

Kath and Quicksilver



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by Larry Niven & Brenda Cooper

Brenda Cooper and Larry Niven have published collaborative fiction in *Asimov's* and *Analog* for the past four years. The two authors have also written a novel, *Building Harlequin's Moon*, which has just been published by Tor Books. Brenda Cooper's solo science fiction and fantasy stories have appeared in *Analog*, *Strange Horizons*, *Oceans of the Mind*, and in several anthologies. Brenda lives in Bellevue, Washington, and serves as the City of Kirkland CIO. Multiple Hugo- and Nebula-award

winning author Larry Niven lives in Chatsworth, California, with his wife Marilyn, a cat, Amelia, and a dozen unnamed koi. He has been a published author for forty-one years. Together, he and Brenda, take us on a stunning tour of Mercury and a desperate attempt to save lives.

* * * *

Kathlerian looked out at black rocks and a glowing horizon. They had been dusted with frost when she first arrived at Midnight Dome, seventeen standard years ago. The frost was gone now. “Joplee,” she said, “Let’s go out.”

Joplee turned a silvered blue visual

sensor toward her. “No.”

“You’ve never let me outside. You used to tell me it was too cold. It’s warm enough now!”

“Kathlerian, dear, it’s too dangerous.”

The sun never rose over Midnight Dome on Mercury. There was no sense of time, and yet everyone was in a frantic hurry. Some were observing the sun while Noonpoint’s ancient array of instruments was still in place: last chance before the expanding sun melted or burned them. Most were preparing for departure.

Kathlerian had nothing to do with solar observations or the exodus. She’d

helped tend the Vivarium—farming—but that was shut down now. She missed the jungle section and the animals. Now there was nothing to occupy her time. She had to do something.

“Joplee, how long has it been since an environment suit failed?”

“Eleven hundred eighteen standard years,” Joplee said promptly. “Veriority Claust Kerry 7122, on Earth. Quick rescue allowed her to be regenerated. She presently lives at Dub City on—”

“And the temperature out there lists as benign!”

“Briefly, Kath. Midnight Dome has been

the coldest place on Mercury since Mercury stopped rotating. Ever since the Turnover Period these rocks have been at around ninety degrees absolute, as cold as Pluto and Charon once were. A billion years and more. Even when you first came here at age fourteen, these rocks were below the freezing point of carbon dioxide. In a Mercury year they'll be glowing. In fifty they'll be traces of gas inside the Sun."

"So it's our last chance!" she said triumphantly.

"We're already in the outer traces of the Sun's atmosphere. Can you see how rounded the rocks have become?" Joplee superimposed blue pointers on parts of

the landscape. “High-velocity gasses would etch away any protection we can build. We might also risk missing our departure window.”

“If I went out, you’d have to come with me.”

“You will not go,” Joplee said. “The Naglfar Marui is nearly ready to load. It’s the last evac pod. We must board or be left behind. Find some other form of entertainment, Kathlerian.”

Kath nodded stiffly, turning to face the wall. A swivel stool rose from the floor just behind her feet. At her command the wall dimpled into an alcove and extruded a monitor screen and

touchboard. She set to work. Maybe she could get something done this way, if Joplee didn't catch on.

* * * *

Eighty or so pink dwarves swarmed past, paying her no attention at all.

Two augmented humanoids made an alcove, stepped into it, and folded into each other's arms. Kathlerian heard a rapid clicking. For a moment she wished, wistfully, that Jerian would allow her to grow up. She'd been a little girl for thirty-one years: quite long enough, thank you.

There weren't many people left on

Mercury: thirty-four thousand and some. Passersby were rare. Everyone without a physical body had left, the last ten standard months ago.

A silver egg zipped down the corridor at eighty or ninety KPS and stopped jarringly. Zesh Foly 12 poked her mirror-silvered head through the egg's surface. "Kathlerian 771, the Naglfar Marui will be departing in one hundred hours," she said.

"I'll be ready."

"Kath, it's the absolutely last ship. We're using the last of the antimatter, dear," her featureless face watching her anxiously, as if Kath really were ten

years old.

Old people could become timid. Zesh dreaded being left behind to broil. It was an obsession. Kath concentrated on her monitor screen until the egg zipped away.

She was trying to contact Jerian Wale 9000.

Jerian was Kathlerian's never-seen guardian. She pictured him as thousands of years old, maybe millions. She'd wondered if she might be his specific N-child, a direct descendant. Then again, he seemed to be running the entire human control group, the Bear Clade, tens of millions strong and billions of years old

in design. Kath was in the Bear Clade. All she really knew was that Jerian controlled her destiny.

Jerian didn't want more Bear Clade children. That was why Kathlerian wasn't growing up: he had altered her biochemistry to leave her as a little girl until she completed her pre-college education. And Joplee's mind was a dumbed-down copy of Jerian's, though Joplee looked more like a skeletal bird of metal and plastic, a forest of appendages and sensors.

The last order she'd gotten from Jerian was to leave Mercury on the Naglfar Marui.

Jerian had left Mercury seven years ago to organize the exodus: find places for people, fit them to tasks, a thousand concerns for millions of citizens departing Mercury in such a way as to leave order behind and machinery still running. He'd had time, then, but the exodus had now grown urgent. Getting his attention might be difficult.

The sun's adolescence was billions of years in the past. Sol was a red giant and still expanding. Mercury was orbiting within the sun's outer envelope and would soon be swallowed. A cautious old entity would be elsewhere! If Jerian Wale had fled to some other world, he'd be minutes away at lightspeed, or hours.

Refugees were piling up on Pluto and Charon, more than ten hours distant via lightspeed communication.

She decided not to wait for a response. Jerian never let her do what she wanted anyway. He usually didn't even answer her. Where was Joplee?

Just behind her, watching what she did. She summoned up a work in progress, then spoke over her shoulder. "Joplee, would you get me a meal? Midmorning snack. You choose."

"I will," Joplee said. He didn't move.

Kathlerian summoned up a file two years old. It was bulky. She had researched

Jerian Wale 9000, and various electronic personalities, and Joplee himself.

Of Jerian she'd learned little. Then again, the library gave her the same lack of response to questions regarding the AIs who ran various transport systems. That told her Jerian was important, a possible target for paparazzi or terror bards. She'd probed the edges of his data firewall and found enough to awe her.

Of electronic personalities there was too much information. They were everywhere in the solar system and beyond. In complexity they ran the gamut from a simple sewer system or air travel

monitor through Joplee and his kind to the transcendently intelligent AIs. Their kind couldn't even be counted: they merged and fissioned at will, merging to share information, dividing to perform multiple tasks.

Joplee wasn't an AI. He was only her nursemaid and guardian. Kathlerian could often talk him around to her viewpoint, but there was a point at which he stopped listening, stopped responding. Maybe his programming wasn't flexible. Maybe the original Jerian was just that way.

What she'd found about Joplee had set her giggling.

That was almost a standard year ago. She'd been gaining weight, then. The submind in charge of resource allotment in Midnight Dome had set her on a diet. Tired of the sameness, she'd made a tiny alteration in Joplee's programming.

How many people would notice that Joplee could no longer choose a meal? He'd loop until Kath chose for him. Now he looped while Kathlerian worked her way into a new program.

What showed in the wall screen was a complicated three-dimensional shape. It turned, changed, zoomed or shrank as Kathlerian stabbed at it with a virtual cursor.

“Hello, Kathlerian 771. What are you doing?”

The voice was cheery, perhaps childish. Kath jumped violently. Her ears curled into tight little knots in a reflex as old ... no, not as old as humankind, but as old as the Bear Clade.

“Just playing,” she said, and looked around. Nobody. There weren’t any other children in Midnight Dome. “Who speaks?”

“I’m Quicksilver. You are playing with an almost intelligent being. Be careful.” The voice came from her monitor screen, with a second’s delay. She found that odd. Electronic intelligences thought

almost instantaneously.

She snapped, “I saved Joplee in memory. What are you, Quicksilver?”

“Do you know Mercury? The iron core is almost the entire planet. Sol’s magnetic fields interact strongly with the core—”

“I know all that.”

“I was a man once. Widge Hordon of the Vance Clade, plasma physics, pleased to meet you. I let my colleagues record my mind and impose me on Mercury’s magnetic field.”

Kathlerian continued her work. She

asked, “How do you expect to be evacuated?”

“I am Mercury. When Mercury goes, I go. Will you keep talking to me, Kathlerian? I’m lonely.”

Kathlerian shuddered at the thought of spending her last few hours on Mercury talking to a doomed entity. “Is that why you’re so slow? You’re a pattern written into this random ball of dirty iron?”

“That and the magnetic fields, the flux tube that runs from the sun to Mercury’s core.”

“There’s something I’ve got to do,” she said. The changes in Joplee were almost

finished.

* * * *

When she finished she was ravenous. She turned off the monitor and the wall absorbed it. “Joplee, order me a veg handmeal and a brown shake.”

“Done.”

“Joplee, let’s go out.”

“Yes. The nearest airlock is this way.” Markers glowed in the floor. Joplee drifted that way.

“Are there suits?”

“No.” Joplee didn’t stop.

“I’ll have to be fitted. Guide me to a tailor. Have the meal delivered there.” The floor marks changed. Kathlerian was giddy. This seemed too easy.

The tailor shop was next to the A4 personal airlock. Nobody was on duty. Her meal arrived while she worked.

What she wanted was easily ordered, but she was surprised at what emerged. The suit was thick-walled foam, with a feathery spine and a considerable weight of motor. Cooling system, she thought. It was little-girl sized. It fit her like a work mitten: cumbersome, restrictive, cozy.

She stepped through the lock and out onto Mercury.

The sky was black. The horizon glared. A crater rim surrounded Midnight Dome. The black rocks had a half-melted look. Low hills crept away from the dome, dark on dark humps rising to meet the edge of a crater. She felt a moment of triumph. She'd beaten Joplee.

Riding lights flared from a huge lens shape to her right.

That was the evac pod named Naglfar Marui. It looked half as big as Midnight Dome, with capacity for forty thousand. When formed it had been mostly empty shell. Everyone, even Kath, had had a

hand in shaping the interior. The AIs had vetoed some bulky, silly suggestions, but interior space had filled up nonetheless. Kath's quarters would be cramped and spartan. She dreaded spending thirty standard days in this thing.

Bent rainbow flames stretched from the horizon halfway to the black zenith. The sun itself was still hidden; so what was this wavering glare? Zodiacal light? Unnamed magnetic effects? "Joplee," she said, and realized for the first time that her nursemaid hadn't followed her.

"Yes," said Joplee's voice.

"Come out," she said.

“I am not protected against thermal radiation or magnetic devil knots.”

Another voice spoke: Quicksilver.
“Kathlerian, what are you doing?”

“I didn’t call you,” she said.

Silence.

“It’s my last chance to explore Mercury,” she said. “Wh—?”

“You can’t go anywhere interesting on foot! Design a vehicle.”

What was Quicksilver doing on her talker? But the mystery voice was right; she’d need a vehicle to get anywhere.

Besides, unlike Joplee, he wasn't fighting her, and he wasn't mentally crippled. She smiled and went back in.

* * * *

Her credit held. The thirty-four thousand entities left behind at Midnight Dome were rich: they commanded the resources of Sol's innermost planet, a treasure built up over billions of years. Kathlerian chafed at the time and cost required to build a vehicle. But she had time, and what did cost matter now?

She started with a bubble heavily shielded against radiation. She gave it pods to extrude tractor treads, paddles, wheels, mag coils. One protean couch

for a small human being and a niche for Joplee. A big airlock. Like her suit, the design grew a feather plume to radiate heat. Power source with a fleck of antimatter in it. The thing grew larger with each of Quicksilver's suggestions. Kitchen box, medical inputs in the couch, and a niche for her bulky EVA suit. Automatic darkening of the bubble wall, with an override. In the image it now looked like a tremendous old war helmet.

“Mercury wasn't always like this,” Quicksilver said.

She had already trusted Quicksilver for help on the ship. He had made some suggestions that improved her safety.

Joplee wasn't making suggestions at all, and that, in its way, was scary. She'd succeeded too well. She must constantly remember that she had overwritten Joplee's nursemaid urge.

Quicksilver said, "When I first came here, the planet was tidally locked in a two-to-three spin ratio. The effective day was twice as long as the year. Over a day you could see the sun grow and shrink and do a weird kind of a loop—"

"Good enough, Joplee. Build it. Quicksilver, if that crazy orbit was stable—it was stable, wasn't it? What could knock a whole planet off balance?"

“A magnetic storm in the sun. A chaos effect, unpredictable. We were lucky to get any warning at all. I missed some of what came after. The storm screwed up the flux lines between the sun and Mercury’s core. I went into a coma.”

“Mmm.”

“I lost over a million years there. But when the fields settled down, when I rebooted, Mercury was one-to-one stable. One face always to the Sun ... wobbling a little, though. And Earth was resettled, and Mars—”

“Earth is empty now.”

“There are still research stations on and

around Earth. Stations on Venus too.”

The controls were daunting. She rolled the bubble ship out through an extruded airlock. She stowed Joplee in his niche, an egg in a cup, leaving most of his arms free. Under the zodiacal glare she spent a few minutes reviewing the instructions.

She asked, “Joplee, how long before Naglfar leaves?”

“Seventy-one hours, Kathlerian.”

“Do a countdown for me. I want to see what I can do of Mercury. How far will the mag coils take me?”

“Fifty to sixty thousand kilometers.”

Several times around Mercury. She could still trust Joplee to protect himself, couldn't she? "Quicksilver, what have I got to see?"

"Caloris Basin and the Hot Spot, at least, and the Hoplisht Rill. I'll guide you." A dotted green line superimposed itself on the glaring landscape, stretching over the horizon.

* * * *

She took the bubble ship up. As she rose, the rim of the sun appeared. The bubble darkened a little. The sun's rim was a bright red line storm with glimpses of yellow within, edging along a considerable span of horizon. She

scooted away at the listed cruising speed, a hundred kilometers an hour, passing over dark circles upon dark circles, eons old.

Now she heard a whisper of wind. The cooling system hadn't been needed much until now. Motors pumped heat out through the plume, which glowed orange. A prominence lifted thousands of kilometers out from the sun, streaming, arching higher, reaching toward Mercury.

Joplee said, "Seventy hours."

The land was all craters and cracks. "Quicksilver, what's with all the canyons?"

“Oh, that’s interesting, Kath. The early Mercury shrank as it cooled, of course, and the surface wrinkled a little. With almost no atmosphere the ridges don’t erode very much. The thing is, it didn’t wrinkle much either. The core never shrank enough for that. It’s stayed molten for ten billion years.”

“What’s wrong with that? Mercury is right up against the sun.”

“That’s only since the sun’s been expanding. It’s a small planet, Kath. It would have lost that internal heat before there was a single human species. What keeps it molten is the sun’s magnetic field interacting with the iron core.”

“And that’s you, Quicksilver?”

“Well, the flux tube was in place before I was, but I’m in there now. Picture my memory stored in core and my mind reaching through the magnetic lines toward the sun. Kath, that line of rock is part of the Hoplisht Rill.” A cursor danced along the horizon.

“You talk like a teaching program.”

“I was a teacher.” The whisper of cooling had become a hum, and Quicksilver’s voice rose. “After I chose this, I was a celebrity, the Mercury Mind. I was the ultimate data source for studies of the planet. We studied Sol too. But eventually there wasn’t anything

more for me to learn. So I taught visitors, children and adults. Teacher and guide.”

“What’s that?” She used the controls to put a cursor mark on what she’d seen on the surface. “Iron crab? It’s as big as Midnight Dome!”

“No, not quite, but there are nine of those on Mercury. Mining systems from the Shibano Dynasty, each of them a little different. That’s part of why people came to Mercury, Kath. Metals. They’d sink a shaft into the iron and siphon what they needed. Eventually the shaft would close again. They didn’t want just iron, they wanted some of the impurities, so they sank shafts in different places.”

“These drills still work?”

“Let me see.” A pause of several seconds. “That one does ... and ... four of them still come on.”

The sun was a great red arc with a fuzzy, hazy rim. Mercury wasn't big; two hundred clicks could take you a long way around its curve. A wall rose over the horizon. She asked, “Caloris Basin?”

“Yes. Do you know what a planetesimal is?”

“Big mass, from when the solar system was just condensing. Enough planetesimals crashed together gives us

planets.”

“Yes. A planetesimal hit the Earth and gouged out a ring of debris that condensed into the Earth’s Moon. Another one hit here and made Caloris Basin. But look at how regular it is, Kath.” Caloris was a perfect circle around a nearly smooth floor. There were thousands of craters inside it, the marks of later strikes, but of large craters there were none.

“Whatever hits Mercury hits hard,” Quicksilver said. “Anything that gets this deep in the sun’s gravity well has huge kinetic energy. The strike that made the Caloris impact must have made a very hot fireball. It didn’t rise, not in vacuum.

It would have hovered like a flaming leech, melting everything.”

Kath tried to imagine it. Then, “Show me.”

“I picture it like—” The image formed slowly, then lurched into motion. A small moonlike body flew tumbling from offstage, glowed at its forward rim, and struck. A hemisphere rose glare white and symmetric from a darkened primordial landscape. “—like this.” It expanded to engulf Kath’s viewpoint, and now they were inside the fireball. Rock sprayed.

Kath tired of being blind. “Enough.”

Black sky, tongues of corona, red sun. The bubble ship continued its descent into Caloris Basin. Kath spotted a silver crab-shape near the rim.

Quicksilver said, “Red giant stars aren’t as well behaved as we once thought.”

“Oh?”

A glare-white storm was rising from the red arc of the sun. The vehicle’s drive stuttered.

“Quicksilver?”

The voice of Quicksilver was silent.

“Joplee, land us safely.”

The bubble ship's drive steadied, then drove hard. Kath sagged in her couch. It reclined her, enclosed her tenderly. She spoke with difficulty. "Joplee, what's going on?"

"A solar storm, Kath. Let me work. If I can't compensate for this mag whorl, we'll tumble."

"How's the radiation level?"

"High and growing, but it's no threat to me."

"What about me?"

"It will kill you in perhaps twenty hours."

“Joplee, land us near that digging machine.”

The bubble ship surged sideways, then back. It came down with a jolt. Kathlerian felt small next to the iron crab.

“Kathlerian?”

“Quicksilver! Where did you go?”

“Magnetic fields disordered me. It could happen again. Kathlerian, you’re endangered. Radiation—”

“I thought maybe I could dig in. Quicksilver, can you start that digging machine?”

“No, I don’t have any such control over Mercury’s industrial facilities. Work through Joplee.”

“Joplee, I want to dig a big hole, fast. Can you—?”

Dirt sprayed back from the huge machine, jetting into the sky. Joplee said, “This is expensive, Kath.”

“Give me a depth reading.”

“The machine had already dug point eleven kilometers down when it was stopped. Now point fifteen.”

“Quicksilver, does that look deep enough?”

“Go for point three clicks. Then get into it quickly.”

* * * *

The machine had gone in at an angle. Kath settled the bubble ship into the black depths, extruded tractor treads and rolled under the digging machine. Its huge mass would be some protection too.

The vehicle's air conditioning hummed, but the feather plume wasn't dumping heat into black sky any more. Hot rock surrounded them. The cabin grew warm.

Joplee was cut off from the Midnight Dome. He could still monitor radiation,

still keep time.

Quicksilver went silent.

Kath waited with dwindling patience through fifty hours underground. Then Joplee announced, “Twenty hours to departure. Kath, radiation levels are falling.”

“Safe enough for me?”

“That depends on your purpose. If you intend to return to Midnight Dome, then the shielding will hold at present levels. To circle Mercury would certainly kill you. Do you want to be told this kind of thing?”

“Yes.” The altered Joplee knew what the old Joplee knew, except to protect her. Maybe if she knew what to ask, he could help save her after all.

The bubble ship’s magnetic lift system wouldn’t lift.

Kath tried not to think about what that meant. She extended tractor treads and crawled out of the slanting hole and into the glare. The sun didn’t look much different from when she had last seen it, but now it seemed scary. She extended wheels and set off around the curve toward Mercury’s dark backside. Her explorations had missed most of the planet.

* * * *

Twenty hours later she saw a silver lens lift above the close black horizon. Joplee had finished his countdown: she knew what to expect. She zoomed the forward view and saw Naglfar Marui pause above the glaring mountains, then dwindle rapidly against the black sky.

They'd left her. She was angry, then ashamed, then—"Joplee, can you call Naglfar?"

"Yes. Whom will you speak to?"

"Anyone."

She got Zesh Foly. The silver egg was

hysterical with relief, then horror. “But you’re trapped!”

“Can someone send a lifeboat back for me?”

“Oh, Kath, we can’t interrupt the systems. Mercury’s already in the photosphere. Naglfar Marui is our last chance. We looked for you. Have you tried to reach your, um, protector?”

“Jerian? No, I called you first.” Jerian would be furious. Or indifferent. Would he actually want Kathlerian 771 returned to his breeding pool? She could guess at the cost of rescuing her: it would be astronomical, if it could be done at all.

“I’ll set a system to monitor you,” Zesh said. “Where are you?”

“On my way to the Dome.”

“Call your Jerian.”

There was no escape. “Joplee, call Jerian Wale, site unknown.”

“Kath, your vehicle’s design doesn’t include long range communication. I can’t reach any sources more distant than a few million clicks. You should try again when we reach the Dome.”

“When will that be?”

“At this pace, one hundred thirty hours.”

Too long! “Will my supplies last?”

“Your water will run short. Oxygen should last long enough.”

Horror crept up the back of Kath’s neck; her ears and nostrils and fists curled tight shut. “Water?” Run short, in this oven? “Maybe there are some caches somewhere? By the drilling machines?”

“Probing with radar. No.”

“Are there machines or vehicles in the dome that can bring me water?”

Joplee went still for a moment, probably communing with the dome. “They’ve been packed away. The dome believes

it's closed, they won't respond from here. I could change that from inside the dome, but not from here.”

She put her head in her hands. Why had she overridden Joplee? The silent dark rocks of Mercury passed by her view. Headstones. She had to think. “Wait. Joplee, my food is stored dry, isn't it?”

“Most of it is.”

If she stopped eating, she'd have more water. Joplee should have thought of that. Her first move upon reaching the Dome was going to be to put Joplee back the way he'd been.

Every few waking hours, Kathlerian

called for Quicksilver. There was no answer.

* * * *

Kathlerian held her breath as they drove up to the dome. Would the doors open?

They did.

She wobbled into the Dome, her stomach tight and angry, Joplee humming at her heels. She could feel the emptiness, the stillness. Oddly, the dome still supplied running water to its sinks. She ran water over her hair and face and drank from her cupped hands, dripping water from her chin. The suit landed in a corner and she wrinkled her nose at the sharp

sweaty stink of her skin. Finding a fresher would take too long. Minutes was too long. She started a sponge bath. “Joplee, get me a fruit basket.”

“Which fruits, Kathlerian?”

“Some of everything in memory stores, a kilogram total. Send it here.”

“I cannot find transport.”

She sank down into a chair, the dry hot air of the dome melting dampness from her skin. Where machines had been there was only silence. All the robots must have gone into storage. “Revive some machines, Joplee. Get me a fruit basket and some corn bread. And pull the

temperature down some.”

“In process.”

Kathlerian created a wall niche and monitor surface. As she worked, a small window popped up: a display of the expenses she was incurring. Daunting ... but the Dome must have registered her as an emergency rescue project. As the last occupant of the Dome, her reserve was huge. The kicker was that it would have to be paid back, if she lived.

There were delays: much of the works had been shut down.

She was greatly relieved to find Joplee's mind still in storage under her

label: Joplee Base Program.

Shut down Joplee? No, she'd have to re-order through the wall interface. She was famished! All right, call Jerian while she waited. She tapped instructions.

The words "Outside Transmission Shut Down" floated across her screen in bright yellow letters.

A robot, a float plate a meter across, arrived with fruit and a hot loaf of corn bread. Kathlerian ate while she worked the keyboard. Exterior cameras were still running, most of them. Antennas built into the roof's curved surface had a softened look. They were being etched

away much faster than they could rebuild themselves.

Could the Dome build her an escape craft? “Quicksilver?”

No answer.

She'd better work through Joplee, after she gave him back his mind. The Joplee Base Program had grown into his original instructions: protect a little girl against her own mistakes. Joplee would have that talent again.

“Joplee, choose me a dinner.”

“Yes, Kathlerian.” Joplee froze.

Rebooting Joplee was much easier than rewriting him had been. She finished the fruit and bread and ordered a mug of stim and an overstuffed cheese and tomato handmeal with everything, using the wall connection, while she waited. In the wall screen Joplee's mind was a complicated three-dimensional shape, changing, turning.

Lights blinked on Joplee's extensors. Kath said, "Joplee?" a bit apprehensively.

"Kathlerian."

"I need to build—"

"Reviewing. You may not go out. May

not build. Surface conditions are. I've killed you.”

“It's all right. We'll get out. We'll just —” Joplee's lights went out. “Just build a ship. Joplee?” In the wall screen Joplee's mind had become a featureless blue sphere. She stared into it, momentarily lost.

All right, now, that didn't work, but no civilized entity would be stopped by one programming mistake. Maybe if she talked faster?

She set Joplee to reboot, and waited. When lights flashed she said rapidly, “We have to build a spacecraft, Joplee.”

“Reviewing.”

“Abort review. See if Midnight Dome can build us a spacecraft.”

“Antimatter stores are depleted. I can't get you fuel, Kath. The Dome is deserted. We've missed Naglfar Marui.”
Joplee's lights went out. Blue sphere of death.

She carefully made a copy of the Joplee Base Program. She'd work with that and reserve the original.

“Kathlerian?”

“Quicksilver?”

“Yes. You missed your ship.” An echo of Joplee’s last words.

“At least the radiation didn’t get me. Are you all right?”

“Diagnostics suggest some corruption. You should work through Joplee.”

“I can’t reboot Joplee!” Her voice became a squeal.

“What have you tried?”

Kathlerian began a tearful review. Quicksilver interrupted: “I understand. He sees that he’s risked your safety and he can’t tolerate it.”

“But he could save us. He can build us a ship. I’m registered for Emergency Survival Funding. There’s plenty of credit.”

“Can you reload the Joplee version that went out with you?”

Kathlerian sniffed. “I didn’t save it.”

“Use the wall connection. Try to design something.”

Kathlerian set to work. It occurred to her to ask, “How are you doing, Quicksilver? Is the sun hurting you?”

“I’m having trouble concentrating. There’s magnetic kinking in the flux

tube. It's like being kicked in the head at random intervals. Kath, your problem is with the armor. If you armor a ship enough to protect you, it won't lift you to safety."

"Antimatter is very powerful stuff," she said.

"You need too big a ship. I find two antimatter motors, both too small, and only dregs of an antimatter reserve. The best drive systems from the old ship junkyard were all reworked and integrated into Naglfar Marui. Wait, now, I've found some fusion drivers from a long time ago, and there's all the water in the Dome for your hydrogen ... mmm ... no."

“There were other bases. Whole industrial cities.”

“I remember. There was a molecular pump, too, right here, just outside Midnight Dome. Mercury’s atmosphere is all protons from the solar wind, all ionized hydrogen: very thin once, but thicker now. We could have done something. But the pump system is long gone. So are the cities.”

Kathlerian ordered an elaborate dinner. She was recovering from partial starvation, and her brain needed fuel, she told herself. Half of what she ordered was rejected. The Dome had lost much of its stores and its capability,

and the Vivarium wasn't producing fresh food—nor fresh air.

She asked, “How long have we got?”

“Mercury has centuries. Mercury's surface, much less. The Dome might survive two years. Stores ... the recycling system is quite advanced. Three to ten years.”

“Longer than the Dome? Wait, now, I could dig. Cover the Dome with rock. But it couldn't radiate heat then, could it?”

“No. I don't see a solution.”

Joplee was no help. She couldn't revive

Joplee unless she could present him with a way to save them. What now?

“I have a notion,” Quicksilver said.

“See if you can describe it.”

“You’ll think I’m crazy. Hey, I am crazy, a little.”

“I am not inclined to be picky!”

“I have magnetic fields for thrust and iron for reaction mass. We could accelerate the planet to a wider orbit.”

Her eyes bugged. “Turn Mercury into a rocket? Are you-?” Crazy. She didn’t say it.

“All I lack is a rocket nozzle. You would have to dig a hole all the way down to the core. We’d be working at Mercury’s aft point, the West Pole, you might call it. But I don’t control the digging machines.”

Kathlerian’s fists, ears, eyelids all clenched tight. She was only thirty-one standard years old! This was all Jerian Wale’s fault. If he’d listed her as an adult, she’d be working directly through the base systems! But a child had to work through her guardian.

Joplee was only a machine. Must she pay with her life for mistreating a machine?

Kathlerian spoke slowly, feeling her way. “You can jet iron?”

“Iron plasma at high exhaust velocity.”

“Why not just use that to dig your way out from the core?”

“Yes, Kath, I can blast away twelve miles’ depth of regolith, but it would spray silicate meteors all over Mercury’s surface. Midnight Base wouldn’t survive. You wouldn’t survive.”

“But you would. Mmm?”

“Yes. I can compute a path to keep me safely distant from the sun, yet close

enough to keep the flux tube in place; moving ever out as the sun expands. But I don't think the solar system's defense systems would allow me to do anything so reckless, unless I was acting to rescue, say, a little girl."

"I'm surprised you didn't decide to try it anyway."

Silence.

"Quicksilver, what is your form? You were written from a human mind into some kind of code—?"

"Of course."

"Would the code match our machines?"

No, of course not. But can you write a version of yourself to upload into Joplee?”

“Joplee doesn’t have the capacity.”

“A simplified version?”

“I can’t write that.”

“Joplee’s my guardian. I need him to work the ... Quicksilver, is there any way to register me as an adult?”

“Hack the Dome? Kath, if you make a mistake you’ll be locked out.”

“I think I have to try it. Let’s see, the Joplee Base Program is a copy of Jerian.

Base might accept its credentials...”

* * * *

It was like using a dead man’s brainscan to run an insurance scam ... but it worked. The Base took Kath for Joplee, Joplee for Jerian, pending action from Jerian. She could lose it all in an instant.

That wasn’t the hard part.

The hard part was running the digging machines.

Base didn’t have software to run the machines itself. Kath puzzled out how to set them, the four that still worked, to converge on Mishinjer’s Crater; but

from then on she had to monitor them constantly.

One machine died early. Its fleck of antimatter was gone, and there was no way to refuel it. A second died of the heat, probably, while digging at the bottom of the cone. Molten iron flooded through the crater's floor and killed another while most of the floor of the cone was still in place. Then its antimatter protection failed. The machine disappeared in a blast that opened the hole wider.

Quicksilver finished the job by blasting iron up from underneath. Kath hid in the bottommost part of Midnight Dome while congealed iron droplets fell

around Mercury. She'd managed to move the last machine to relative safety behind the Mishinjer Crater wall.

At Midnight Dome there was black only at the zenith: no stars. But Mercury began to move ... not that there was any easy way to notice.

This was Kath's suggestion: Mishinjer's Crater wasn't exactly at the eastern point of the terminator. It pointed a little sunward of that. Iron plasma blasted almost straight back from Mercury, but a little downward, into the outer envelope of the sun. The corona would absorb the blast before it circled the sun to impinge on Mercury. Otherwise the surface of the

planet would erode away far too quickly.

But it meant that there wasn't a hope of seeing the blast from Midnight Dome. Kathlerian just had to take Quicksilver's word that it was all working.

By the end of a standard year, supplies were not so much low as strange. Trace elements built up or were lost with each cycle of use. Details of complex molecules were lost. Kathlerian had to count on the medical systems more and more, and all the food began to taste alike. She stopped noticing the smell, almost.

The rocks around Midnight Base were

changing. She could see them glow; she could see them slump. The horizon was a red blaze.

Kathlerian rarely looked out. She looked often at a wall-sized monitor with a view of a vast conical pit and a violet glow.

The pit was growing. The true rocket nozzle was a magnetic field; it didn't touch the pit. But the glow from the plasma flow was evaporating the rock.

She couldn't feel the acceleration, the thrust was too low. Quicksilver kept her informed.

She suggested games. Quicksilver

played excellent chess. Kath was better at poker. Quicksilver told her about the sun's roiling wild surface, then winked out for three days. When he returned he could only spout facts at her, an endless babbling lecture. It took three whole days before Quicksilver could beat her at chess again.

On the morning of the four hundred and fifth standard day, in the half-sleep just before dragging herself from bed, Kath remembered Quicksilver asking her if she'd go on talking to him in his last hours. He was lonely. Had Quicksilver seen how she might strand herself on the dying planet? And had he let her do it?

Maybe there wasn't any iron jet. Visuals

could be hacked. Maybe her half-year with the digging machines had only been a virtual reality game. Maybe the sun was just waiting to eat Quicksilver and Kathlerian and Joplee, who hadn't moved in a long time.

* * * *

She was eating something like sweetened cereal, or trying to. Quicksilver was a three-dimensional image in the wall. Kathlerian had grown used to him: a squat, hairy creature clothed in a shapeless robe, with a blade of nose and funny ears that didn't fold up. He wasn't paying her any attention, but he was company.

He blurred. Cleared, and gasped. “Kath? I’m buzzing. I hope that isn’t the sun g
—”

Then Kathlerian was looking at someone else.

The cereal bowl rolled across the floor. Kath stared at a man similar to herself, with wrinkled nostrils and fanlike pink ears. Stupidly she asked, “Who are you?”

The man glared, not quite at her. “Whoever hears this message, you are drafted. Do you understand? I am Jerian Wale 9000—”

“Jerian!”

“—have the authority to commandeer property that is deemed to be abandoned. You are drafted into the service of the Community of Solar Worlds and assured adequate compensation. Whatever is causing motion of the planet Mercury, you are to stop it at once. If you do not cease at once, we will be forced to fire on you.”

“Quicksilver!”

“I heard. He’s going to fire on a planet?”

“But he’s ordered us to stop!”

“We can’t. Turning off the jet would take tens of hours, and I don’t want to. Talk to him, Kath. He might be light-hours

away. You'll never get anything said unless you talk across each other."

"Well—all right." She didn't much like the man's face nor his expression. "Jerian Wale 9000, I'm Kathlerian Wale of the Bear Clade, born in Bear Three Bubble. I've been left behind at Midnight Base on Mercury. My own fault. There are only the two of us. We're trying to move the planet to where I can be rescued. After all, there's nobody to be risked! Nobody's around, we're too close to the Sun for any kind of mining or research or tourism, and nobody else here on Mercury—" She bit it off. It sounded like she was whining.

Jerian Wale was repeating himself,

cycling.

He looped for half an hour. Then he blurred, listened, and spoke. “Kathlerian, you’ve claimed priority under emergency action. I doubt you have any concept of how expensive that is or what the penalties are. Who is your companion? Wait, I find a record—yes. Quicksilver, Widge Hordon of the Vance Clade as of the Second Deep Reworking Period. Quicksilver, please respond.”

Kath asked, “Quicksilver?”

“I’ve got nothing to hide, Kath. I’m sending him everything I have. You look very twitchy. Do an exercise program while we wait.”

* * * *

Waiting ran hour after hour. Quicksilver didn't answer queries. When Kath pressed him, his brute image disappeared. She tired of waiting, and slept.

He was there when she woke. "We have an agreement," Quicksilver said.

"He didn't want to talk to me?"

"We're more similar, Kath. Jerian is nearly as old as I am and has more intelligence and wider experience. Of course he thinks faster, too, but that's nothing compared to the lightspeed delay."

Badly humiliated, Kath shut down Quicksilver's image.

Two days of that and she couldn't stand it any more. She booted up her link and asked, "So, are we going to live?"

"More or less."

"What's that mean?"

"You've seen a list of expenses, but they don't include possible damage claims. We've moved a huge mass without filing flight plans or waiting for responses. We've sprayed gigatons of iron vapor into the sun. I may have covered some of that, or all, by claiming Mercury as salvage. The planet was completely lost

to human profiteers until you and I intervened. Now there's easy access to a source of iron and rare earths. Bidding has already started. Also, Jerian has arranged to store a recording of myself. It took me time to send it. I'm sorry if I've been ignoring you."

So he hadn't noticed her ignoring him! So be it. "And now there are two of you?"

"Not for long. We've arranged to settle Mercury in the L4 point of Venus. The mass should stay there long enough to be mined before the Sun expands to take both planets. But we're getting too far out from the Sun. The flux tube will cut off in about twenty days. You'll be

offloaded, and Mercury will coast into place without further guidance.”

Somehow she hadn't seen this coming. “You're still going to die?”

“Well. ‘Die’ is such a vague word. Jerian will hold me in storage, he says. I won't have anything like civil rights unless and until he finds some reason to revive me.”

“I'll—”

“Don't promise anything, Kath. You might be a pauper before this is over. The bidding for Mercury isn't enthusiastic. If there's any profit, though, you'll get half and you'll be my executor

for the rest.”

“Me? I don’t have any skills, Quicksilver.”

“Kath, it can’t be Jerian. I don’t want to give him a motive not to revive me. We thrashed that out.”

She was being entrusted with the very life of an ancient being. Her tongue thickened and her ears curled against her head. “Thank you.”

Quicksilver did not answer, so she asked, “Play another game of chess?”

A board appeared on her monitor, with green and blue pawns that looked like

planetesimals. The knights were iron crabs. The kings and queens were domes.

* * * *

The sun shrank. Even so, the Base refrigeration system howled. Mercury was turning now, if very slowly. The sun was a vast, stormy red half-globe. It covered a quarter of the sky, as if the world was falling into it. Realistically, everything was. Venus wouldn't last forever.

The flux tube ruptured in a tremendous lightning bolt that stretched all the way into the sun. The whole planet shuddered. When it was over, part of

Midnight Base was open to space. Kathlerian was caught in the dining area. Her nose, ears, throat, and other sphincters all snapped shut. She felt internal pressure trying to rip out of her, and she ran for the nearest double doors, her mind howling that it wasn't fair!

And she made it, but from that moment she had no food source. She had water: spigots that had fed the Vivarium.

Venus was only a pink pinprick, changing little as Mercury approached its fourth Lagrange point. And Quicksilver was—but dead is such a vague word. Dead as Joplee, anyway.

* * * *

She didn't hear anything at first. Kath had grown used to the refrigeration pumps. She found the Base unnervingly silent. She spent more and more time sleeping.

She dreamed of bones rattling together, and someone calling her name. "Kathlerian Wale 771, I'm Joplee. You are to come with me."

But Joplee was dead.

She thrashed and rolled to her feet. Something was coming toward her, a spiky humanoid shape. She shook her head. "You're not Joplee."

"Jerian Wale 9000 has upgraded me. I

am a simplified version of Jerian, with a new set of restrictions. Kath, dear, you are to be upgraded as a young adult. Jerian says that you have certainly been behaving as one, and you might as well accept the obligations that go with the job. We'll leave your current Joplee version here.”

“Jerian still won't talk to me? Is he angry?”

“No, Jerian is pleased with the way matters have worked out. He just doesn't have time to talk to you at this time. Kath, I have a ship. I'm to take you directly to Mars.”

“What's on Mars?”

“A subset of the Bear Clade has assembled. Medical facilities are on hand. You’ll be treated to mature into an adult. Jerian is there too. What would you like to take from Mercury?”

Nothing. Memories. “Video imagery. I’ve stored a lot of memory in the Base.”

“I’ll store the Base mind in the ship. Anything else?”

Joplee, the real Joplee. She set her hand on him, the old Joplee. It felt as if she was leaving her childhood behind, and a crime she would never repeat.

“Nothing.”