

Second Chance
David D. Levine

This novella originally appeared in *Alembical 2*,
edited by Arthur Dorrance and Lawrence M. Schoen
©2010 and published by Paper Golem LLC

I closed my eyes. The technician smeared my eyelids with a cold gel that smelled of disinfectant, then gently pressed the last set of metal electrodes in place. “All right now, Mister Eades,” she said, “it’ll just be a moment more.”

And then I was falling.

I gasped and jerked spasmodically. But a foul sticky fluid filled my mouth and nose, and my arms and legs met resistance—something hard and cold encased me on all sides. Coughing, choking, retching, I pounded my fists against the smooth unyielding surface. I couldn’t see a thing.

Oh Lord Jesus, I prayed, let me wake from this nightmare. But no dream had ever gripped me with such visceral intensity—trapped, blind, suffocating, tumbling headlong from some unknown height and moments from smashing against the ground—for so long. Still coughing, I brought my knees up to my chest and shoved my feet against the encasing walls, but my legs felt wrong... frail and thin and weak.

Then the lid sprang open of its own accord, sending me tumbling out into the bright chill air. Blinded by the sudden light, barely able to force my eyes open against the coughing spasms that wracked my chest, I thrashed desperately to catch myself on something, anything.

But I was not falling.

My gut and my ears told me I was plummeting uncontrollably through space. My eyes told me I was drifting away, gently rotating, from a man-sized lozenge of white plastic—a vivification capsule. It lay open like a clam. The inner surface glistened with a gray, viscous fluid. A moment later I bumped into a stack of boxes bungee’d to the far wall of the room.

The capsule was fastened to the wall of a small pie-wedge-shaped room. It was one of seven such capsules; the others were dry and empty. Most of the rest of the space was filled with bundles of clothing, boxes, and canisters. I knew this room—or a training version of it. But the version I’d known had not been crammed with unused equipment, and I had never experienced it without gravity.

I was in space. Aboard *Cassiopeia*. For real.

No. This couldn’t be. The first scan was only supposed to be a backup.

Maybe this was some kind of test.

Another fit of hacking, retching coughs made me curl around my aching abdomen, hacking out gout after gout of hot gray mucus from my mouth and nose onto my bare legs. Some of it stuck there, the gray of it looking sickly pale against my dark brown skin. Most floated away in loose obscene gobbets. I tasted phlegm and salt.

I was naked.

I shuddered in the chill air and clutched my legs against my chest—and stopped, amazed. No flabby belly intervened. No aching knees, no creaky hips. I was thin and lithe, with skin as smooth and unmarked as a baby's brown bottom. I inspected my left thumb—the old scar that had cut across the knuckle and permanently marked the nail, souvenir of a broken beaker in a high-school chemistry class, was gone.

No. Not gone.

Had never been there.

My heart raced, and I struggled to control my breathing. I squeezed my eyes shut. Oh, dear Jesus. This was no test.

I wasn't me.

I was a clone. A copy of my body, grown by machines and implanted with a copy of my mind.

Shivers ran through my torso, tendrils of steam drifting lazily away from me in the cold still air, as I tried to get a handle on the situation. I was on *Cassiopeia*, that much was certain, but clearly something had gone very, very wrong. I was supposed to be sedated for the difficult process of rebirth. There was supposed to be someone here to help me. And my memories were supposed to include two and a half years of intensive astronaut training, not just six months.

I twisted in the air, groping for a bungee cord, but misjudged my reach and scraped my hand on the rough plastic panel joint next to it. My body was all wrong—too thin, too long, the skin as delicate as a newborn's; my hands and feet wouldn't go where I wanted. My heart pounded and I took slow, deep breaths to calm myself. On the second try I managed to hook a finger through the cord and pull myself to the cluttered wall. I clung there, panting, reveling in the small triumph.

The many small compartments that lined the walls behind the stacked boxes and cans all bore tidy labels—square machine-produced letters fabricated right into the plastic—and I soon found a towel and wiped the gray slime off myself. One of the bundles gave up a white coverall, rough and over-large. I had never before realized how much I depended on gravity in putting on a pair of pants, but eventually I managed to dress myself and find slippers for my feet. Thank you, Jesus.

The door, a plain plastic panel closed with a simple latch, led to a habitation bay: four doors opening onto a circular space about three meters across and two high, smelling of fresh plastic. I couldn't tell which of *Cassie's* five modules I was in. All five hab bays were identical, with a food prep area and a big wall screen—currently displaying a shimmering grid of colored squares that meant nothing to me—and a circular port in the “ceiling” leading to the adjacent work bay. I pushed off from the wall, caught myself awkwardly on the padded rail that rimmed the port, and pulled myself through.

The work bay was a large cylinder, eight meters in diameter and thirty long, divided into work stations by open-weave plastic partitions. The open central way extended from the hab bay port I'd just come out of, which we called the “bottom,” to the systems bay port at the “top.” At the waist of the cylinder two other ports led to the work bays of the adjacent modules.

Everything I could see was made of fresh gray or black plastic. Gray plastic bulkheads reeked of solvents. Black foam pads on corners and edges showed no wear. Taut gray fabric panels stretched crisp and pristine. Each of the ship's five modules had been boosted all the way from Earth, at great energy cost, as a densely-packed bundle of metal parts, electronics, and complex mechanisms. The ship then self-assembled here at Tau Ceti, fabricating its plastic parts from local hydrocarbons, and color was an unnecessary luxury. The only relief from the monochromatic came from the false colors of scientific displays glowing on some of the monitors. And there were no windows; transparency was difficult to fabricate. The only views outside were from the airlocks at either end of the cylinder.

This place was my home—my whole world—for the rest of this life. Which might be short.

Movement caught my eye: a teenaged white girl, just pulling her head from an open maintenance panel. Tall and waif-thin, with pale, pale skin and a short brush of red-blond hair, she wore white coveralls just like mine, equally poorly fitting on her gamine frame. Who was this girl and what was she doing on board *Cassie*?

As soon as she saw me, she gasped, and paled still further. “Chaz?” she said, nearly choking on my name, and when I heard her voice I suddenly realized who she was.

Kyra. Kyra McCullough.

The last time I'd seen her she'd been a sturdy matron of fifty-one who wore her thick gray hair in a braid.

For a moment we just gaped at each other, hanging blinking in the air. Kyra was supposed to have awakened on mission day three, same as me,

but the way she moved showed that she was already acclimated to free-fall. Something very wrong was happening here.

“Yeah, it’s me,” I said. My voice sounded strange—too high, too thin. “I... I just vived. It was... rough. No sedatives. And my memories... Kyra, I don’t remember a single thing after initial scan.”

“Oh, Chaz...” her eyes glistened, but she didn’t say anything more.

“What day is it?”

“Uh... day ten.”

“And I’m the only one who... overslept?”

She swallowed. “Yes.”

So they’d all been awake for a week or more without me. “Did anyone else have any... memory problems?”

“No. Everyone’s clear, right up to final scan.” She stopped, blinked. “Well, except you. I... Chaz, I’m so sorry... we were... we were going to...”

“Why wasn’t anyone there to help me through vivification?” I was starting to get peeved. “You could at least have handed me a darn towel.”

“I... I’m sorry. You weren’t supposed to w... uh, to wake up by yourself.”

“And who the *heck* decided to vive me with outdated memories?” I spat.

The initial synaptic recordings that had been placed on board along with our cell samples were only a last-ditch backup; they were not supposed to be used unless *Cassiopeia* failed to receive *any* of the scans transmitted from Earth during the two years after launch. And from what Kyra had said, that hadn’t happened. I gave up a lot to join the first crewed expedition to another star, but I still had the Constitutional right to control the destiny of my consciousness, and I had *not* consented to be vived with outdated and untrained memories unless there were absolutely no alternative.

“Chaz....” She swallowed. “We... we didn’t...”

She paused again, seeming to gather herself. She still hadn’t moved from the spot she’d been working when I entered the work bay.

“Chaz, you... you died.”

“I... died.” Repeating the word didn’t make it any more comprehensible. It was as though my ears could parse the sound, but my brain couldn’t attach any meaning to it.

“You died. Almost two years ago... I mean, two years before final scan. Just a week before scan number two. You were hit by a car in a crosswalk. The driver was on skip. We all went to your funeral. Tien sang ‘Rising to the Light,’ it was so beautiful, and the Director said that you...” She seemed to hear what she was saying and cut herself off. “Oh, God....” She wiped her nose on her sleeve. “I’m so sorry, Chaz, I’m such an idiot...”

I realized I had let go of the rail and was floating stupidly in the middle of the port. It must be a mistake. I couldn't be dead.

But I could be. Most likely we all were.

If *Cassie* had reached Tau Ceti on the original schedule, my last Earthbound memories were over eighty years old: forty years of boost from the drive lasers in Earth orbit, thirty years coasting, two years of repeated aerobraking maneuvers in the target system's three Neptune-sized gas giants, and ten or twenty years with *Cassie's* automated systems gathering raw materials and assembling habitations, equipment... and crew. If Kyra were still alive back home, she'd be at least a hundred and forty.

She might be. But I wasn't. This... this copy of me, was the only one.

For a moment I wondered why I hadn't simply been replaced when I died. But *Cassie* was scheduled to launch—no, *had* launched—just days after first scan, with those initial scans and our cell samples on board. After that point, the crew roster was irrevocably fixed.

I must have cheered as the boosters had thundered into the Florida sky. Not knowing I'd be dead in less than three months. Or that my clone would be lived eighty years later with no memory of the event. Trying to make sense of the mixture of future and past made my head hurt.

"Well," I managed at last. My eyes were dry, but I felt brittle and hollow inside, as though I were a mockup of myself built from papier-mâché and chicken wire. Why should I be reacting this way to the news that a body I once occupied had died over eighty years ago? *I* was alive, thank Jesus. And I was on the greatest scientific expedition in human history.

An expedition from which I would never return.

God was everywhere in the Universe, I knew, and before I'd even sent in my application I'd consulted with my pastor and satisfied myself that my clone's soul would be welcomed in Heaven at the end of its mission to Tau Ceti. But now that *I* was the clone, faced with the reality of my own original's death, I wondered anew. How could I be certain that God would not consider this mission a form of extended, technologically-assisted suicide?

I blinked and saw that Kyra was still floating in the same spot. It was as though she feared death might be contagious. "Can I get you something?" she asked. "Something to drink?"

"Yeah. Yeah, that might be a good idea."

She slipped through the port to the habitation bay below, neatly avoiding any contact with me, and came back with a cold squeeze-bulb of tomato juice. "I was hoping for a gin and tonic," I said.

She gave me an apologetic grin. "You know the drill. No solid food for

three days, no alcohol for a week.” Which reminded me all over again that my body was brand new—this throat had never before swallowed anything, and no food or drink had ever before landed in this stomach.

I had thought I was prepared for this. I was learning that I wasn’t. I put my head in my hands... and was startled to feel springy curls instead of the bald pate I remembered.

While I sipped my juice, mind racing, Kyra got on the intercom. “Tench tench,” she said, her voice echoing from speakers throughout the ship, “Chaz is awake. I repeat, Chaz is awake. We’re in Epsilon work bay.”

Tench tench? What was that supposed to mean?

As each of the other crew members floated into the bay, their reactions to me varied. Tien said “oh, Chaz...” and bit her lip, eyes glistening. Bobb gave me a hug, which was very much like him—but it seemed distant, as though he were somehow not really touching me at all. Matt shook my hand and said “Welcome to *Cassie*, mate.” Nuru just inclined her head in solemn greeting.

Mari was the last to arrive, and she didn’t meet my eye.

As for my reactions to them... only the seriousness of the situation kept me from giggling, because the seven of us looked like the junior high school science club. Bobb, a bear of a man back on Earth, was now a tall gawky white guy with just a few wisps of black fuzz on his cheeks. Matt, an avid rock climber and bicyclist, lean and tanned with sinew flexing beneath his tattoos, was now scrawny and pale. Tien had always been elfin, but her Asian elegance had vanished under the same shapeless white coverall and brush-cut hair as the rest of us. Everyone was at least a head taller than I remembered them, the legacy of being grown in zero gravity. None of us would ever be able to stand up in a full gee.

Of course we didn’t expect to ever return to Earth, or to live long enough for the long-term effects of life in free fall to catch up with us, which was why the designers hadn’t bothered making the ship big enough to spin for artificial gravity. It had seemed like a reasonable decision when I’d been making it for my clone, but now that it was *me* up here, all frail and attenuated, I questioned the judgment of my previous self.

Nuru was the least changed of us, I thought at first: even floating in free fall she carried herself with the same grave dignity as before, and the deep brown eyes in that mahogany face, even darker than mine, had lost none of their wisdom. But then I realized how lithe and straight and smooth her body had become, all the infirmities of age cast aside.

And then there was Mari. My eyes kept drifting back to her, wondering what it was about her that made her look *so* different. She had the same lush black

hair and dark expressive eyes, the same fine olive-brown complexion I'd always longed to touch. Maybe she'd lost more weight than some of the others...

No. More than just weight.

Mari was now male.

The realization was like biting into a ripe peach and finding it rotten inside. I knew that there were such things as transsexuals, but I'd never met one before... or so I'd thought. The idea that a person might want to change something so God-given, so fundamental, about themselves was disconcerting enough in the abstract, but seeing such a transformation in someone I'd known—and even been attracted to—was profoundly disquieting.

Before I could really come to grips with Mari, or whatever her-his name was now, Nuru clapped her hands twice. It was her usual way of calling a meeting to order. “Welcome back, Chaz,” she said, and everyone murmured assent. “As good as it is to see you again, I'm sorry it must be under such sad and unexpected circumstances for you. We had planned to delay your vival until we were better prepared to accommodate your psychological needs.” She looked around at her crew, dark eyes lingering on each face in turn. “I don't know why you were vived just now. Bobb, would you please investigate?”

“Monit monit,” Bobb said.

I frowned. What did “monit monit” mean?

They were all looking at me. Except Mari. I shook off the question. “Thank you,” I said, to Nuru and to the group as a whole. “Though I can't say I'm happy to learn of my own death, or to find myself on board with incomplete training, I'm excited to be a part of this historic mission. I hope that you will try to keep my... limitations in mind, and I promise to use as much caution and common sense as I can. But if you see me about to open the airlock thinking it's the bathroom, please don't hesitate to correct me.”

No one laughed.

“So,” I continued, trying to pretend my failed joke hadn't been intended to be funny, “what have I missed?”

In some ways I hadn't missed much. Nuru, the mission commander, had vived ten days ago, the others following at intervals over the next three days. So far they had checked and inventoried all of *Cassie's* systems and performed an initial analysis on the fourteen years of data she'd gathered while building up her systems and crew.

In addition to the three gas giants we'd known about, named Voltaire, Molière, and Balzac by the French scientists who'd discovered them, the Tau Ceti system held at least three terrestrial planets, which we'd christened Achebe, Shakespeare, and Tolstoy. Unfortunately, Tolstoy was

a slushy iceball and the other two tiny, airless rocks—all three subject to constant bombardment from the system's thick disk of planetesimals. Not very hospitable. But that same thick traffic of ice and rock fragments might have hidden other planets from *Cassiopeia's* instruments, so the search went on.

All of that information was fascinating, but not entirely unexpected. On the other hand, *Cassie* herself had sprung a couple of unpleasant surprises.

For one thing, the ship was only three-fifths complete. Alpha module hadn't made the rendezvous—lost somewhere in the vacant light-years between Earth and here. Also lost was Delta, which had made it all the way to Tau Ceti only to burn up in the first aerobraking maneuver. So instead of the planned pentagonal bundle of five cylinders, *Cassiopeia* was a shallow V, with Gamma module between Beta and Epsilon. Fortunately, three modules provided sufficient resources and space for our purposes; the mission had been designed to succeed with as little as one module, but it would have been tight quarters.

The other surprise was that we had no communications from Earth. *Cassie* had not received any data at all from back home for over thirty-three years.

"What?" I shouted as soon as Nuru dropped that bombshell. "No *Earth*?"

Nuru raised one long brown finger. "Ojer ojer. Don't leap to conclusions."

All three of *Cassiopeia's* surviving modules, she explained, had suffered failures in their long-range receivers during the long trip here: Beta during year eight, Epsilon in year twenty-one, and Gamma in year forty-seven. In each module's database, the signals were clear and strong right up to the end of the data, then cut off suddenly—all frequencies simultaneously, both natural and artificial. No disaster, natural or human-made, could have had such an effect; the problem had to be on our end.

"That's what comes of having everything built by the low bidder," Bobb said.

Dear Jesus, protect us from any other malfunction. "But if we can't send our data back home, what's the point of the mission?"

Nuru shook her head. "I didn't say we couldn't communicate *to* Earth. We know from the probe satellites that our long-range transmitters are putting out a good strong signal, and we have a solid navigational fix on Sol, so we can be sure our transmissions will be received. I've asked Bobb to prioritize this problem lower than some other tasks. We can wait a week or two to find out what happened back home while we were in transit."

"Not that it really matters to us anyway," Matt said.

I could see his point, but I couldn't agree. Any news from Earth was purely academic to us, since we'd never be returning, but I did want to know what we'd missed in the eighty years since we'd launched. And we had to establish two-way communications eventually, or we'd lose the insights of Earth's finest scientists into our findings... and we'd never know if we'd made a difference. Even a twenty-four-year wait for our data to crawl Earthward at lightspeed and the acknowledgement to return was better than nothing.

Assuming we survived that long. Amazing as it was that we had made it this far with ship and crew largely intact, we couldn't know how long it might be before the unknown hazards of an unexplored planetary system did us in. Even though we had our whole lives here ahead of us, and *Cassie* was designed to last at least thirty years, the mission planners had drilled into us again and again that we had to move quickly—to get as much data shipped off to Earth as possible, as quickly as possible. *Cassie* had started the job, transmitting her raw data as soon as she'd arrived, but we could add our analysis and direct the instruments to research the most interesting findings more deeply.

Assuming our transmissions were reaching Earth at all. "I'd like to look into the communications problem," I said. Though Bobb was the primary ship systems specialist and my specialty was terrestrial planetology, each of us performed multiple functions and I was secondary on ship systems. "Two pairs of eyes are better than one."

"I'd rather have you doing science," Nuru replied, her dark eyes level. "Now that you're here, I'd appreciate your insights into some questions of Achebe's crustal evolution."

I inclined my head in acknowledgement. I couldn't deny that science had to take precedence over ship systems—unless crew safety was at stake, of course.

#

Mari, our life sciences specialist and the closest thing we had to a doctor, gave me a check-up as soon as the initial meeting was over. "Breathe in," she said, listening to her stethoscope and not meeting my eye.

I inhaled as requested, watching her face. Now that I saw her... him... without make-up, without décolletage—for that matter, without breasts—I saw how blocky the planes of the face were, how thick the jaw and wrists. How had I ever considered her attractive? "So," I said on the exhale, "what do I call you now?"

She-he didn't look up. "Mari."

"No... I mean... what pronoun do I use?"

“She.” Mari turned me brusquely in the air and rapped on my back with two fingers. I noticed she was still avoiding looking me in the face. “Breathe in again.” I did as she asked, and then bent and stretched and presented various body parts as requested.

I tried to think of Mari as “she,” really I did, but I found it impossible to ignore the very male body that was so disturbingly close to me. And when she put on the rubber gloves and asked me to turn around for a prostate check... “No way!” I said, holding up my hands.

Mari turned away from me, seeming to gather herself, then turned back. “Look, Chaz, I know how uncomfortable this makes you, but you’ll just have to deal with it. I’m female where it counts... up here.” She tapped her forehead. “Always have been, always will be.” Her words began to gain speed and vehemence. “I’ve lived as a woman since I was sixteen, and I didn’t get the surgery until I was thirty-five. Just having a *penis*”—she spat the word—“didn’t make me male then, and it doesn’t now!”

“Hey, cool down!” I sputtered. “I need a chance to... to get used to the new you. Maybe we could, you know, talk it over.”

Mari threw up her arms, her face livid with anger. “You and I already hashed this whole thing out once, back on Earth, and you were a real shit about it! I don’t see any reason I should have to go through the same painful process again for your sake.”

“But that wasn’t *me*! And I don’t see any reason I should have to suffer for the mistakes of that previous person.”

“Then who should? Me? *Again?* No thanks.” And she kicked off from the med station and disappeared into the work bay below.

I didn’t follow.

#

A couple of days later I was in Beta work bay, peering into a stereoscopic viewer at a pair of images from Achebe. This planet was similar to Mars, but a little smaller and a little farther from its star, which with Tau Ceti’s lower luminance meant it was substantially colder. It also showed little sign of naturally occurring radioactivity. That lack of energy should have made Achebe solid rock almost all the way to its core... yet there were signs of recent tectonic activity. Either we’d misinterpreted those signs, or the theories of planetary evolution would need to be revised. Which was, after all, why we were here.

It sure would be nice to know for sure that the data we were gathering was being successfully transmitted. Bobb was working on the communications issue but he kept running into problem after problem—hardware failures,

software glitches, database snafus—and could frequently be heard cursing the subcontractor responsible for the long-range receiver. These problems made the idea that the communications failure was entirely on our end seem more and more likely, even as they made it harder to debug. I shook my head and returned my attention to planetology.

At the moment I was looking at a surface feature that looked like a huge, ancient impact crater pulled into two separate half-circles by the motion of two plates of Achebe's crust—something never seen on any body so small and cold in Sol system. I was hoping that a stereo view would help convince me I was really seeing evidence of tectonic motion, and not just a pair of semicircular rilles that happened to look like the halves of one battered crater. But the two images in the stereoscope had been taken too far apart, and the attempt just gave me a headache.

I pushed away the stereoscope and called up an orbital chart on the monitor. *Cassie* was in an elliptical solar orbit at an angle to the plane of the ecliptic, an orbit that avoided most of the system's dense and dangerous cloud of planetesimals while still taking us in naked-eye observational range of many of the system's most interesting bodies every fifteen years or so. At the moment we were almost 800 light-seconds away from Achebe, and getting farther away every day, but two of the dozens of probe satellites that *Cassiopeia* had scattered throughout the system over the last fourteen years were in orbit around it. And, according to the chart, one of them was in almost exactly the right place. I used my stylus to direct it to take a high-resolution stereo pair in IR and visible light, then moved onto another phase of the analysis while waiting for my images to arrive.

Ten minutes later I got something, but it wasn't what I'd expected. Tien shot out of the port from Gamma work bay, diving right at me and looking like she was ready to spit nails. "What were you *thinking?*" she said, jerking to a halt with one hand on a panel edge.

"What?"

"You just turned Sat Fourteen around to point at the damn planet. I was in the middle of a system-wide solar wind analysis that needed simultaneous data from all the sats. I'm going to have to set up the whole thing again! You've cost me *days* of work!"

So that had been the meaning of that cryptic confirmation message. Focused on my task, I'd just tapped OK as I did on so many other such messages. "I... I'm sorry. I didn't know..."

"Why the *hell* didn't you check the chromo first?"

"The what?" The word was vaguely familiar, but with all the new

concepts the crew had thrown at me in the last few days I couldn't keep them all straight.

"The fucking *chromo!*" She pulled herself in front of me and keyed my monitor to a new display. Hundreds of tiny colored squares filled the screen, shimmering and shifting about like the crowd at a soccer game. She pointed at a wide band of light teal that spread across the lower part of the screen, with one orange square vibrating in the middle of it. "See? There's Sat Fourteen, right in the middle of my pattern."

"I... I see, but I don't understand. I've never seen this display before."

"You... you've... *ooh!*" She squeezed her eyes shut and shook her head with an inarticulate noise of irritation. "Kay kay. Hue is topic, luminance is importance, saturation is relevance. Proximity indicates correlation, of course. Jitter is freshness, jump is urgency. Use the help if you get lost." She pointed to a tiny question mark in one corner. "If you have any questions, ask Bobb. But until you can learn how to avoid stepping on other people's work, I'd suggest you leave the damn sats alone! Now if you'll excuse me, I have a solar wind analysis to set up. Again!"

And she dove through the port back to Gamma.

After Tien left, I just hung there for a moment, clutching my stylus and clenching my teeth. How *dare* she just barge in, rip me a new one, bury me under incomprehensible jargon, and storm out? It wasn't my fault I'd died. I hadn't asked to be vived without proper training. I was trying as hard as I could to catch up, and I'd asked the crew to cut me some slack. If this was the consideration I got... well, then, to heck with her.

On the other hand, I *had* messed up. I should have realized that a satellite was a shared resource, and found out how to check that no one else was using it. I should have read and understood the confirmation message before tapping OK. But I hadn't, and now I'd made an enemy.

I considered following Tien and asking her forgiveness, but the vehemence with which she'd departed made me think that it might be better to wait a while, until she calmed down. In the meantime, I decided to learn about this "chromo" thing so I didn't make any more stupid mistakes.

I stared at the jittering, dancing array of squares for a while longer, feeling foolish and angry with myself, then tapped the question mark—the only thing Tien had mentioned that made any sense at all.

A chromo, it turned out, was a shared-source software tool for visualization of dynamic information. The *Cassiopeia* crew hadn't started using them until some time after my last memory. But, according to the local history log, once they'd started the team had gotten into the tool in a big way,

and used it to coordinate all their activities. Several members of the team—including, most disquietingly, myself—had even developed new software features and contributed them to the chromo-using community. The satellite information chromo Tien had showed me was just one of a dozen in the ship's computers.

I could see how useful chromos could be—the information density of that twitchy screen was enormous. I could also see that, unless you had started from the beginning and learned the system bit by bit as it grew in complexity, the learning curve would be extremely steep.

There was a tutorial. I started in on it.

#

We had one meal a day together, in Gamma habitation bay; we called it “dinner” although it was breakfast for some, a midnight snack for others. This was our time to share findings as well as food.

Tien had put some amazingly beautiful photographs of Balzac's ring system up on the big monitor. As the slide show advanced, she pointed out the delicate structure of the G ring, peculiar waves in the H ring, a shimmering rainbow of ice crystals in the B ring. Balzac's rings were even bigger than Saturn's, relative to the size of their primary, and their peculiarities hinted at answers to longstanding questions about the formation and maintenance of Saturn's rings—answers that would never have been forthcoming from study of only a single solar system—and raised more questions, even more intriguing than the answers. Ideas and speculations ricocheted around the habitation bay like lasers, with Nuru finishing Kyra's sentences and Mari pointing out interesting implications of Tien's latest theory.

At one point Matt's hand brushed against Tien's, and a significant look passed between them. I wondered if they were sleeping together.

Sex was permitted by the mission profile. All the women were on birth control, of course, implanted before vival. We'd been offered sex-drive suppressants as well, but after reviewing the side effects we'd agreed as a group that no matter how young and lithe our cloned bodies might be, our minds were those of mature adults and we could deal with the close quarters without chemical assistance. It was another decision that had seemed to make sense when I was making it for my clone.

Despite the lively technical discussion, Kyra was looking sad and pensive. “I wonder what Mkebe Osarenogowu would think of all this?” she asked, naming one of the most prominent astrophysicists back home... or at least, one who had been prominent at the time we'd left. He was almost certainly dead by now.

“Or *anyone* on Earth,” Tien added, reminding us all that we still had not re-established contact. Faces fell all around the table.

Bobb looked both sheepish and angry. “I’m sorry, guys,” he said, shaking his head. “I’ve been giving the problem as much attention as I can, but every time I think I’m getting close to a solution it seems that something else breaks.”

Nuru broke the melancholy silence that followed by taking the remote and advancing to the next image. “What’s that feature there?” she asked Tien, pointing out a thread-thin wavy ring in the otherwise-empty gap between D and E rings. Tien started to explain, getting more and more excited about the possibilities, but Kyra had a different theory, and soon a lively scientific debate erupted.

Tien waved her spring roll at the monitor to emphasize some point. Kyra grabbed at the remote to zoom in on the gap, but Matt was more interested in another part of the image and refused to hand it over. The two of them mock-tussled briefly over the remote, until Matt neatly slipped it out of Kyra’s grasp and flipped it behind his back to Nuru. But Mari snagged the remote from the air, and used it to back up to a previous image she’d wanted to examine in more detail. “Otcha otcha!” said Bobb, and everyone laughed.

Everyone but me. I found their doubled slang pointless and childish. Usually I could puzzle it out—“otcha otcha” was “gotcha”, just as “kay kay” was “okay” and “ojer ojer” was “hold your horses”—but it didn’t seem worth the effort. I sighed to myself and took another swallow of my tomato soup. It was too salty. When it was my turn to cook I’d show them how much better it could be with less salt and more herbs.

And then I noticed what I was thinking. “Them.” How had this happened? When did I start thinking of my crewmates as “them”?

It had been so different six months ago... six months ago in my memories, that is; six months before first scan, which turned out to be my last. That was when the crew had taken its first meal together, right after the press conference where our selection had been announced to the world. The President had been there, and representatives of all the other countries participating in the project, and we were all in our finest formal clothing, but even as the tuxedoed waiters brought out the fish course on chilled china with the White House seal we couldn’t help peering at each other and grinning our fool heads off.

We’d made it!

That dinner was the culmination of a selection process that had taken almost three years. This was the first crew of astronauts ever to be selected entirely on the basis of experience and intellect rather than physical fitness, and tens of thousands of scientists worldwide who’d never before considered

themselves astronaut material had applied. The chosen seven who'd emerged from that process ranged in age from forty-eight to eighty-three, and many were fat or frail, but that didn't matter—after two and a half years of intensive training together, we would return to our previous lives, sending copies of our memories and skills to Tau Ceti in fresh young bodies.

On that evening the seven of us might as well have been one person. Despite our different ages, backgrounds, and races, we were all intensely committed to science, showed great mental agility and world-class expertise in two or more fields, and were prepared to commit the next two and a half years of our lives to the *Cassiopeia* mission. Not to mention we'd all survived the same gantlet of tests, interviews, and simulations. As each of us faced the same questions from the reporters and politicians, we gave similar modest answers, but we saw in each other's eyes the same triumphant gleam. And when, after the formalities had concluded, we withdrew to our hotel, we stayed up talking and laughing until nearly dawn, too amazed at our good fortune to sleep. The next day we'd flown to Dallas to begin our training.

It had all started out so well. But the rest of the crew had been through two more years of training than I had... two years to build up skills and tools and slang that tied them together into a single functioning unit. A unit that didn't include me.

Fine. It wasn't my fault, and it wasn't really their fault either. I would just have to make the best of it—to try to fit in as best I could.

#

I continued to study the planet Achebe, delving into the mystery of its tectonic activity. New satellite photos—this time properly scheduled via the chromo—confirmed that the thing I'd thought was an ancient crater torn apart by crustal drift really was what it seemed to be. But scans for radioactivity turned up negative, and there were no nearby large bodies to produce heat by tidal squeezing. So what was the source of the energy that kept the mantle fluid enough for the tectonic movement I'd seen?

I stretched in the air and stuck my stylus back in its holder. Maybe a short break would refresh my mind. I shoved myself away from my work station, turned in the air, and grabbed a strut to propel myself to the habitation bay.

I floated through the habitation bay's central space and into the airlock in the "floor," swinging the hatch shut behind me as required by protocol. Being just one door away from vacuum made it all feel more real, somehow; it put me more in touch with the fact that I was really in space.

But that wasn't the main reason I liked it here.

The window in the center of the outer hatch was round, twenty centimeters in diameter—I could easily span it with one hand—and already slightly scratched and smeared with fingerprints. And the view was nothing special, to be honest... spectacular ringed Balzac was farther from our current location than Saturn was from Earth at closest approach, the other planets even further away. In fact, all I could see through the window was a few bright dots, and those only if I pressed my face to the window and shielded my eyes with my hands. I didn't know which of those dots were planets; I hadn't tried to correlate the view with the orbital charts. But the sun whose rays warmed my skin through that window was not the Sun—it was Tau Ceti.

I was one of only seven human beings ever to bathe in the light of another star.

I floated there for a while, the window's plastic cold against my forehead, soaking in that alien sunlight. But then my reverie was interrupted by a muffled curse. It was followed by another curse, this one loud enough to be clearly audible through the plastic of the inner airlock door.

Curious, I returned to the habitation bay, where I saw light leaking around the door to Matt's room. That door was also the source of a continuing muttering and scuffling sound. "Are you okay in there?" I called.

Matt's voice was curiously muffled. "Actually, I'd appreciate it if you'd give me a hand..."

I'd never been in Matt's personal space before. The walls were bright with photographs of Matt and his wife, and various other trim, muscular people, on mountains, rock walls, trails, and beaches. He must have used his entire paper allowance for the first month on them. Matt himself floated awkwardly in one corner, holding his left bicep firmly with his right hand.

The hand was wet with blood. Small drops of blood floated all around it... blood, and something else. Something black.

"Can you snag me that bottle there?" he said, gesturing with his chin. He was clutching some kind of instrument between his teeth.

I grabbed the indicated bottle from where it floated near the air vent—the place where all dropped items accumulated—and tossed it to Matt. He caught it with his bloody hand and squirted clear liquid onto his bicep, drawing in his breath with a hiss as he did so. A sharp tang of alcohol hit my nostrils.

As Matt daubed away the alcohol with a fabric wipe, I saw that the injured bicep bore the outline of a four-leafed clover, cut into the skin and oozing blood. The whole area was stained black with ink.

"A *tattoo*?" I said. "You can't be serious."

“What does it look like?” he replied, and squirted more alcohol onto the cut.

“But...” I’d never understood why anyone would get a tattoo at all, never mind doing it to himself with a sharpened pair of tweezers. “I don’t get it. There’s nobody here to impress.”

He inspected the damaged area with a hand mirror, then started rolling a fabric gauze bandage around his arm. “I didn’t do it to impress anyone. I did it for me. Tear me off some of that tape, would you?” I did as he asked, handing him strips of tape one at a time. “Every tat I had, back on Earth, commemorated a significant experience in my life. This one is to remind me how lucky I am to be here. And to remind me who I am.” He patted a plastic covering sheet onto the bandage; a little blood was already seeping through the fabric.

“And who are you?”

Matt looked me right in the eye. “I’m me. Me, here, now. *Not* the man who had three red and gold koi put on his left bicep in Kauai when he was twenty-three. That man was an astrophysicist, and he probably died at the bottom of some crevasse on Earth forty years ago. But the man with a lucky clover on his bicep is a fucking *astronaut*. This tat helps me remember which of those men I am.”

Matt’s intensity was almost scary. “You’re taking your own death a lot better than I did.”

“Well, for me it’s just theoretical. No one here went to my funeral.”

I looked down. “Unlike me.”

“Buck up, mate. You’ve got a whole new life to screw up.”

I had to grin at that. “Thanks.”

#

I used the remote to move the pointer on the big monitor. “So here’s Anansi crater, the feature that first gave me the clue. You can see how the two halves appear to have been pulled apart by tectonic activity. But Achebe’s too small and cold to be tectonically active. So what’s up?”

Mari didn’t look up from her omelet. She had barely had a word for me since the day I’d been vived. Tien, too, had been very distant ever since I’d spoiled her solar wind experiment. But the others looked on with varying levels of interest. I’d been keeping to myself for the last week, thrashing out the details on my theory, and they wanted to know what I’d come up with.

I swallowed, then continued. “I’d like you to note how badly hammered the crater is by later impacts. It looks like it’s a million years old. But when I did a gravitic scan for mascons, I found what I think is the original impact

body just a few kilometers below the surface. That, and a seismic ring analysis, lead me to conclude that this crater is less than ten thousand years old. Achebe gets a *lot* of impacts.”

My heart, already pounding hard, picked up the pace even further. I'd always been nervous about public speaking, never more so than when introducing a new idea, and in this case I was venturing into entirely new theoretical territory. I put up a slide full of statistics and formulae.

“We don't yet know exactly how many megatons of rock and ice land on Achebe every year. But based on Matt's preliminary orbital analyses of the planetesimal disk, I've estimated the average impact frequency and the impacting objects' mass and velocity.” I switched to the next slide, which showed a graph of estimated temperature overlaid with an annotated cross-section of the planet. “Based on these estimates, the total energy added from infall is between ten to the twenty-first and ten to the twenty-third joules per year.” Another slide crammed with data. “That might be just enough to keep the magma layer below the crust liquid, accounting for the otherwise unexplainable crustal movement.”

No one said anything. They were all just looking at me.

This wasn't the reaction I'd expected. I'd investigated an extremely interesting anomaly and devised a radical new theory to explain it. I'd hoped for acclaim, but had been prepared for an argument. I got... silence.

I managed a wavery grin. “Any questions?”

After another interminable pause, Kyra spoke. “That's an excellent confirmation of Pederson and Wu. But do you have anything new to add?”

I felt blindsided. “I'm sorry?”

“Pederson and Wu. From Washington University. They published after... after you died, but surely you did a literature search?”

“I... I did, yes, of course I did, but it didn't turn up those names.” I stared from face to face, in hopes that someone would rescue me from this appalling situation. But Tien just looked exasperated, Bobb refused to meet my eyes, and Nuru was slowly shaking her head. I fumbled with the remote, keyed in a search. “Peterson?”

“Pederson,” said Kyra. “With a D as in dog.”

There it was, right at the top of the first page of results. *Dynamic analysis of particulate interaction with prolate spheroids*, from the *American Journal of Topology*. It was dated over a year after my last Earth memory. “This is pure mathematics,” I said. “It doesn't have any relevant keywords.” No wonder it hadn't turned up in my searches.

“That's what Pederson and Wu thought,” said Tien. “But the planetology

community realized that this thesis, applied to meteorite impacts on Saturn's moons, could explain why Enceladus is so smooth."

I scrolled through the results, increasingly frantic. There were several references to the Pederson and Wu paper, but they were all in the pure math realm. "There's no sign of that connection in the database." I felt my voice trying to crack, but clutched the remote and kept it under control.

Nuru spoke up. "This was all happening right before final scan. We all knew about it, but it's possible that none of the papers on the planetology connection were actually published before the database was put to bed." She gave an apologetic little smile. "I think there was a poster session at the ASPS conference."

"Poster sessions don't appear in the conference proceedings..." I began, but it was hopeless. I'd blown it. I should have dug deeper into the literature, should have asked someone else to look at my conclusions, shouldn't have been so eager to believe I'd discovered something completely new.

I didn't finish my sentence. I left the remote hanging in the air, left my lunch untouched, left everyone behind me. I needed to be alone for a while.

No one followed.

#

I pushed myself through the air, not really looking where I was going, glancing painfully off of panels and struts. Eventually I found myself in the airlock off of Epsilon habitation bay, near my personal space. I closed and dogged the inner hatch, then curled up into a ball, clutching my knees. I drifted, trembling.

I could see now that I had never really fit in with the rest of the *Cassiopeia* crew. They were all from academic or government service backgrounds; I was the only one who'd come from industry. I'd put myself through college as a welder, then worked in the space development sector for years before going back for my doctorate at age thirty-one; they were mostly from privileged backgrounds and had been in one branch or another of space science for their entire careers. I was the only black person other than Nuru—and she was the commander, which set her apart. I was the only regular churchgoer in the bunch.

Oh, sure, we had all bonded at first. But from here I could see the cracks that had already been developing in that bond between me and the rest of them by the time of first scan. The two years they'd worked together without me had only deepened those cracks.

I wiped my nose on my sleeve. Okay, so I didn't fit in. What the heck was I going to do about it?

I might be out of sync on the technologies. I might be out of date on the science. I might be completely out of step with the rest of the crew. But I still had all the real-world skills that had earned me my position as secondary on ship systems: diagnostic, debugging, and repair skills independent of any specific technology.

Even if my relationship with the crew was beyond repair, at least I could fix anything broken in the ship itself. And there was one thing that I already knew was broken: the communication link from Earth.

The malfunction, whatever it was, had not stopped us from continuing our mission. With dozens of sats sending in petabytes of data every day from a whole new solar system, every one of us had more than enough fascinating work to do that the absence of news from Earth was something we could sometimes forget for days at a time. But I'd browsed through the forty-seven years of data we *did* have, and it just made me more curious about what had happened after that.

"Who cares?" Matt said when I brought up the issue during a coffee break one day. "It's just old news, and completely irrelevant to us. Look at this." He pulled up a page of headlines on the big screen. "Is this 'Goruba Jost' a video star, a politician, or a beach resort? What are 'greeblies' and why are the 'woffers' so upset about them? And this is from just twenty years after we left! The newer stuff is even less comprehensible. Why are you worrying about trivia from Earth when there's more than a lifetime of fascinating science to do right here?"

Knowing I'd never convince him, I mumbled some excuse and turned away. But he hadn't changed my mind either... I'd already followed the lives of my nieces and nephews as far as I could, and I wanted to know more about them, their children and grandchildren, the places I'd lived...

Nuru kept reminding us that our primary mission was to gather as much data as possible and send it back as quickly as possible. Only when we had completed the initial system survey and our situation seemed stable, she said, would we have time to spend on distractions like catching up with eighty years of scientific progress back home. But I'd done the best I could toward our primary mission and I'd gotten nowhere with it. Here at least was something I knew I could *do*.

#

I'd poked at the problem a few times in the two weeks I'd been awake, but hadn't even been able to determine the cause. Now I threw myself into the investigation full time.

I started with basic hardware diagnostics. I was certain that Bobb would

already have run those, but I wanted to establish a firm baseline. And in only a few hours of work, I did determine that the communications hardware was operating properly—at least to the extent it was able to check itself.

But a hardware diagnostic was just the first step—like making sure a non-functioning device was actually plugged in and booted up. The next phase would dig deeper, isolating each component and testing its inputs and outputs separate from the system. I wrote myself a checklist and set to work.

Days went by, then weeks. Each time I thought I'd found the source of the problem, it seemed that something else nearby would fail, requiring me to fix that before I could proceed. With nothing to report, other than that I was spending almost all my time on a side project that Nuru had explicitly told me not to do, I spent less and less time in the common area at dinner, just dashing in, grabbing a bite, and dashing out; finally I stopped attending completely. I spent hours at a time with my head buried in access panels, or staring at technical readouts. Sometimes I went for days without speaking to anyone.

Nobody seemed to be missing me much. Mari, Tien, and even Bobb—who'd become extremely distant, for no reason I could discern—were probably quietly relieved that I wasn't doing anything to mess up their science or rile up their emotions. Nuru had always given her people a pretty free rein, and probably assumed I was going into more depth on Achebe's crust; she didn't pester me for a status report. And Kyra and Matt were busy enough with their own work that they might not even have noticed I wasn't interacting with them as much as I used to. Or else they, too, were relieved at it.

But no matter how hard I worked, how little sleep I got, how many other malfunctions I worked around, the answer was always the same: Nothing. Nothing. Nothing. It was an engineer's nightmare—all the pieces worked, but the whole didn't. The big dish was able to receive signals from our probe satellites, the signal was properly amplified, the amplified signal could be decoded, the decoded signal could be stored. That was under test conditions. But when I put all the pieces together and pointed the dish at Earth? Nothing.

Naturally, I began to worry that it was Earth, not the dish, that was at fault. But with all three modules showing the same sudden cut-off of both natural and artificial signals at different times, that seemed unlikely. A global multiple thermonuclear detonation would have ended with a burst of radio noise; a meteor strike would have been followed by the calls of the survivors, for at least a few hours. And when I reviewed the news channels for the weeks and months before the final recorded transmission in year forty-seven, there was no hint of concern about a disaster of global proportions. I couldn't

imagine anything big enough to take out an entire planet that could strike without any warning at all.

The problem *had* to be on our end.

But then, after another fruitless day—another day of trying to solve a problem that, from all I could tell, didn't actually exist—I awoke from three hours of sleep with a key realization. Stark naked, I logged into the database from the screen in my room.

Cassiopeia's five modules had all been built from the same designs at the same time by the same contractors. It wasn't completely astonishing that a subsystem had failed in the same way on all three surviving modules. But I hadn't seen that kind of triple failure in any other subsystem. For that matter, I hadn't seen even one other failure big enough to take out an entire critical subsystem on even one module, and the long-range receiver was certainly a critical subsystem.

I'd inspected all the pieces and they were all working. The only thing that could have caused the same failure in all three modules was a systemic integration or design problem, but I couldn't imagine how a problem that widespread could leave no other symptoms.

So I looked to see if there were any other differences in the three databases that might tell me what had gone wrong. But I soon discovered that *Cassie's* merged database didn't record the source of each individual record—I had no way to tell whether any given piece of data had been recorded by Beta, Gamma, Epsilon, or a mix of the three. There was a field for that information, but it was inexplicably blank in every relevant record. And when I went to check the original, separate databases...

They weren't there.

I ground my teeth in frustration. *Cassiopeia* had capacity for at least thirty years of data—there was absolutely no reason to have deleted those databases after the merge, no matter how redundant they may have seemed. But they weren't in the primary store, they weren't in the backup, they weren't in the archive, and they weren't in the redundant array.

And we sure as heck didn't have any off-site backups.

I floated, staring at the screen, feeling the sweat cooling on my flat belly and worrying at the things I wasn't seeing. The missing data indicated a serious problem—I wasn't yet sure if it was software, hardware, or human error. The word "sabotage" tickled at the back of my head, but I brushed it away. No need to be paranoid. Yet.

I threw on a coverall and headed off to Bobb's room, in Gamma module.

We didn't all keep the same schedule, but there was a rough consensus ship's "day" and "night," and this was the deepest part of the night. Most of the lights were off, and I drifted past static monitors and stowed equipment that loomed like reefs in a darkened ocean. My sleep-deprived brain saw movement in corners where no movement should be.

I paused at Bobb's door. No light was visible behind it, and I heard a faint rumbling snore. I asked myself if this problem was really urgent enough to justify waking him.

But just as I raised my hand to knock, a raucous klaxon sounded throughout the ship. At the same moment the emergency lights slammed on, blinding me with harsh flat whiteness.

Impact alarm.

I spun in place, blinking in the sudden light and momentarily disoriented. Where was the nearest brace point? The nearest vacuum shelter? The nearest hull repair kit? Before I could regain my bearings, a hammer blow of sound punched my ears, followed by a harsh, high-pitched whistle.

That wasn't good.

Bobb's door burst open, seemingly silent against the whistle of air and the klaxon's repeated blasts, and Bobb tumbled out, struggling into his coverall.

Matt followed him out, buck naked and holding his coverall in one hand.

As I hung slack-jawed at this development, Bobb zipped up his coverall and moved to a wall panel, where he stilled the klaxon. In the ear-ringing silence that followed, the whistling hiss of escaping air was very loud. Bobb cocked his head, listening, then kicked off from the airlock door and shot through the port into the work bay above. Matt and I followed.

The hiss was coming from behind a monitor at the gamma ray spectroscopy station. The monitor itself was black, its screen cracked in a jagged Y, and there was an acrid smell. I popped open the access panel at the base of the station and flipped circuit breakers—a fire now would only make things worse. As I worked, I prayed hard, over and over: "Lord Jesus preserve us, Lord Jesus preserve us..."

Bobb and Matt, meanwhile, were trying to remove the monitor from the wall, so they could repair the hull breach behind it. But though Bobb strained at the wrench handle, it wouldn't budge. "We'll have to saw it loose."

"Too slow," said Matt, and pulled a heavy prybar from the tool box. The tool's momentum made his free-fall movements awkward, but he tucked his legs into the work station's restraint and smashed the prybar repeatedly against the broken monitor's casing. But the casing was made of the same

tough plastic as the hull, and apart from sending a few additional glass fragments sailing into the air, this had no effect.

By now Nuru and Mari had appeared, from their rooms in Gamma hab, and Bobb had briefly explained the situation to them. “You’re just wasting time with that,” Nuru said to Matt. “We’ve already lost almost fifty pascals of pressure. I want you and Chaz to prep for EVA.”

Matt and I exchanged a glance of deep concern. But Nuru was right, as usual—it was beginning to look as though we might not be able to even see the hull breach, never mind repair it, from inside any time soon.

We pulled the emergency air barrier across the port between Gamma work and habitation bays as we passed through it. The barrier’s translucent plastic bellied taut as soon as it was sealed, pointing out the seriousness of the leak. Then, after crossing the habitation bay and entering the airlock, we closed and dogged the inner airlock door behind us. The latches snicked into place with disturbing finality.

I called up the decompression checklist on the airlock’s little monitor. It had one hundred and ninety-seven steps and, even under emergency conditions, took a minimum of two hours and twenty minutes. While Matt unshipped the lock’s two exercise bicycles, I pulled two oxygen masks from their sterile wrappers.

As I inserted the oxygen hose connectors into the socket on the wall, I was uncomfortably reminded of the situation I’d encountered just before the impact alarm. Matt and Bobb had both been in Bobb’s room. In the middle of the night. With the lights off. Naked.

What had they been doing in there?

I had some idea—I wasn’t naïve. But the very thought made me queasy.

I shook the image out of my head and fastened one of the masks over my nose and mouth, then handed the other mask to Matt. Once he’d donned his mask, I programmed the airlock for EVA stepdown, then fitted my feet into the bike’s pedals and began to pump.

It seemed insane that, with the ship losing air and an emergency spacewalk on the agenda, the first thing we had to do was work up a sweat. But our EVA suits were run at a fraction of the ship’s air pressure—it made it possible for them to be much lighter and more flexible—and if we subjected ourselves to that lower pressure too quickly we’d get the bends. Nitrogen bubbles expanding in our bloodstreams could cause severe pain, neurological disorders, and even death. So we had to get all the nitrogen out of our blood before decompressing, and the fastest way to do that was to exercise vigorously while breathing pure oxygen.

We pedaled together for a few minutes in silence, side by side, the masks' straps waving around our faces like kelp in the sea as we strained at the pedals. We'd alternate pedaling and resting for the next half-hour, while the airlock ramped slowly down to suit pressure. Then we'd help each other don our suits.

As I mentally reviewed the suit-up process, I became keenly aware of how intimate it was. The liquid-cooled undergarment had to be smoothed over each limb, with no wrinkling or bunching at the armpits or crotch. Fastening the lower torso unit involved a very close embrace around the waist and hips. And fitting the urine collector...

I thought back to one of the last psych interviews I'd endured before the final selection was announced. "We're a little concerned about some of your sensitivity scores," the young white psychologist had said. Two cameras and a large one-way mirror peered over his shoulders. "You show a forty-three percent tendency to homophobia."

"I was raised in a pretty traditional family," I'd replied carefully, knowing that my selection for the Tau Ceti mission was on the line and that any attempt to BS a professional psychologist would only make things worse. "I won't deny that my parents taught me there are absolutes of right and wrong, especially when it comes to sexual behavior. But at the same time they taught me to respect everyone, no matter what their lifestyle or beliefs. Check my record and talk with my colleagues. I think you'll find that, whatever my personal opinions, I've worked cordially with people of all orientations and gender expressions."

"We have already done so, or you and I wouldn't be having this conversation. But some of your prospective crewmates are faggots and dykes." He was a professional; he spoke the words without any trace of emotional content. I was being tested. "You will be trapped in a small spacecraft with them for the rest of your life. How does this make you feel?"

I swallowed, tried to slow my heart rate. "I'm... conflicted. My father would have me hate the sin and love the sinner. But I know there's no room for any kind of hatred on board *Cassiopeia*. And I know that Jesus said nothing about homosexuality." I sat forward in my chair. "What He did say was that there are no greater Commandments than these: 'love thy God with all thy heart' and 'love thy neighbor as thyself.'" My hands clenched together under the table. "I try every day to express that love. Sometimes it's hard. But we're all God's children, so I keep trying."

The psychologist hadn't even blinked. But I must have convinced someone, because the issue had never been raised again.

Suddenly, without preamble, Matt spoke. “I’m sorry you had to see that,” he said, his voice ringing hollow in the oxygen mask. “Me and Bobb, I mean. I know how much it upsets you.”

It wasn’t the first time I’d been surprised by another member of the crew seeming to read my mind. “Am I that transparent?”

Matt shrugged, but said nothing. His facial expression was obscured by the mask.

“I mean...” I said, after a long uncomfortable moment of silence, then trailed off, not sure what I did mean. I tried again: “I mean... aren’t you *married?*”

“That was someone else. A man with a goldfish tattooed on his arm.” He indicated the shamrock tattoo, still angry red around the edges, with his chin. “This whole expedition is a new adventure... a new life. What better time to try something different?”

My mouth must have gaped open at that, because the mask lost its seal and started whistling around the edges, reminding me of the air leak we were going outside to patch. I closed my mouth and the whistling stopped. “I can’t believe anyone could be so flippant about something so serious.”

“Why does everything have to be *serious* with you, Chaz? Can’t you just accept a little fun as something worthwhile in itself?”

Fun? I noticed I was pedaling harder, as though I were trying to get away. I brought my speed back down with an effort. Love thy neighbor as thyself. “I’m sorry. It’s just... it’s not...”

“Not what? Natural? Neither is wearing clothes. Not to mention cloning, synaptic recording, and interstellar travel.” He shook his head. “Look, neither of us is going to get pregnant, there are no sexually-transmitted diseases in this entire solar system, and no one’s cheating on their spouse... the old ‘until death do us part’ clause has been invoked. The worst that could happen is that someone gets hurt emotionally. And that could happen even without the sex. So where’s the harm?”

“But... *Bobb?*”

“Why not? He’s a real sweetheart. And, to tell you the truth, I felt a little sorry for him. How’d *you* like to be the only gay man for twelve light years?”

“Bobb?” But even as I said it, I knew it was true.

“Gay as a happy day. I still can’t believe you never twigged to it.”

Desperate for something to take my mind off this conversation, I reached out and flipped the wall monitor from the EVA checklist to an air pressure graph for Gamma work bay. Still falling steadily. At this rate we had about five hours before we’d have to seal off and abandon that bay. Given that it was the central point of our truncated ship—everything connected to

everything else through that bay—losing it would be a major disaster. “We need to discuss strategy for the repair. We’ll only get one shot at it.”

For the next hour we talked through the agenda and procedures for our upcoming spacewalk, while we alternated pedaling and resting and the air pressure in the lock slowly dropped. Every minute or so I had to swallow to make my ears pop.

Our biggest problem was the swarm of asteroid fragments traveling with the ship in orbit around Tau Ceti. For the last couple of decades, *Cassiopeia* had been intercepting asteroids whenever they came near its path. Those whose spectrum indicated useful materials, such as water, oxygen, or the carbonaceous chondrites that could be processed into plastic, were captured and mined by *Cassie’s* fabricators, and the unusable rock and metal ores discarded—smelting the metal was beyond the ship’s capabilities. But it’s difficult and expensive to throw anything away in space—unless we wanted to fit each piece of trash rock with an engine, it would move in the same orbit as *Cassie* until our next course change. So anyone on EVA ran the risk of cracking open his helmet on a heavy, jagged rock.

Given the current configuration of the swarm, visible on the same radar that had sounded the warning for the meteoroid that had hit us, I proposed that we leave the thruster packs in the airlock and go handhold-to-handhold across the hull. But Matt gestured at the air pressure graph, rubbing his shoulder with the other hand. “We don’t have enough time. The last time I did something like this in the tank, it took me over an hour to crawl half-way down the ship. No, we have to take the thrusters... we’ll just keep a sharp eye out for flying rocks.” He rubbed his shoulder again.

I switched the monitor to the radar display. “We’ll have to take the long way around the ship, then...”

But Matt interrupted me with a sharp indrawn breath. He winced, clutching his shoulder... and then his eyes went wide and his pedaling faltered.

“What’s wrong?”

“My shoulder hurts!”

We both knew what that meant. Joint pain was one of the symptoms of decompression sickness. “It can’t be the bends. We’re breathing pure oxygen at”—I switched the monitor back to the airlock status display—“almost half an atmosphere.”

But Matt wasn’t looking at the monitor, or at me. He was staring over my shoulder, at the point where the hoses from our masks attached to the wall. “Son of a bitch!” He stopped pedaling, ripped the mask off his face, and punched the big red EMRG REPRESS button.

“What the heck are you doing?” I shouted over the roar of inrushing air.

“Look at the valve!”

I looked where he was pointing, at the valve that controlled the flow of oxygen to our masks.

It was set to MIX. We weren’t breathing pure oxygen, we were breathing the usual mix of oxygen and nitrogen. And we had been for the last hour and a half, with the pressure dropping and the nitrogen seething in our bloodstreams.

“Oh shit.” I had missed one of the hundred and ninety-seven steps in the EVA checklist. No, two of them—I’d failed to switch the valve to OXY, and then I’d failed to check the valve setting. “I.. I’m sorry. I don’t know how I missed...”

“I know exactly how you missed it,” Matt said. The rush of air was rapidly fading as the lock pressure came up to standard, his anger rising with it. “You were too busy worrying about who was putting whose cock where.”

“I never...” But no... I couldn’t deny it. I’d been distracted, and it could have killed both of us. I shut up, started again. “You should put your mask back on.” Pure oxygen was standard treatment for the bends.

Matt never took his eye off of me as he re-fitted his mask and ostentatiously switched the valve from MIX to OXY. I immediately tasted the difference in my own mask—the pure oxygen was rich and invigorating, with a slight iron tang. How could I have failed to notice its absence? Matt rubbed his shoulder again, his face taut. He moved to the wall and keyed the intercom. “Tench tench,” he said, his voice echoing dully from beyond the inner hatch. “We’ve had a malf in Gamma hab lock and we’re both suffering possible stage 1 DCS. Have repressurized. Situation stable. Please advise.”

A moment later Nuru’s voice came back. “Oppy oppy, Matt. Stay where you are, and keep the pressure up. I’ll have Kyra and Mari prep for EVA from Gamma sys lock.”

“Oppy oppy,” Matt acknowledged, then cut the connection. He stared at the intercom for a long moment, then shouted “Damnit!” and slammed his palm against the wall. The whole airlock thrummed and he rotated slowly as he rebounded from the force of the blow.

“I’m sorry,” I said again, though it didn’t help anything.

“You’re sorry.” He didn’t even look at me. He just swam back to the monitor and programmed the lock to raise the pressure to an atmosphere and a half.

“Kyra and Mari...”

“They’re not going to make it in time.” Now he did look at me, and I wished he hadn’t. “By the time they get out there they’ll have only half an

hour—an hour, tops—to find the hole and patch it. We'll have to evacuate Gamma work bay." The vacuum that would ruin all the organics and volatiles in the bay—almost one-third of the ship—couldn't have been any harder or colder than his face just then. "You've screwed us all."

"I didn't do it on purpose."

Matt's eyes were icy above the mask. "You shouldn't even be here."

"What the heck's *that* supposed to mean?"

He started to respond, then cut himself off, waving a hand in front of his face. "No. Never mind. I shouldn't have said anything."

"What did you mean by that?" I demanded.

"Never. Mind." Our eyes locked for a long cold moment.

In the end I was the one who had to look away. I'd screwed up; he had every right to be upset.

We stewed in silence for half an hour, floating in enforced idleness—any exertion could make the bends worse—and watching the work bay pressure graph fall, slowly and steadily. At least I wasn't in any pain.

"How's the shoulder?" I asked at last, unable to stand the silence any longer.

Matt flexed and stretched it. "Better," he admitted. "I think I'll be okay."

The silence wore on.

"Matt..."

He looked at me.

"You told them it was a malf. You didn't say it was me who messed up." I swallowed, to relieve the pressure in my ears. "Thank you."

Matt sighed. "I didn't want to make your life any more hellish than it already is." Then he turned in the air so he could look me square in the eye. "Listen, Charlie," he said. It was the first time anyone in the crew had called me "Charlie" since the first day of training, when Kyra had noticed that everyone but Bob and I had four-letter names and we changed them for solidarity. "I shouldn't tell you this..."

Just then the intercom burst into life. "Tench tench," came Nuru's voice, breathy with exertion and excitement. "Leak is stabilized. I repeat, leak is stabilized. Kyra and Mari, abort emergency prebreathe protocol; I still need you to go outside to complete the repairs, but no sense rushing things. Matt and Chaz, report status."

Matt keyed the microphone. "DCS symptoms resolved, situation stable. We will continue at one point five atmospheres for four hours."

"Oppy oppy."

Matt blew out a breath in relief, then keyed the mike again. "How'd you fix the leak?"

“Bobb managed to unbolt the whole damn section from the hull. There’s crap floating all over, but we found the hole and patched it.”

“Thank you, Jesus,” I said.

#

Everything was set aside for the next couple of days as we finished cleaning up from the meteoroid strike. Kyra and Mari completed their spacewalk without incident, welding a patch onto the hull to complete Bobb’s temporary repair of the fingertip-sized hole. The rock that had made it had been smaller than a grain of sand, and had evaporated on impact. Meanwhile, the rest of us labored to put all the equipment back the way it had been before the strike.

I couldn’t get Matt to admit what he’d been about to say. Whatever it was, though, I was convinced it was tied into whatever was making me such a pariah.

And I *was* a pariah. I wasn’t certain whether it had gotten worse, or whether I was just noticing it more, or whether I was becoming increasingly paranoid, but it was clear to me now that everyone was giving me a wide berth. Conversations stopped when I drifted near. People refused to meet my eyes, or—even worse—I looked up from my work and discovered they were silently watching me. I wondered if Matt had quietly spread the word about my error in the airlock, but that didn’t seem like him.

It couldn’t be racism... could it? But no, even Nuru was avoiding meeting my eyes.

Whatever the cause, there seemed to be little I could do about it other than to be as unobtrusive as possible. Whenever I considered confronting Nuru or Mari about the crew’s behavior, I balked—surely complaining about the situation would make it even worse. So once the ship had returned to normal, I retreated to the communications problem I’d been working on before the impact.

My database searches led nowhere. The merged data just stopped forty-seven years after launch; the three original databases were simply gone, with no clue as to what had happened to them. When I asked Bobb to look into the situation, as I’d been about to do at the moment of the meteoroid strike, he begged off—too busy with recovery and maintenance operations. No one else had Bobb’s expertise in ship systems, and in any case they were all even less willing to give me any of their time than he was.

At least Bobb had offered an excuse. Mari simply waved me away whenever I tried to talk with her.

I spent a lot of time alone. The airlock was less appealing than it had

been, so I started taking extra shifts in the greenhouse, the rotating transparent tube full of plants that turned our waste products into food and oxygen. No one liked working there, necessary though it was to our continued existence, because it stank of sewage and the CO₂-heavy air led to lethargy and headaches. But I learned to cope, because it was better than the looks I got in the work and habitation bays.

It was while I was in the greenhouse, pinching back the soybeans, that I realized I was going about the communications problem all wrong.

At a certain point in the plants' life cycle, it was necessary to pinch off the growing stem end to encourage them to put more of their energy into beans rather than leaves and tendrils, a painstaking and tedious job because of the crowded conditions. I was ducking my head back and forth as I reached through the tangled vines, trying to see if I'd missed any wayward sprouts, when the shifting image reminded me of something I should have known all along.

Humans had been using multiple small radio receivers to achieve the effect of a single giant dish—a technique known as “long-baseline interferometry”—for almost a century. It was really just an extended version of the way that two eyes can give a better picture of a three-dimensional object than just one, and the farther apart the eyes the more pronounced the 3-D effect.

We already had a flock of satellites spread across Tau Ceti system. Though their radio dishes were smaller than the big dish on *Cassiopeia*, if I pointed two or more of them at Earth and combined the signals together I might be able to pick Earth's signal from the Sun's background noise. And the information I gained from the exercise might be helpful in figuring out what was broken in *Cassie's* receivers.

Over the next few days I researched interferometric techniques, found a useful set of subroutines in the ship's software library, and reserved time on five satellites. I was being extremely cautious—I didn't want to antagonize anyone with my use of satellite or computer resources.

When my reserved time arrived, the five satellites swiveled themselves to focus on Earth and kept up this scrutiny for a full eight hours. Post-processing took another two hours. During this time I floated among the tomatoes and zucchinis in the greenhouse, trying to distract myself with pruning and pollinating but actually accomplishing little more than plant-assisted nail-chewing. When my watch chimed, I rushed eagerly to Delta work bay, where the monitor revealed...

Nothing.

The interpolated data of the five satellites did not show any signal from Earth at all.

I checked and rechecked my procedures, verified that I was using the subroutines properly, made sure that the data was not corrupt. Everything seemed nominal. But when I checked the timestamps on the data, I discovered that the satellites' realtime clocks were not properly synchronized; they varied from each other by as much as an hour and a half.

Accurate timestamps were critical to interferometry. The data was useless. And with the satellites scattered all over the system, as much as seven light-hours away, it might not be possible to synchronize them now.

Maybe there was a way. But even as I looked into the problem, my frustration grew. Bad enough that no one on the ship would talk to me, now even the machines were being uncooperative...

"Are you almost finished with the main processor array?"

I looked up from the monitor. It was Mari, floating with one foot hooked into a restraint and her arms folded across her flat chest. She'd grown her hair out, but it didn't make her look any more like a woman. Even thinking of her as "she" made my head hurt.

"I didn't want to say anything," she continued, "but your reservation ran out over three hours ago."

"This is important," I said. My teeth clenched on the words.

"Well, the rest of us have important data to process too..."

"And why is *your* important data always more important than *my* important data?" Matt and Nuru, working at their own stations at the other end of the work bay, turned at the sound of my voice. "I've tried hard. I've been cooperative. I've learned your procedures, followed your rules, listened to your stupid-oopid doubled slang for months now, and all I've gotten in return is the silent treatment!" The anger and frustration I'd been building up for weeks came pouring out. "What about *me*?"

Mari was backpedaling away, clumsily beating the air with her hands as she tried to get away from my tirade.

"I didn't mean to die! I didn't ask to be vived without training! All I wanted was a little patience, a little compassion... but you... *all* of you!" I swiveled in place, taking in Nuru and Matt—and Bobb and Kyra, who had just arrived as well, drawn from adjacent modules by my shouting—with a broad sweep of my arm. "You've all treated me like... like dirt, and I'm tired of it!"

"Chaz..." Nuru began, but I cut her off.

"No more explanations," I said. "No more recriminations. I just want a little..." I was choking up. "... A little respect..."

They were all staring at me. I couldn't blame them—I was ranting, self-centered, over-emotional...

Oh dear Jesus. They'd never take me seriously now.

I opened my mouth to explain... but I could barely breathe past the swollen lump that had appeared where my tonsils used to be.

Eyes stinging, I struggled out of the restraint at my work station and launched myself past a startled Mari and Bobb... up to the systems bay and through the lock there into the greenhouse.

I floated among the peas and peppers, curled in a ball and shaking with pent-up tears that would not come. The air here was foul and heavy. My life stank like sewage.

Once I had thought that being selected for the *Cassiopeia* crew was the greatest thing that could ever happen to me. How had it come to this?

A long time later, I heard the lock from Delta open. "Chaz?" Matt's voice. I didn't even grunt. The greenhouse wasn't that big; if he really wanted to find me, he'd find me.

Eventually a shadow fell across me. "I'm sorry, Chaz."

"You didn't do anything," I said to my knees. "I got frustrated and lost my temper."

"No. I did do something. To you. We all did."

That got me to uncurl and look at him, though my vision was blurred. Tears don't fall in zero gee. I waited.

Matt hooked an elbow around a nearby structural element. He started to speak, hesitated. Tried again.

"You died just a week before scan number two—almost six months after your last scan. You know that, right?"

I just looked at him.

"Haven't you wondered what happened during those six months?"

I considered the question. "No more than any of the rest of the two years I don't remember."

He turned away from me, spoke to the transparent plastic of the wall. "Chaz, this is going to hurt you. But you deserve to know."

"Okay, let me hear it." I wasn't really ready to hear any bad news, but this was the first time in months anyone had even started to talk straight to me and I wasn't going to let the opportunity slip by.

Matt sighed. "Okay." A long pause, then he turned back and looked straight into my eyes. "Not long after the first scan, you and Mari started dating."

"Mari." Oh, Jesus.

“Yeah. You didn’t know. About her, um, personal history.”

“No. I didn’t. Were we... intimate?”

“Alas, yes. And when you found out... well, it was pretty traumatic, for both of you. You were...” A rueful little smile came to his eyes. “Well, Chaz, frankly, you were a real shit about it. Railing up and down about how you’d been deceived, how filthy you felt. You told me that when you came home that day you stood in a scalding hot shower and scrubbed yourself raw for over two hours.”

If Mari had had sex with me without revealing she was really a he... oh, dear Jesus. No amount of love-thy-neighbor could have gotten me to accept that kind of dishonesty. I felt nauseous just thinking about it, and it hadn’t even happened to me. Not in this body, anyway.

“After that, it got really ugly. You refused to be in the same room with her. And when Bobb got tired of you going on and on about it—basically, how awful it was to have sex with another man—he told you about himself, and that made the situation even worse. The mission planners had to halt the training while we all went through counseling together. I think you wanted out just as much as we wanted you out, but *Cassie* had already launched, with all our cell samples on board—we *had* to learn how to work together.”

My mouth was dry. I worked up some spit and swallowed. “Did it... did it work?”

Matt thought about that for a minute. “I think it was starting to. But then you got hit in that crosswalk.” He turned away from me again. “To be honest, once we got over the initial shock, we were... relieved. Until we realized we would *still* have to work with you when we got to Tau Ceti.”

I had nothing to say. The silence stretched out between us.

Matt turned his head to me, but his body still faced away. “Chaz... you have to imagine how it was for us. After two years of training, we were more than a family, we were a *unit*. A finely honed machine with no extraneous parts. And every day we knew that we were going to wake up on *Cassiopeia* and have to deal with... you. Touchy, rigid, unforgiving, homophobic. With all kinds of bad history with Mari and Bobb, and to a lesser extent with all of us. And completely untrained—”

“I’m not ‘completely untrained.’ We crammed in a lot of training in the first six months. They wouldn’t have launched with those initial scans unless they thought we knew enough to complete the mission.”

Matt shook his head slowly. “We all thought that at the time. But after two more years of training we could see how naïve we’d been.” He held out his hands in an appeal for understanding. “Imagine you’re a senior in

college. And you know that when you graduate you're going to have to go into business with... no, *marry*, your freshman roommate. Who hasn't changed a bit. Still a freshman. Still as ignorant, immature, and annoying as he was back then, while you've turned from a high school kid into a functioning adult. But you can't get out of the deal."

"You could have given me a chance..."

Matt closed his eyes, shook his head hard. "You hurt too many people, too badly. We voted not to vive you."

I blinked, trying to assimilate what he'd said. They'd voted. Not to vive. Me.

Matt opened his eyes. "We had to meet in secret. The mission planners would never have agreed. But it was unanimous."

They'd voted not to vive me. Unanimously. "How..."

"It wasn't hard. You were in the third group. Once Bobb was awake, he just jiggered the software so you wouldn't wake up."

That wasn't what I had been about to ask. I'd been starting to say "how could you?" But... I could see how. And why. I imagined what I might have done if Matt or Bobb had turned out to be a rabid white supremacist. I might have voted the same way.

Matt was still talking. "But we didn't want to... uh, to dispose of.. you. Your body. We just left it in the capsule. Too uncomfortable to think about, I think. And we were busy."

Another long silence. This time I broke it. "So... why did you change your minds?"

Matt sighed, deep and long. "See, that's the thing. We didn't."

"You... didn't?"

"Nope. When you woke up, it was a surprise to everyone... or at least, everyone *said* it was a surprise. Bobb swears it wasn't a hardware or a software glitch. So, on top of the stress of having you around, we've all been trying to figure out what... or *who*... made it happen." The wry little smile returned. "Under the circumstances, I'd actually say we treated you comparatively well."

My mind was awash. Too much to take in. "Why are you *telling* me all this?" My voice cracked as I said it.

He blew out his cheeks. "Damn good question. Maybe I thought we weren't being fair to you. Maybe I just got tired of the strain of keeping secrets." He shrugged, spread his hands. The light of Tau Ceti, shining through the vines and leaves, dappled his shoulders. "Anyway. There it is, and here you are, and here we all are. So what are we going to do about it?"

“Matt... it wasn't *me*. I didn't do any of those things. I didn't even know they'd happened.”

He paused, considering, rubbing his cloverleaf tattoo. “That's as may be. But even so, *we* still have all that bad blood with *you*. And you might do the same things again.”

“But I *haven't!* And I *won't!*”

He fixed me with a hard stare, like the one he'd given me in the airlock when I messed up with the oxygen. “Not in the same way. But you've still been cruel to Mari, and to Bobb. And me.”

I curled up again, hugging my legs to my chest, leaves crinkling against my back. “I'm sorry,” I said to my knees. It seemed painfully inadequate, but it was all I had to offer. “At least... at least now I know. I can try to change.”

There was a long silence. “Yes,” Matt said at last. “You can try.”

I raised my head and saw that he was reaching out a hand to grasp my shoulder. But when he saw I was looking, he drew it back.

“I'm sorry,” I said again.

Without a word he turned and made his way back to the ship. I heard the lock close behind him.

#

After that conversation, I cried. A lot. And I prayed, and cried some more.

Eventually I came out of the greenhouse. But I found I couldn't meet anyone's eyes. Every time I met Mari or Bobb, in the kitchen or while passing from one module to the next, as soon as I opened my mouth to speak my throat tightened up and forced me to silence. How could I ask their forgiveness when I didn't even have first-hand knowledge of what I had done to hurt them? Indeed, could I truly be forgiven for acts I myself had not committed?

And even though I had not hurt any of the others as badly, to talk with them was just as impossible. It was a difference of degree, but not of kind.

So I kept to myself. And I continued to pray for guidance.

And I kept working, on mission science as well as the lack of communication with Earth. Because I had always found that engaging my intellect in a scientific or technical problem was the best way to free up my soul for deep contemplation, and there were so many questions that still needed investigation, no matter how badly messed up my personal situation was.

Thus it was that I came to knock on Matt's door, four days later.

“Sup sup?”

“Matt, it's me. I need to talk to you.”

A moment later, Matt opened the door. He wore only a towel tied around his hips. “That’s a change.”

I swallowed past the lump in my throat. “Please.”

Matt’s eyes never left mine as he moved to one side, silently pulling the door open for me.

“I’ve been looking some more into the question of Achebe’s crustal temperature. Balzac and Voltaire have moons that are also warmer than expected, and I’m beginning to wonder if they might be hospitable to life.”

“I’ll help if you like, but that’s really Mari’s specialty.”

“I know.” I swallowed again. “I... I can’t talk with her.”

“So you want me to be your intermediary? I’m sorry, I can’t—”

“No,” I interrupted. “I need your help in... changing my attitude.”

Matt looked a question at me.

“I want a tattoo.”

He blew out his cheeks and pulled his bare legs up under himself. “I see. You want to mark yourself as a new man.” He gestured at his cloverleaf. “Like me.”

“Yes. But... um, where would it hurt the least?”

He grinned at that. “Someplace with plenty of meat between the skin and the bone. Bicep is good, or buttock. Depends on whether you want to show it off or not.”

“Bicep. I want people to see it.”

“And have you thought about what kind of image you want?”

“I have. I want a lamb.” The lamb of God, but I didn’t say that. “To represent new life, a new start.”

Unfortunately, neither Matt nor I had any artistic talent, and I twitched away from the pain a couple of times. So the lamb came out looking more like a rain cloud—a lumpy blob with four jerky lines coming down from it—crudely sketched in blood and ink. But I knew what it meant.

It still took me a couple of days to steel myself to face Mari. I floated at the bottom of Epsilon work bay, watching her as she jotted notes on one monitor while staring intently at another. Finally I squeezed my still-bandaged arm—the pain reminded me that whether or not I was the person who had done those hurtful things, I was not the man I had been; I was born anew, with a chance to begin again. I kicked off the bulkhead and drifted up behind Mari.

She noticed me immediately; her body language told me that. But she refused to acknowledge my presence, continuing to work, her back turned to me.

Her hair had grown long and loose and curly, the way it had been back on Earth. From here I could imagine everything else was as it had been as well. I could understand the attraction my earlier self had felt.

I waited. Though I wanted desperately to leave, to avoid confrontation, to not think about what this person had under her coverall, to keep pretending we were not all trapped in a tin can together for the rest of our lives... I waited.

Finally she stabbed her stylus back in its holder. Without turning, she said "Well?"

I had to clear my throat before I could speak. "I would like your help."

Now she did spin to face me, and her dark eyes were hard. But as soon as she saw the bandage on my arm they softened a little. "You're hurt."

I waved dismissively at the bandage. "It's nothing. No, I need your help on a scientific problem."

She cocked her head—not making any promises, but willing to listen.

I told her how I'd done infrared observations of the moons of the three gas giant planets, trying to confirm my analysis of Achebe, and had found several moons whose surface temperatures were unexpectedly high even after applying the Pederson/Wu equations. Voltaire's moons Cunegonde and Paquette were close to their primary, and tidal squeezing might be enough to explain the difference. But Balzac's fourth moon, Bianchon, was much warmer—more than warm enough for liquid water, in fact—though Balzac itself orbited barely within Tau Ceti's habitable zone and any water on its moons should have been frozen solid for most of its year.

"Have you looked for greenhouse gases in Bianchon's atmosphere?"

I had, and the results were most intriguing, but I wanted her opinion... and I needed to work on my humility. "Well, I'm not sure I know how. Could you give me a hand with the spectrographic analysis?"

Mari scooted to one side, allowing me to fit my legs into the other restraint at her work station, and called up the spectrograph control software on the monitor. "Where's your data?"

I learned a lot from watching her work—she guided the software with delicacy and finesse, teasing and cajoling meaning from the raw data many times faster than I'd been able to. "Huh," she said as the graphs built up on the screen. "That's odd..."

"What?"

"Greenhouse gases, all right. Carbon dioxide, methane, and... looks like... oxygen?" Her eyes widened at that last.

As I'd thought. I was pleased to have my analysis confirmed, and also to be working side-by-side with Mari on the question. It was a start, anyway.

We worked together for hours. I was familiar with the data, because I'd collected it; she knew what it meant, and how to use the tools. But as we worked I realized her understanding of the ship's computer systems was shallow—expert though she was in her specialist software, she made almost no use of automation or datastreaming. So, as we went on, she learned from me even as I was learning from her. And together we discovered that Bianchon was a very interesting place.

There were what Mari called “anomalous indications of biological activity.” Might be life, might be something else, but *something* was generating oxygen there. The atmosphere might even be breathable—cold and thin, but capable of sustaining human life. Perhaps.

Too bad we didn't have any way of landing there. Adding a lander to the mission, never mind the gene banks and other colonization equipment some had insisted should be included, would have raised the weight of each module above what the boost lasers could push to Tau Ceti. But we could drop one of the atmospheric drones. The nearest satellite with drone capability was orbiting Balzac and could be in position in a couple of weeks. We told it to make all deliberate speed.

While we were waiting for that data, the question remained open: where was the oxygen coming from?

The problem drew Mari and I together. We built on each other's ideas, shot theories back and forth, argued over the meaning of the data. But though we had probably exchanged more words in a matter of hours than we had in the whole rest of the time we'd been at Tau Ceti, we were still uncomfortable with each other—emotionally reserved, overly sensitive to each other's personal space, shying away from any kind of physical contact. And when we realized just how long we'd been working without sleep, we went to our rooms with only a very formal good-night. Still, it was a start.

#

Over the next few days, between sessions with Mari on the anomalous composition of Bianchon's atmosphere, I continued to tackle the lack of communication from Earth. But all the dead ends I'd run into before were still dead. I tried a couple of techniques to resynchronize the satellites' clocks, or compensate for the lack of synchronization, but no matter what I did the result was the same: nothing.

Finally, after much introspection and prayer, I asked Bobb for help. He was in Gamma systems bay, cleaning the air filters—a messy chore he happily abandoned to help me.

“Have you tried a Fourier analysis on the data from one satellite?” he asked.

“Uh...”

Talking with Bobb was much harder than I’d expected it to be... harder even than with Mari. Maybe it was because he was so much bigger than me. Some part of my brain kept wondering what I would do if he tried to jump me. I kept reminding myself that this fear was ridiculous, but it was deeply ingrained. Love thy neighbor, I reminded myself.

“I don’t think there’s enough signal there for that to be worthwhile,” I said at last.

“Maybe not. But it’s still worth a try.” He wiped his grimy hands on a towel and headed down to the work bay.

Once we set up the Fourier transform, it took only a few minutes to run. The result, as I’d feared, was inconclusive—natural radio noise from the Sun was the dominant factor in the signal, and any artificial signal from Earth was drowned out even after processing. We really needed to combine the signals from several satellites to augment the resolving power of their little radio dishes, but without a solid timestamp on the data that wasn’t possible.

Bobb’s face grew thoughtful. “What about a natural timestamp?”

I understood immediately. “I don’t know if there are any pulsars in the data.” But if there was one, we might be able to use its regular radio pulses as a natural clock to line up the signals from the different satellites.

“Only one way to tell...”

We signed up for the big dish on *Cassiopeia*—although I considered the whole system suspect, it had the potential to give us a quick positive—and pointed it toward Earth, then set up routines to troll the data for a faint regular pulse in the appropriate frequency range.

In some ways, doing the work with Bobb was more comfortable than working with Mari. We had similar skill sets, so it was more cooperative than mutually instructive. But the fact that I’d seen Bobb and Matt together was like a constant background noise.

Every time I found myself wondering where those hands, that mouth, had been, I reminded myself that it was wrong to think of him as “a homosexual.” He was more than what he did in bed. He was a whole human being—and a fine human being, far more tolerant of me than I’d been of him. As we worked, he displayed no discomfort or awkwardness from my earlier self’s mistreatment of him.

I felt like a heel.

Bobb’s brow furrowed, then his eyebrows shot up. “Hey! Got one!”

“Let me see.”

He swiveled his monitor so we could both see it. “There.” The graph showed a nice periodic pulse at 260 MHz, not very powerful but extremely crisp and regular.

Extremely crisp. I’d never seen a natural signal with such a constrained pulse width. “Wait a minute. What’s the period?”

“A little under a second.” He tapped with his stylus on the controls. “Point eight two seconds, to be precise.”

“Wait, wait...” A memory nagged at me. Each of *Cassie’s* five modules broadcast a module beacon—a powerful omnidirectional ping at 215 MHz, which they used to locate each other on arrival at Tau Ceti. “If it’s 215 megahertz, blueshifted to 260...” I turned the monitor toward myself and popped up a calculator window, which told me that the source was approaching at nineteen percent of lightspeed. A very familiar number. And subtracting the same blueshift from the signal’s 0.82-second period yielded an original period of... exactly one second. “Look at this. One second period. 215 megahertz. Nineteen percent of lightspeed. Does that mean anything to you?”

Bobb’s eyes widened and his mouth broke into a huge grin that echoed my own. “The module beacon.”

We looked at each other. “It’s *Alpha!*” I shouted.

Bobb and I grabbed each other in an enormous hug, laughing and pounding each other on the back. The return of the lost module meant more metals... more instruments... more living space! We scooted off in opposite directions to share the happy news with the rest of the crew.

I didn’t realize until I was talking with Matt that I’d embraced Bobb without fear. I smiled to myself at that.

#

The grainy image on the big monitor showed why Alpha was so late. One of the four sails that was supposed to catch the light from the boost lasers, then drop off for coast phase, was still attached—bent and twisted into a crumpled C shape. The sail had probably jammed on initial deployment, and had cut the module’s thrust during boost phase by twenty percent or more. There was some concern that the jammed sail could cause problems during the first aerobraking maneuver, as Alpha slammed into Molière’s atmosphere at interstellar speed. But simulations showed that it would most likely come off as the module’s aerobraking ballute inflated, and if it didn’t do that it would probably simply burn away early in the maneuver.

Everyone chattered excitedly over the personal possessions the module held. My own two hundred and seventy grams was mostly devoted to a pocket

Bible that had been my grandfather's—I remembered thinking of alpha and omega as I placed it in the bin labeled ALPHA. But then my breath caught in my throat as I remembered something else that was on board the wayward module—a full set of crew tissue samples and memory scans. Left to its own devices, Alpha was fully capable of reconstituting the entire crew by itself.

Of course, that wouldn't happen. We had already transmitted the rendezvous code, and when Alpha joined us after two years of deceleration it would be unoccupied. But if the situation had been reversed, if it had been Alpha that had arrived on time and the other modules delayed, it would have been Alpha's cells and scans that would have created... me. Or someone like me.

Would that person have had as tough a time of it as I had? Probably he would not have been lived at all. I still didn't know why *I* had been.

Which made me realize that Alpha carried one other thing of interest.

A full set of data from boost and coast phase. And possibly the answer to the missing signal from Earth.

#

Nuru's eyes flicked back and forth between two monitors filled with figures. "Yes?" she said without looking up.

"You've locked me out of the big dish."

She glanced up at me, then returned her gaze to the monitors. "I have."

I waited for an explanation. When I didn't get one, I said "I need it to retrieve Alpha's coast-phase data."

Nuru paused, then closed her eyes and steepled her long brown fingers in front of her nose. "That's exactly why I placed that hold."

"Oh?"

Now she did look at me. Her dark, liquid eyes held mine with firm intensity. "Chaz, you've been spending far too much time on this side project. We are here for science, not engineering."

"What good is science if we can't send our results back?"

"Transmission's working fine. You've said so yourself. And as far as our *basic scientific mission* goes"—she emphasized the words with an index finger driven hard into the palm of her other hand—"we won't need to receive anything from Earth for almost twenty-four years. Plenty of time to fix the receiver. Assuming we live that long."

I was momentarily taken aback, but then I recovered: "If there have been any relevant advances in basic science since we launched, they'll be beaming them in our direction right now. We don't want to be spending our precious time out here reinventing the wheel."

She didn't blink. "Zac zac. This environment is dangerous—we have no idea how much time we have. So I want you to focus your attention *on the mission*. Do I make myself clear?"

I felt my heart beating in my throat as Nuru and I stared at each other for a long moment. "Perfectly clear," I said.

She returned her gaze to her screens, dismissing me.

#

I swallowed and licked my lips before speaking. Bobb and I were alone in his quarters, which made me nervous for many reasons. But what I had to say could not be overheard. "Something very peculiar is going on."

Bobb just looked at me, questioning.

I swallowed again. "Look... I know you guys voted not to vive me."

He dropped his eyes from mine. "Yeah. I... I thought you might find out eventually. I'm sorry." He looked up. "They did it for my sake. And Mari's. I... I wasn't happy about it, but it would have seemed... ungrateful not to go along."

"I'm sorry too. For the way I treated you. The first me."

Bobb's lips pursed. Contemplative or angry, maybe a little of both. Then he sighed and shook his head. "Water under the bridge, Chaz. You would have gotten over it eventually, if... if you hadn't died."

"Well, I'm back now. And I'm trying. To get over it."

"I can tell."

We floated there for a while, each with our own thoughts. "But that's not the only thing," I said eventually. "Nuru's put a lock on my access to the big dish. She says I'm spending too much time trying to re-establish communication with Earth, and she wants me working on science."

"Well, it's our main mission."

"But there's an... undercurrent. I think she wants to keep me from getting ahold of Alpha's data."

"Why?" His expression reflected my own bafflement. We were all scientists, and free access to information was fundamental to scientific progress.

"I don't know. But that only makes me more determined to get it."

"So you want me to get it for you."

"Yes. But be subtle about it."

He looked to one side, considering. "I could relay the communication through several satellites. Bury it in other data streams."

"Exactly. I mean, zac zac."

Bobb grinned. "Now you're getting it."

#

I focused my visible attentions on science, specifically the composition of Bianchon's atmosphere. I swapped my primary work station with Kyra so that Mari and I could work more closely together, with Mari looking into the chemical activity while I focused on a high-level planetological survey of the moon. We hadn't originally planned to go into such detail on the gas giants' moons until later in the mission, but the presence of oxygen made Bianchon a lot more interesting. As Mari and I spent more and more time together, I realized I was starting to look on her differently. Not as a woman, exactly, but as a human being rather than some kind of aberration.

I also started taking dinner with the crew again. At first I ate quietly at the back of the group—in the team but not of it—but as the days went on I began to offer my opinions, then to engage in discussion and debate. After a week and a half the interactions started to feel natural, and I found that I could even disagree with people without feeling as though I was balancing on a razor's edge.

But during what was supposed to be my sleep period, I analyzed the data that was trickling in from Alpha. The wayward module was so far away, and moving so fast, that the bandwidth the satellites could achieve with their little dish antennas was pathetic. I was frustrated as the puzzle built up, slowly, piece by piece, but I knew Bobb was doing the best he could to move the data quickly without attracting attention. I was tremendously impressed with his feats of digital legerdemain, and I told him so.

One night, as I was peering with gritty eyes at a graph comparing the growing set of Alpha's coast-phase data with the merged data from *Cassie*, I was startled by a tap at my door. "Chaz, are you awake?" came a low voice. "It's Nuru."

Heart pounding, I powered the screen down and opened the door. "I'm awake," I said, blinking in the light from the habitation bay outside. "I haven't been sleeping well."

Nuru cut the sleeves off of all her coveralls, and when she wasn't working she wore a shawl over her bare shoulders. It was her way of marking personal from work time. With the light from behind her shining through the thin fabric, patterned in vivid stripes and squares of autumn colors, I could imagine her as some high priestess or village shaman, looking over the veldt at sunset.

"Chaz... I wanted to say that I'm sorry I came down so hard on you."

I didn't have anything to say to that. Anxiety, anger, sadness, and suspicion tightened around my throat and kept the words inside.

"It's just..." she continued, then paused. "It's just that you didn't seem to be accepting any more subtle direction."

“I know you don’t want me looking into the communication problem. But it’s important.”

“I understand. But...” Her voice was more hesitant than I could ever recall having heard. “...but you mustn’t. Please don’t try any more.”

I waited to see if she would say anything more. When she didn’t, I asked “Why?”

She shook her head. “I can’t say. I wish I could.” She looked deep into my eyes, and I could not withdraw from her gaze. “I’m sorry, Chaz. But I want you to know that this is for everyone’s good. I... I do respect your judgment. And you’ll have to respect mine.”

She turned and left, leaving me shaking my head in bafflement.

#

Puzzled though I was, I meant to do as Nuru asked... leave off my nocturnal investigations, at least for a time. But when I powered the screen up again, just to close down my work before I went to sleep, it chimed and displayed something that made my breath catch in my throat.

The data from Alpha had been arriving in apparently random order, determined by its physical location in storage rather than chronologically. I’d been waiting for weeks to see what I saw on the monitor now: a purple rectangle, representing a block of Alpha data that didn’t correspond to anything already in *Cassie’s* database.

To my surprise, it wasn’t coast-phase data from after the cutoff. It was in a completely different part of the database, one with which I wasn’t familiar.

I bit my lip, but after a brief battle with my conscience, curiosity won out. I tapped the purple rectangle with my stylus.

The data turned out to be in the medical/lifesystem section.

Specifically, the crew reconstruction and vital instructions for Charles Eades. Me.

Here was hard evidence that my vital instructions had been deliberately wiped from the system. Which only confirmed what Matt had told me. Though the news was a twist of the knife in my gut, it wasn’t a surprise.

But then I noticed something that *was* a surprise, and told me the situation was more complicated than it had at first appeared. Immediately adjacent to the purple area of new data from Alpha, I saw a thin red stripe indicating data that was present in both databases, but slightly different. There was no reason I could think of for this.

I looked more closely. The Alpha data was a straightforward prologue to the following code. The *Cassiopeia* data replaced one instruction in that prologue with a jump to another section of the database.

I followed the jump.

It led to a completely separate datastore, in a different hive—temporary mission data, not instructions that had been loaded preflight.

The linked data turned out to be identical to the new data from Alpha, but with a more recent timestamp. About eighty years more recent.

I stared hard at the screen, rubbing absently at the hot rough tissue of my new tattoo. It itched almost as much as my brain.

Matt had said the crew had voted not to vive me. But then I'd been vived anyway, and no one knew how this had happened.

Here was the answer. Someone, probably Bobb, had deleted the data, but later someone else had restored it from backup. And whoever had restored the data had put it in an obscure temporary datastore so the reinstatement wouldn't be noticed. The link to the restored data was extremely subtle—the only reason I'd spotted it was that I had an unmodified copy of the original data to compare it with.

I drummed my fingers on my chin. The user ID on the data in the temporary store was some random number, not any of us—whoever had restored the data had concealed their identity. But I could check the system audit log. It was a write-only record of all significant system activities, intended to be impossible to evade or to modify after the fact. We had mostly ignored it in our training; the only reason it was present in *Cassie's* systems at all was a general requirement for all government software.

The audit log told me that the restore had been performed using a temporary ID to obscure the user's true identity. But that ID had been created only a few seconds before it was used, and the creator's name was clear in the log.

Nuru.

I shook my head. It made no sense. Matt had said the vote not to vive me had been unanimous. As our commander, if she'd disagreed with the decision she wouldn't have allowed it to go forward. Why would she then sneak back and undo it?

While I was digesting that information, trying to decide what to do about what I'd learned, another chime came from the monitor, and another purple rectangle appeared. This one was where I'd expected the first one to be: in the coast-phase data, a couple of months after the data cutoff in *Cassie's* database.

I tapped the rectangle with my stylus. If nothing else, I thought, it would be a distraction from the painful news about who had vived me.

I was quickly proved wrong.

#

I worked the latch and entered without waiting for a response. There were no locks anywhere in *Cassie*.

Nuru poked her head out of her sleep sack, blinking in the light from the habitation bay outside. “What the hell?”

“698463 Teitelmann,” I said.

Sleep immediately fled from her eyes. “Close the door.”

I shut the door behind me. A sliver of light fell across Nuru’s face. I wanted to cry like a baby, to have her take me in her arms and tell me everything would be all right. I wanted to slap her hard and scream with rage. I wanted her to pray with me, to help me to understand that all of this somehow fit into God’s plans. Torn in so many different directions, I said nothing. I just looked at her, breathing hard.

“Have you told anyone?” she asked at last.

“Not yet. But I will. It’s not fair to keep them in the dark.”

She closed her eyes and buried her face in her hands. “How did you find out?” she mumbled.

“Bobb helped me download the coast-phase data from Alpha. It was all there.”

“You disobeyed my orders.”

“Yes.”

I waited. Eventually she raised her eyes to me. They shimmered with moisture. “Can you forgive me?”

It was a hard question. “I think... I think I can understand why you erased the news. I might be able to forgive you for that. But why... why did you vive me? Knowing what you knew?” My throat was choked with unshed tears—tears of rage or anguish or both. “How could you wake me up... to *this*? When you could have just left me in peace forever?”

Nuru’s face was a mask of grief. “I’m sorry, Chaz. I’m so, so sorry. But I didn’t want to be *alone*.”

I didn’t understand. “But you weren’t alone...”

“I couldn’t bear knowing that the only face like mine in the universe was the one in the mirror.”

I looked into her dark, dark eyes, shining with tears, the yellowish whites and the smooth mahogany skin. So much like mine. And I reached out and took her into my arms.

We shuddered together, racked with silent sobs.

The jumbled, fragmentary video and audio from Alpha’s data played over and over behind my eyelids. ...*asteroid 698463 Teitelmann’s orbit intersects...*

impact in as little as eight months... entire nuclear arsenal lacks sufficient... mission to Teitelmann does not seem to have... millions rioting... last few places in the shelters... a world prays... devastation even greater than... we are the dinosaurs... and then the silence, oh Jesus, the silence that went on and on...

Eventually Nuru dried her eyes on my shoulder, and it all came spilling out—how she'd deleted the data, putting the cut-off at different times in the three modules to make it look like a hardware problem. How she'd kept the news of Earth's demise to herself, and focused the crew on its original scientific mission to keep us all from falling into despair. How she'd continually sabotaged Bobb's and my efforts to find the source of the problem. I was amazed she'd been able to retain her own sanity under that pressure, never mind the technical and psychological challenge of keeping her bright and curious crew from learning the truth, and I said so. "I'm not so sure I did retain my sanity," she said.

"At least you won't have to hold it all inside now..."

"No." She gripped my shoulders, her long strong fingers biting hard into my flesh. "We can't let them know, Chaz. Matt, maybe, but the others... they wouldn't be able to go on. Trust me in this."

"This secrecy is poisonous. They deserve to know."

"They deserve *purpose*."

"Even if it means lying to them for the rest of their lives? Lie upon lie, coverup over coverup, year after year, with nothing better to hope for than that we'll all get killed by an oxygen leak or something before they find out the truth?"

Nuru hung her head. "I can't take hope away from them."

"Then don't!" Even as I spoke, pieces of a plan were coming together in my head. "Give them a *new* hope." I outlined my idea, sketchy and conditional though it was. She raised objections—sound ones—but, driven by desperation, I came up with answers. "It might not work. We might all die in the process. But it's better than floating around in a tin can, gathering data with no audience and writing papers no one will ever read."

"We don't have the genetic diversity for a viable colony..."

"I know." I closed my eyes hard, squeezing back the tears for a moment before I could continue. "But isn't one or two generations better than nothing? And if there *is* anyone alive back home, maybe the information in our databases can benefit them." The mission planners had provided us with entire libraries and museums, to support basic research and as a hedge against boredom. "We owe it to them to preserve it as long as possible—until they can dig themselves out. No matter how long that might be."

Nuru was silent for a long time. Finally she said “Kay kay. But I need you to let me break it to them.”

#

We gathered in Gamma hab bay. I’d watched Nuru as she’d approached each crew member, letting each one know how critical this meeting was: a simple statement to Bobb, a light joke to Matt, a long held glance with Mari. Suddenly I understood in my bones just why Nuru was the commander and how she’d managed to hold us together as a crew as well as she had.

Nuru clapped her hands for attention. But once she had it, she floated in silence for a long time, gathering herself. “This is hard,” she said, and another silence followed. Moisture glistened in the corners of her eyes.

“I’ve lied to you,” she said at last. “I’ve lied to you all, at many times and in many different ways. Sometimes that’s part of the commander’s job. But now it has to stop.” She closed her eyes, took a breath. “First: I was the one who vived Chaz.”

The crew’s reaction was like a released breath. Matt jerked his head back in astonishment; Bobb nodded to himself; Mari stared sullenly at me. No one spoke.

“My reasons were selfish,” Nuru continued, “and my deception... unpardonable. But this wrong also undid a greater wrong.” She looked around. “We are all guilty of a gross injustice. We tried, convicted, and *executed* Chaz, in absentia, for a crime he did not commit.”

Tien looked dubious. “Executed?”

“We voted to deprive him of his life—his second life, this life we all share now—before it even began.” She waved one long brown hand at me. “*This* Chaz, this second Chaz, did no harm to any of us. He has no memory of the hateful things the first Chaz said and did. And even that first Chaz... I believe he, too, was wronged. Deceived.” She looked at Mari. Mari looked back, for a moment, then averted her eyes. “We might all, in time, have learned to forgive each other. But we were all cheated of the opportunity.” Now she looked at me. “After your death, our feelings toward you crystallized—frozen at the most terrible moment of our relationship. Chaz, can you forgive us for remembering you at your worst, and forgetting the good things we shared?”

I swallowed past the hard constriction in my throat. What I really wanted was vindication... acknowledgement that I’d been treated unfairly for crimes that I hadn’t committed, or at the very least an apology. I wanted to see the tables turned, to be the one to gloat smugly while they turned their eyes away and admitted they’d been wrong. But what was needed right now was for me to turn the other cheek.

“Yes,” I managed at last. “I.. I forgive you.”

“And the rest of you—Mari, Bobb, everyone—can you forgive Chaz, this Chaz, for his ignorance, his errors, his anger?” Most of them nodded, but Mari still did not meet her eyes. “Would any of us have done any better, if *we* had arrived here unprepared for our mission and ostracized for the sins of our earlier selves?”

“You remember how he was,” Mari whispered to her chest. “Hurtful. Cruel. Unforgiving.”

I pushed off the wall, floated close to her. “That was someone else,” I said, so softly that she had to look up. “He’s dead now... eighty years dead. Let him go.” Please God, let her give me this chance.

She didn’t speak for a while, just looked at me. I couldn’t read her expression. “I’ll never forgive him,” she said at last. “And you... you look just like him. But I’ll try.”

“That’s all anyone can ask.”

I held out my hand to her, and after a moment she took it and squeezed it.

Nuru broke the moment by clearing her throat. “There is another thing. Even harder.” We all looked at her, and though I knew what was coming my heart still pounded in my throat. “The communication problem with Earth... is not on our end.” A deathly silence settled over the crew. “Earth... Earth was struck by a meteor, forty-seven years after we left. There hasn’t been any signal since then.” She raised her hands against the gasps and curses. “There may be survivors. But they aren’t in any position to contact us. *Yet*.” She pointed at me. “Chaz has figured out a way for us to survive until they can.”

Everyone looked at me. I swallowed. “It isn’t going to be easy...”

###

When the noise and movement finally stopped, it took me some minutes to decide whether or not we’d survived. It had been a bad landing. We hadn’t expected a good one, but the sheer brutal pummeling we’d taken was still a shock. One of my shoulder straps had pulled loose; the other had bitten so deeply into my collarbone I knew I’d be bruised for weeks. “Is everyone okay?” I asked.

A chorus of groans answered, but no one seemed to be seriously hurt. I offered up a brief prayer of thanks.

Then I tried to sit up, and let out a groan myself. Even a tenth of a gee was more than my abdominal muscles were ready for. Mari had been right—I should have been doing more crunches. I rolled over onto my side and used my arms to force myself to a sitting position.

All through *Spirit*, the others were doing the same. Tien was already on her feet, wobbly but vertical.

Walking. A new concept for us.

At least she could do it. We hadn't been completely certain that bodies that had never walked would be able to manage the skill, even when directed by minds with years of walking experience.

Eventually I struggled upright. The appalling effort it required was cruelly mocked by my balloon-like low-gravity gait. My sinuses felt as though they were full of lead shot.

Nuru's arm fell heavily across my shoulders, and we both nearly collapsed from the weight. But when we got stable again I saw she was grinning like the sun. "We made it," she gasped.

"We made it," I concurred, and I found I was smiling the same crazy smile.

Supporting each other, we shuffled to the airlock—the one that had been Epsilon sys lock before we'd torched it off and joined it to the growing assemblage of hardware that we called *Spirit*. There we found, to our surprise, that we were already breathing Bianchon's atmosphere. The crude welded seam joining the lock to the hull had parted from the stress of the landing.

It was a chilling reminder that our margin of safety had been almost nonexistent. But one good landing was all we'd needed.

The lock's doors were warped and distorted, and it took both Bobb and Matt to force them open with a raucous screech. We all ducked through and stepped outside.

Spirit lay on a long gentle slope of gray rock, scattered with rough stones ranging from boulder to fingertip size. Overhead Balzac's ringed and banded form loomed huge, and the tiny red disk of Tau Ceti was just rising behind a fog bank downslope. The white fabric of the parasail, which lay on the ground for hundreds of meters along the scrape marks of the lander's final descent, flapped desultorily in the wind.

Wind.

There was *wind* here.

The air was thin and cold and very dry—even here at sea level it was barely dense enough to sustain life—but there was so *much* of it. And it smelled... clean. No plastic solvents, no leakage from the greenhouses, no unwashed bodies. I opened my mouth and drank in the air like fresh cold water, shuffling in a circle and marveling at the openness of it all.

The rock-littered gray slope extended up, and up, and up—out to a horizon closer than Earth's, but hundreds of times more distant than

anything I'd seen in this lifetime. It hurt to focus that far away. I trusted my eyes would learn to cope. And in the other direction, lost in fog...

"Listen," said Kyra, breaking into the excited babble of conversation. We listened.

Yes. There it was, coming from downslope. Surf. The low rumbling hush of waves on a shore.

The sound of the ocean that covered the whole equatorial region of this moon. An ocean teeming with microscopic life, devouring each other and excreting the oxygen we needed to breathe. In an atmosphere whose density was maintained by an improbably high level of outgassing from the planet's core.

Surely this highly-unlikely alien biosystem was a gift from God. Humbled, I lowered myself to the ground and said another prayer of thanks.

Nuru watched over me while I prayed. "You might want to hold some of that gratefulness back," she said when I was done. She waved a hand, indicating the cold lifeless rock all around.

Indeed, this rocky slope looked pretty inhospitable, and the cold was already beginning to bite through my foam-insulated parka. But after eight years of planning and building and testing and improvising we all knew it was our best alternative. No one had seriously suggested that hanging around in orbit, waiting to get clobbered by a passing meteoroid or suffer a blowout or lifestystem failure, was a viable long-term solution.

"We'll make this place into a home," I said. "It'll be a lot of work, but we'll do it."

Bobb was peering into a handheld monitor. "Lander nine's just over that ridge," he said, pointing. All the pieces of *Cassiopeia* that we thought would be useful on the surface—including the greenhouses, the bioprocessors, and the materials fabricators—had been sent down ahead of us, to test and refine the ablative atmospheric entry shielding and the parasails. Some of the landers had failed, and some were a long walk away, but there was more than enough nearby to get started. Only Alpha module, which hadn't completed assembling itself, remained in orbit to act as our weather satellite and meteoroid warning system. "Lander seven's about two kilometers beyond it. Three's that way, about six kilometers."

"There'll be time for that later," said Mari. "I'm going for a swim." And she burst into a clumsy, loping run, headed downslope.

"You're crazy, girl!" I shouted, and she slapped me on the ass with a raucous laugh as she passed. "Those alien microbes will eat you alive!"

"If they're going to do that," she called out over her shoulder, "I'd rather find out sooner than later!"

“Oodle oodle!” I called back, meaning “good luck.”

Nuru and I leaned on each other, watching her go. “We’d better haul in that parasail before it blows away,” Nuru said to me after a while. “Start setting it up as a tent.” Her arm was warm across my shoulders. I’d forgotten how much taller she was than me.

“In a minute,” I said. “I’m enjoying the view.”

We stood side by side, watching the sun rise over our new home.