV, but otherwise, they wouldn’t have a starting point.”

The colonel clearly found this interesting; evidently his philosophy was, the less the aliens knew, the better. Gary Donnelly read the colonel’s expression too and rolled his eyes. I suppressed a smile.

Then Colonel Weber asked, “Suppose you were learning a new language by talking to its speakers; could you do it without teaching them English?”

“That would depend on how cooperative the native speakers were. They’d almost certainly pick up bits and pieces while I’m learning their language, but it wouldn’t have to be much if they’re willing to teach. On the other hand, if they’d rather learn English than teach us their language, that would make things far more difficult.”

The colonel nodded. “I’ll get back to you on this matter.”

The request for that meeting was perhaps the second most momentous phone call in my life. The first, of course, will be the one from Mountain Rescue. At that point your dad and I will be speaking to each other maybe once a year, tops. After I get that phone call, though, the first thing I’ll do will be to call your father.

He and I will drive out together to perform the identification, a long silent car ride. I remember the morgue, all tile and stainless steel, the hum of refrigeration and smell of antiseptic. An orderly will pull the sheet back to reveal your face. Your face will look wrong somehow, but I’ll know it’s you.

“Yes, that’s her,” I’ll say. “She’s mine.”

You’ll be twenty-five then.

The MP checked my badge, made a notation on his clipboard, and opened the gate; I drove the off-road vehicle into the encampment, a small village of tents pitched by the Army in a farmer's sun-scorched pasture. At the center of the encampment was one of the alien devices, nicknamed "looking glasses."

According to the briefings I'd attended, there were nine of these in the United States, one hundred and twelve in the world. The looking glasses acted as twoway communication devices, presumably with the ships in orbit. No one knew why the aliens wouldn't talk to us in person; fear of cooties, maybe. A team of scientists, including a physicist and a linguist, was assigned to each looking glass; Gary Donnelly and I were on this one.

Gary was waiting for me in the parking area. We navigated a circular maze of concrete barricades until we reached the large tent that covered the looking glass itself. In front of the tent was an equipment cart loaded with goodies borrowed from the school's phonology lab; I had sent it ahead for inspection by the Army.

Also outside the tent were three tripod-mounted video cameras whose lenses peered, through windows in the fabric wall, into the main room. Everything Gary and I did would be reviewed by countless others, including military intelligence. In addition we would each send daily reports, of which mine had to include estimates on how much English I thought the aliens could understand.

Gary held open the tent flap and gestured for me to enter. "Step right up," he said, circus-barker-style. "Marvel at creatures the likes of which have never been seen on God's green earth."

"And all for one slim dime," I murmured, walking through the door. At the moment the looking glass was inactive, resembling a semicircular mirror over ten feet high and twenty feet across. On the brown grass in front of the looking glass, an arc of white spray paint outlined the activation area. Currently the area contained only a table, two folding chairs, and a power strip with a cord leading to a generator outside. The buzz of fluorescent lamps, hung from poles along the edge of the room, commingled with the buzz of flies in the sweltering heat.

Gary and I looked at each other, and then began pushing the cart of equipment up to the table. As we crossed the paint line, the looking glass appeared to grow transparent; it was as if someone was slowly raising the illumination behind tinted glass. The illusion of depth was uncanny; I felt I could walk right into it. Once the looking glass was fully lit it resembled a life-sized diorama of a semicircular room. The room contained a few large objects that might have been furniture, but no aliens. There was a door in the curved rear wall.

We busied ourselves connecting everything together: microphone, sound spectrograph, portable computer, and speaker. As we worked, I frequently glanced at the looking glass, anticipating the aliens' arrival. Even so I jumped when one of them entered.

It looked like a barrel suspended at the intersection of seven limbs. It was radially symmetric, and any of its limbs could serve as an arm or a leg. The one in front of me was walking around on four legs, three non-adjacent arms curled up at its sides. Gary called them "heptapods."

I'd been shown videotapes, but I still gawked. Its limbs had no distinct joints; anatomists guessed they might be supported by vertebral columns. Whatever their underlying structure, the heptapod's limbs conspired to move it in a disconcertingly fluid manner. Its "torso" rode atop the rippling limbs as smoothly as a hovercraft.

Seven lidless eyes ringed the top of the heptapod's body. It walked back to the doorway from which it entered, made a brief sputtering sound, and returned to the center of the room followed by another heptapod; at no point did it ever turn around. Eerie, but logical; with eyes on all sides, any direction might

as well be “forward.”

Gary had been watching my reaction. “Ready?” he asked.

I took a deep breath. “Ready enough.” I'd done plenty of fieldwork before, in the Amazon, but it had always been a bilingual procedure: either my informants knew some Portuguese, which I could use, or I'd previously gotten an introduction to their language from the local missionaries. This would be my first attempt at conducting a true monolingual discovery procedure. It was straightforward enough in theory, though.

I walked up to the looking glass and a heptapod on the other side did the same. The image was so real that my skin crawled. I could see the texture of its gray skin, like corduroy ridges arranged in whorls and loops. There was no smell at all from the looking glass, which somehow made the situation stranger.

I pointed to myself and said slowly, “Human.” Then I pointed to Gary. “Human.” Then I pointed at each heptapod and said, “What are you?”

No reaction. I tried again, and then again.

One of the heptapods pointed to itself with one limb, the four terminal digits pressed together. That was lucky. In some cultures a person pointed with his chin; if the heptapod hadn't used one of its limbs, I wouldn't have known what gesture to look for. I heard a brief fluttering sound, and saw a puckered orifice at the top of its body vibrate; it was talking. Then it pointed to its companion and fluttered again.

I went back to my computer; on its screen were two virtually identical spectrographs representing the fluttering sounds. I marked a sample for playback. I pointed to myself and said “Human” again, and did the same with Gary. Then I pointed to the heptapod, and played back the flutter on the speaker.

The heptapod fluttered some more. The second half of the spectrograph for this utterance looked like a repetition: call the previous utterances [flutter1], then this one was [flutter2flutter1].

I pointed at something that might have been a heptapod chair. “What is that?”

The heptapod paused, and then pointed at the “chair” and talked some more. The spectrograph for this differed distinctly from that of the earlier sounds: [flutter3]. Once again, I pointed to the “chair” while playing back [flutter3].

The heptapod replied; judging by the spectrograph, it looked like [flutter3flutter2]. Optimistic interpretation: the heptapod was confirming my utterances as correct, which implied compatibility between heptapod and human patterns of discourse. Pessimistic interpretation: it had a nagging cough.

At my computer I delimited certain sections of the spectrograph and typed in a tentative gloss for each: “heptapod” for [flutter1], “yes” for [flutter2], and “chair” for [flutter3]. Then I typed “Language: Heptapod A” as a heading for all the utterances.

Gary watched what I was typing. “What's the ‘A’ for?”

“It just distinguishes this language from any other ones the heptapods might use,” I said. He nodded.

“Now let's try something, just for laughs.” I pointed at each heptapod and tried to mimic the sound of [flutter1], “heptapod.” After a long pause, the first heptapod said something and then the second one said something else, neither of whose spectrographs resembled anything said before. I couldn't tell if they were speaking to each other or to me since they had no faces to turn. I tried pronouncing [flutter1] again, but there was no reaction.

“Not even close,” I grumbled.

“I’m impressed you can make sounds like that at all,” said Gary.

“You should hear my moose call. Sends them running.”

I tried again a few more times, but neither heptapod responded with anything I could recognize. Only when I replayed the recording of the heptapod's pronunciation did I get a confirmation; the heptapod replied with [flutter2], “yes.”

“So we're stuck with using recordings?” asked Gary.

I nodded. “At least temporarily.”

“So now what?”

“Now we make sure it hasn't actually been saying ‘aren't they cute’ or ‘look what they're doing now.’ Then we see if we can identify any of these words when that other heptapod pronounces them.” I gestured for him to have a seat. “Get comfortable; this'll take a while.”

In 1770, Captain Cook's ship *Endeavour* ran aground on the coast of Queensland, Australia. While some of his men made repairs, Cook led an exploration party and met the aboriginal people. One of the sailors pointed to the animals that hopped around with their young riding in pouches, and asked an aborigine what they were called. The aborigine replied, “Kanguru.” From then on Cook and his sailors referred to the animals by this word. It wasn't until later that they learned it meant “What did you say?”

I tell that story in my introductory course every year. It's almost certainly untrue, and I explain that afterwards, but it's a classic anecdote. Of course, the anecdotes my undergraduates will really want to hear are ones featuring the heptapods; for the rest of my teaching career, that'll be the reason many of them sign up for my courses. So I'll show them the old videotapes of my sessions at the looking glass, and the sessions that the other linguists conducted; the tapes are instructive, and they'll be useful if we're ever visited by aliens again, but they don't generate many good anecdotes.

When it comes to language-learning anecdotes, my favorite source is child language acquisition. I remember one afternoon when you are five years old, after you have come home from kindergarten. You'll be coloring with your crayons while I grade papers.

“Mom,” you'll say, using the carefully casual tone reserved for requesting a favor, “can I ask you something?”

“Sure, sweetie. Go ahead.”

“Can I be, um, honored?”

I'll look up from the paper I'm grading. “What do you mean?”

“At school Sharon said she got to be honored.”

“Really? Did she tell you what for?”

“It was when her big sister got married. She said only one person could be, um, honored, and she was it.”

“Ah, I see. You mean Sharon was maid of honor?”

“Yeah, that's it. Can I be made of honor?”

Gary and I entered the prefab building containing the center of operations for the looking glass site. Inside it looked like they were planning an invasion, or perhaps an evacuation: crew-cut soldiers worked around a large map of the area, or sat in front of burly electronic gear while speaking into headsets. We were shown into Colonel Weber's office, a room in the back that was cool from air conditioning.

We briefed the colonel on our first day's results. “Doesn't sound like you got very far,” he said.

“I have an idea as to how we can make faster progress,” I said. “But you'll have to approve the use of more equipment.”

“What more do you need?”

“A digital camera, and a big video screen.” I showed him a drawing of the setup I imagined. “I want to try conducting the discovery procedure using writing; I'd display words on the screen, and use the camera to record the words they write. I'm hoping the heptapods will do the same.”

Weber looked at the drawing dubiously. “What would be the advantage of that?”

“So far I've been proceeding the way I would with speakers of an unwritten language. Then it occurred to me that the heptapods must have writing, too.”

“So?”

“If the heptapods have a mechanical way of producing writing, then their writing ought to be very regular, very consistent. That would make it easier for us to identify graphemes instead of phonemes. It's like picking out the letters in a printed sentence instead of trying to hear them when the sentence is spoken aloud.”

“I take your point,” he admitted. “And how would you respond to them? Show them the words they displayed to you?”

“Basically. And if they put spaces between words, any sentences we write would be a lot more intelligible than any spoken sentence we might splice together from recordings.”

He leaned back in his chair. “You know we want to show as little of our technology as possible.”

“I understand, but we're using machines as intermediaries already. If we can get them to use writing, I believe progress will go much faster than if we're restricted to the sound spectrographs.”

The colonel turned to Gary. “Your opinion?”

“It sounds like a good idea to me. I'm curious whether the heptapods might have difficulty reading our monitors. Their looking glasses are based on a completely different technology than our video screens. As far as we can tell, they don't use pixels or scan lines, and they don't refresh on a frame-by-frame basis.”

“You think the scan lines on our video screens might render them unreadable to the heptapods?”

“It's possible,” said Gary. “We'll just have to try it and see.”

Weber considered it. For me it wasn't even a question, but from his point of view it was a difficult one; like a soldier, though, he made it quickly. "Request granted. Talk to the sergeant outside about bringing in what you need. Have it ready for tomorrow."

I remember one day during the summer when you're sixteen. For once, the person waiting for her date to arrive is me. Of course, you'll be waiting around too, curious to see what he looks like. You'll have a friend of yours, a blond girl with the unlikely name of Roxie, hanging out with you, giggling.

"You may feel the urge to make comments about him," I'll say, checking myself in the hallway mirror. "Just restrain yourselves until we leave."

"Don't worry, Mom," you'll say. "We'll do it so that he won't know. Roxie, you ask me what I think the weather will be like tonight. Then I'll say what I think of Mom's date."

"Right," Roxie will say.

"No, you most definitely will not," I'll say.

"Relax, Mom. He'll never know; we do this all the time."

"What a comfort that is."

A little later on, Nelson will arrive to pick me up. I'll do the introductions, and we'll all engage in a little small talk on the front porch. Nelson is ruggedly handsome, to your evident approval. Just as we're about to leave, Roxie will say to you casually, "So what do you think the weather will be like tonight?"

"I think it's going to be really hot," you'll answer.

Roxie will nod in agreement. Nelson will say, "Really? I thought they said it was going to be cool."

"I have a sixth sense about these things," you'll say. Your face will give nothing away. "I get the feeling it's going to be a scorcher. Good thing you're dressed for it, Mom."

I'll glare at you, and say good night.

As I lead Nelson toward his car, he'll ask me, amused, "I'm missing something here, aren't I?"

"A private joke," I'll mutter. "Don't ask me to explain it."

At our next session at the looking glass, we repeated the procedure we had performed before, this time displaying a printed word on our computer screen at the same time we spoke: showing HUMAN while saying "Human," and so forth. Eventually, the heptapods understood what we wanted, and set up a flat circular screen mounted on a small pedestal. One heptapod spoke, and then inserted a limb into a large socket in the pedestal; a doodle of script, vaguely cursive, popped onto the screen.

We soon settled into a routine, and I compiled two parallel corpora: one of spoken utterances, one of writing samples. Based on first impressions, their writing appeared to be logographic, which was disappointing; I'd been hoping for an alphabetic script to help us learn their speech. Their logograms might include some phonetic information, but finding it would be a lot harder than with an alphabetic script.

By getting up close to the looking glass, I was able to point to various heptapod body parts, such as limbs, digits, and eyes, and elicit terms for each. It turned out that they had an orifice on the underside of their body, lined with articulated bony ridges: probably used for eating, while the one at the top was for respiration and speech. There were no other conspicuous orifices; perhaps their mouth was their anus too. Those sorts of questions would have to wait.

I also tried asking our two informants for terms for addressing each individually; personal names, if they had such things. Their answers were of course unpronounceable, so for Gary's and my purposes, I dubbed them Flapper and Raspberry. I hoped I'd be able to tell them apart.

The next day I conferred with Gary before we entered the looking-glass tent. "I'll need your help with this session," I told him.

"Sure. What do you want me to do?"

"We need to elicit some verbs, and it's easiest with third-person forms. Would you act out a few verbs while I type the written form on the computer? If we're lucky, the heptapods will figure out what we're doing and do the same. I've brought a bunch of props for you to use."

"No problem," said Gary, cracking his knuckles. "Ready when you are."

We began with some simple intransitive verbs: walking, jumping, speaking, writing. Gary demonstrated each one with a charming lack of self-consciousness; the presence of the video cameras didn't inhibit him at all. For the first few actions he performed, I asked the heptapods, "What do you call that?" Before long, the heptapods caught on to what we were trying to do; Raspberry began mimicking Gary, or at least performing the equivalent heptapod action, while Flapper worked their computer, displaying a written description and pronouncing it aloud.

In the spectrographs of their spoken utterances, I could recognize their word I had glossed as "heptapod." The rest of each utterance was presumably the verb phrase; it looked like they had analogs of nouns and verbs, thank goodness.

In their writing, however, things weren't as clearcut. For each action, they had displayed a single logogram instead of two separate ones. At first I thought they had written something like "walks," with the subject implied. But why would Flapper say "the heptapod walks" while writing "walks," instead of maintaining parallelism? Then I noticed that some of the logograms looked like the logogram for "heptapod" with some extra strokes added to one side or another. Perhaps their verbs could be written as affixes to a noun. If so, why was Flapper writing the noun in some instances but not in others?

I decided to try a transitive verb; substituting object words might clarify things. Among the props I'd brought were an apple and a slice of bread. "Okay," I said to Gary, "show them the food, and then eat some. First the apple, then the bread."

Gary pointed at the Golden Delicious and then he took a bite out of it, while I displayed the "what do you call that?" expression. Then we repeated it with the slice of whole wheat.

Raspberry left the room and returned with some kind of giant nut or gourd and a gelatinous ellipsoid. Raspberry pointed at the gourd while Flapper said a word and displayed a logogram. Then Raspberry brought the gourd down between its legs, a crunching sound resulted, and the gourd reemerged minus a bite; there were corn-like kernels beneath the shell. Flapper talked and displayed a large logogram on their screen. The sound spectrograph for "gourd" changed when it was used in the sentence; possibly a

case marker. The logogram was odd: after some study, I could identify graphic elements that resembled the individual logograms for “heptapod” and “gourd.” They looked as if they had been melted together, with several extra strokes in the mix that presumably meant “eat.” Was it a multiword ligature?

Next we got spoken and written names for the gelatin egg, and descriptions of the act of eating it. The sound spectrograph for “heptapod eats gelatin egg” was analyzable; “gelatin egg” bore a case marker, as expected, though the sentence’s word order differed from last time. The written form, another large logogram, was another matter. This time it took much longer for me to recognize anything in it; not only were the individual logograms melted together again, it looked as if the one for “heptapod” was laid on its back, while on top of it the logogram for “gelatin egg” was standing on its head.

“Uh-oh.” I took another look at the writing for the simple noun-verb examples, the ones that had seemed inconsistent before. Now I realized all of them actually did contain the logogram for “heptapod” some were rotated and distorted by being combined with the various verbs, so I hadn’t recognized them at first. “You guys have got to be kidding,” I muttered.

“What’s wrong?” asked Gary.

“Their script isn’t word-divided; a sentence is written by joining the logograms for the constituent words. They join the logograms by rotating and modifying them. Take a look.” I showed him how the logograms were rotated.

“So they can read a word with equal ease no matter how it’s rotated,” Gary said. He turned to look at the heptapods, impressed. “I wonder if it’s a consequence of their bodies’ radial symmetry: their bodies’ radial symmetry: their bodies have no ‘forward’ direction, so maybe their writing doesn’t either. Highly neat.”

I couldn’t believe it; I was working with someone who modified the word “neat” with “highly.” “It certainly is interesting,” I said, “but it also means there’s no easy way for us to write our own sentences in their language. We can’t simply cut their sentences into individual words and recombine them; we’ll have to learn the rules of their script before we can write anything legible. It’s the same continuity problem we’d have had splicing together speech fragments, except applied to writing.”

I looked at Flapper and Raspberry in the looking glass, who were waiting for us to continue, and sighed. “You aren’t going to make this easy for us, are you?”

To be fair, the heptapods were completely cooperative. In the days that followed, they readily taught us their language without requiring us to teach them any more English. Colonel Weber and his cohorts pondered the implications of that, while I and the linguists at the other looking glasses met via video conferencing to share what we had learned about the heptapod language. The videoconferencing made for an incongruous working environment: our video screens were primitive compared to the heptapods’ looking glasses, so that my colleagues seemed more remote than the aliens. The familiar was far away, while the bizarre was close at hand.

It would be a while before we’d be ready to ask the heptapods why they had come, or to discuss physics well enough to ask them about their technology. For the time being, we worked on the basics: phonemics/graphemics, vocabulary, syntax. The heptapods at every looking glass were using the same language, so we were able to pool our data and coordinate our efforts.

Our biggest source of confusion was the heptapods’ “writing.” It didn’t appear to be writing at all; it looked more like a bunch of intricate graphic designs. The logograms weren’t arranged in rows, or a

spiral, or any linear fashion. Instead, Flapper or Raspberry would write a sentence by sticking together as many logograms as needed into a giant conglomeration.

This form of writing was reminiscent of primitive sign systems, which required a reader to know a message's context in order to understand it. Such systems were considered too limited for systematic recording of information. Yet it was unlikely that the heptapods developed their level of technology with only an oral tradition. That implied one of three possibilities: the first was that the heptapods had a true writing system, but they didn't want to use it in front of us; Colonel Weber would identify with that one. The second was that the heptapods hadn't originated the technology they were using; they were illiterates using someone else's technology. The third, and most interesting to me, was that the heptapods were using a nonlinear system of orthography that qualified as true writing.

I remember a conversation we'll have when you're in your junior year of high school. It'll be Sunday morning, and I'll be scrambling some eggs while you set the table for brunch. You'll laugh as you tell me about the party you went to last night.

"Oh man," you'll say, "they're not kidding when they say that body weight makes a difference. I didn't drink any more than the guys did, but I got so much *drunker*."

I'll try to maintain a neutral, pleasant expression. I'll really try. Then you'll say, "Oh, come on, Mom."

"What?"

"You know you did the exact same things when you were my age."

I did nothing of the sort, but I know that if I were to admit that, you'd lose respect for me completely. "You know never to drive, or get into a car if—"

"God, of course I know that. Do you think I'm an idiot?"

"No, of course not."

What I'll think is that you are clearly, maddeningly not me. It will remind me, again, that you won't be a clone of me; you can be wonderful, a daily delight, but you won't be someone I could have created by myself.

The military had set up a trailer containing our offices at the looking glass site. I saw Gary walking toward the trailer, and ran to catch up with him. "It's a semasiographic writing system," I said when I reached him.

"Excuse me?" said Gary.

"Here, let me show you." I directed Gary into my office. Once we were inside, I went to the chalkboard and drew a circle with a diagonal line bisecting it. "What does this mean?"

"'Not allowed'?"

"Right." Next I printed the words NOT ALLOWED on the chalkboard. "And so does this. But only one is a representation of speech."

Gary nodded. "Okay."

“Linguists describe writing like this—” I indicated the printed words “—as ‘glottographic,’ because it represents speech. Every human written language is in this category. However, this symbol—” I indicated the circle and diagonal line “—is ‘semasiographic’ writing, because it conveys meaning without reference to speech. There’s no correspondence between its components and any particular sounds.”

“And you think all of heptapod writing is like this?”

“From what I’ve seen so far, yes. It’s not picture writing, it’s far more complex. It has its own system of rules for constructing sentences, like a visual syntax that’s unrelated to the syntax for their spoken language.”

“A visual syntax? Can you show me an example?”

“Coming right up.” I sat down at my desk and, using the computer, pulled up a frame from the recording of yesterday’s conversation with Raspberry. I turned the monitor so he could see it. “In their spoken language, a noun has a case marker indicating whether it’s a subject or object. In their written language, however, a noun is identified as subject or object based on the orientation of its logogram relative to that of the verb. Here, take a look.” I pointed at one of the figures. “For instance, when ‘heptapod’ is integrated with ‘hears’ this way, with these strokes parallel, it means that the heptapod is doing the hearing.” I showed him a different one. “When they’re combined this way, with the strokes perpendicular, it means that the heptapod is being heard. This morphology applies to several verbs.

“Another example is the inflection system.” I called up another frame from the recording. “In their written language, this logogram means roughly ‘hear easily’ or ‘hear clearly.’ See the elements it has in common with the logogram for ‘hear’? You can still combine it with ‘heptapod’ in the same ways as before, to indicate that the heptapod can hear something clearly or that the heptapod is clearly heard. But what’s really interesting is that the modulation of ‘hear’ into ‘hear clearly’ isn’t a special case; you see the transformation they applied?”

Gary nodded, pointing. “It’s like they express the idea of ‘clearly’ by changing the curve of those strokes in the middle.”

“Right. That modulation is applicable to lots of verbs. The logogram for ‘see’ can be modulated in the same way to form ‘see clearly,’ and so can the logogram for ‘read’ and others. And changing the curve of those strokes has no parallel in their speech; with the spoken version of these verbs, they add a prefix to the verb to express ease of manner, and the prefixes for ‘see’ and ‘hear’ are different.

“There are other examples, but you get the idea. It’s essentially a grammar in two dimensions.”

He began pacing thoughtfully. “Is there anything like this in human writing systems?”

“Mathematical equations, notations for music and dance. But those are all very specialized; we couldn’t record this conversation using them. But I suspect, if we knew it well enough, we could record this conversation in the heptapod writing system. I think it’s a full-fledged, general-purpose graphical language.”

Gary frowned. “So their writing constitutes a completely separate language from their speech, right?”

“Right. In fact, it’d be more accurate to refer to the writing system as ‘Heptapod B,’ and use ‘Heptapod A’ strictly for referring to the spoken language.”

“Hold on a second. Why use two languages when one would suffice? That seems unnecessarily hard to learn.”

“Like English spelling?” I said. “Ease of learning isn't the primary force in language evolution. For the heptapods, writing and speech may play such different cultural or cognitive roles that using separate languages makes more sense than using different forms of the same one.”

He considered it. “I see what you mean. Maybe they think our form of writing is redundant, like we're wasting a second communications channel.”

“That's entirely possible. Finding out why they use a second language for writing will tell us a lot about them.”

“So I take it this means we won't be able to use their writing to help us learn their spoken language.”

I sighed. “Yeah, that's the most immediate implication. But I don't think we should ignore either Heptapod A or B; we need a two-pronged approach.” I pointed at the screen. “I'll bet you that learning their two-dimensional grammar will help you when it comes time to learn their mathematical notation.”

“You've got a point there. So are we ready to start asking about their mathematics?”

“Not yet. We need a better grasp on this writing system before we begin anything else,” I said, and then smiled when he mimed frustration. “Patience, good sir. Patience is a virtue.”

You'll be six when your father has a conference to attend in Hawaii, and we'll accompany him. You'll be so excited that you'll make preparations for weeks beforehand. You'll ask me about coconuts and volcanoes and surfing, and practice hula dancing in the mirror. You'll pack a suitcase with the clothes and toys you want to bring, and you'll drag it around the house to see how long you can carry it. You'll ask me if I can carry your Etch-a-Sketch in my bag, since there won't be any more room for it in yours and you simply can't leave without it.

“You won't need all of these,” I'll say. “There'll be so many fun things to do there, you won't have time to play with so many toys.”

You'll consider that; dimples will appear above your eyebrows when you think hard. Eventually you'll agree to pack fewer toys, but your expectations will, if anything, increase.

“I wanna be in Hawaii now,” you'll whine.

“Sometimes it's good to wait,” I'll say. “The anticipation makes it more fun when you get there.”

You'll just pout.

In the next report I submitted, I suggested that the term “logogram” was a misnomer because it implied that each graph represented a spoken word, when in fact the graphs didn't correspond to our notion of spoken words at all. I didn't want to use the term “ideogram” either because of how it had been used in the past; I suggested the term “semagram” instead.

It appeared that a semagram corresponded roughly to a written word in human languages: it was meaningful on its own, and in combination with other semagrams could form endless statements. We couldn't define it precisely, but then no one had ever satisfactorily defined “word” for human languages either. When it came to sentences in Heptapod B, though, things became much more confusing. The language had no written punctuation: Its syntax was indicated in the way the semagrams were combined,

and there was no need to indicate the cadence of speech. There was certainly no way to slice out subject-predicate pairings neatly to make sentences. A “sentence” seemed to be whatever number of semagrams a heptapod wanted to join together; the only difference between a sentence and a paragraph, or a page, was size.

When a Heptapod B sentence grew fairly sizable, its visual impact was remarkable. If I wasn't trying to decipher it, the writing looked like fanciful praying mantids drawn in a cursive style, all clinging to each other to form an Escheresque lattice, each slightly different in its stance. And the biggest sentences had an effect similar to that of psychedelic posters: sometimes eye-watering, sometimes hypnotic.

I remember a picture of you taken at your college graduation. In the photo you're striking a pose for the camera, mortarboard stylishly tilted on your head, one hand touching your sunglasses, the other hand on your hip, holding open your gown to reveal the tank top and shorts you're wearing underneath.

I remember your graduation. There will be the distraction of having Nelson and your father and what's-her-name there all at the same time, but that will be minor. That entire weekend, while you're introducing me to your classmates and hugging everyone incessantly, I'll be all but mute with amazement. I can't believe that you, a grown woman taller than me and beautiful enough to make my heart ache, will be the same girl I used to lift off the ground so you could reach the drinking fountain, the same girl who used to trundle out of my bedroom draped in a dress and hat and four scarves from my closet.

And after graduation, you'll be heading for a job as a financial analyst. I won't even understand what you do there, I won't even understand your fascination with money, the preeminence you gave to salary when negotiating job offers. I would prefer it if you'd pursue something without regard for its monetary rewards, but I'll have no complaints. My own mother could never understand why I couldn't just be a high school English teacher. You'll do what makes you happy, and that'll be all I ask for.

As time went on, the teams at each looking glass began working in earnest on learning heptapod terminology for elementary mathematics and physics. We worked together on presentations, with the linguists focusing on procedure and the physicists focusing on subject matter. The physicists showed us previously devised systems for communicating with aliens, based on mathematics, but those were intended for use over a radio telescope. We reworked them for face-to-face communication.

Our teams were successful with basic arithmetic, but we hit a road block with geometry and algebra. We tried using a spherical coordinate system instead of a rectangular one, thinking it might be more natural to the heptapods given their anatomy, but that approach wasn't any more fruitful. The heptapods didn't seem to understand what we were getting at.

Likewise, the physics discussions went poorly. Only with the most concrete terms, like the names of the elements, did we have any success; after several attempts at representing the periodic table, the heptapods got the idea. For anything remotely abstract, we might as well have been gibbering. We tried to demonstrate basic physical attributes like mass and acceleration so we could elicit their terms for them, but the heptapods simply responded with requests for clarification. To avoid perceptual problems that might be associated with any particular medium, we tried physical demonstrations as well as line drawings, photos, and animations; none were effective. Days with no progress became weeks, and the physicists were becoming disillusioned.

By contrast, the linguists were having much more success. We made steady progress decoding the grammar of the spoken language, Heptapod A. It didn't follow the pattern of human languages, as

expected, but it was comprehensible so far: free word order, even to the extent that there was no preferred order for the clauses in a conditional statement, in defiance of a human language “universal.” It also appeared that the heptapods had no objection to many levels of center-embedding of clauses, something that quickly defeated humans. Peculiar, but not impenetrable.

Much more interesting were the newly discovered morphological and grammatical processes in Heptapod B that were uniquely two-dimensional. Depending on a semagram's declension, inflections could be indicated by varying a certain stroke's curvature, or its thickness, or its manner of undulation; or by varying the relative sizes of two radicals, or their relative distance to another radical, or their orientations; or various other means. These were non-segmental graphemes; they couldn't be isolated from the rest of a semagram. And despite how such traits behaved in human writing, these had nothing to do with calligraphic style; their meanings were defined according to a consistent and unambiguous grammar.

We regularly asked the heptapods why they had come. Each time, they answered “to see,” or “to observe.” Indeed, sometimes they preferred to watch us silently rather than answer our questions. Perhaps they were scientists, perhaps they were tourists. The State Department instructed us to reveal as little as possible about humanity, in case that information could be used as a bargaining chip in subsequent negotiations. We obliged, though it didn't require much effort: the heptapods never asked questions about anything. Whether scientists or tourists, they were an awfully incurious bunch.

I remember once when we'll be driving to the mall to buy some new clothes for you. You'll be thirteen. One moment you'll be sprawled in your seat, completely un-self-conscious, all child; the next, you'll toss your hair with a practiced casualness, like a fashion model in training.

You'll give me some instructions as I'm parking the car. “Okay, Mom, give me one of the credit cards, and we can meet back at the entrance here in two hours.”

I'll laugh. “Not a chance. All the credit cards stay with me.”

“You're kidding.” You'll become the embodiment of exasperation. We'll get out of the car and I will start walking to the mall entrance. After seeing that I won't budge on the matter, you'll quickly reformulate your plans.

“Okay Mom, okay. You can come with me, just walk a little ways behind me, so it doesn't look like we're together. If I see any friends of mine, I'm gonna stop and talk to them, but you just keep walking, okay? I'll come find you later.”

I'll stop in my tracks. “Excuse me? I am not the hired help, nor am I some mutant relative for you to be ashamed of.”

“But Mom, I can't let anyone see you with me.”

“What are you talking about? I've already met your friends; they've been to the house.”

“That was different,” you'll say, incredulous that you have to explain it. “This is shopping.”

“Too bad.”

Then the explosion: “You won't do the least thing to make me happy! You don't care about me at all!”

It won't have been that long since you enjoyed going shopping with me; it will forever astonish me; it will

forever astonish me how quickly you grow out of one phase and enter another. Living with you will be like aiming for a moving target; you'll always be further along than I expect.

I looked at the sentence in Heptapod B that I had just written, using simple pen and paper. Like all the sentences I generated myself, this one looked misshapen, like a heptapod-written sentence that had been smashed with a hammer and then inexpertly taped back together. I had sheets of such inelegant semagrams covering my desk, fluttering occasionally when the oscillating fan swung past.

It was strange trying to learn a language that had no spoken form. Instead of practicing my pronunciation, I had taken to squeezing my eyes shut and trying to paint semagrams on the insides of my eyelids.

There was a knock at the door and before I could answer Gary came in looking jubilant. "Illinois got a repetition in physics."

"Really? That's great; when did it happen?"

"It happened a few hours ago; we just had the videoconference. Let me show you what it is." He started erasing my blackboard.

"Don't worry, I didn't need any of that."

"Good." He picked up a nub of chalk and drew a diagram: