



**SCIENCE
 FICTION**

**ALL NEW
 STORIES**

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THE LONG, SLOW ORBITS

by H. H. HOLLIS

Illustrated by FINLAY

*Nice prison! It was a Klein bottle
in orbit — easy to escape from, if
you didn't mind turning inside out!*

I

I was taping indiscretions at a morning reception in the Israeli Embassy when I saw Gallegher hiding behind two experts in nuclear desert reclamation. We exchanged glances and assembled at the bar, where I saw that he had a grotesque pattern of hairline scars cutting whitely into his rusty Martian tan.

"Have you become a consul for some slowly developing nation too poor to afford real diplomats?" I asked.

He laughed. "No, I'm a house guest here, sort of. Why don't you ask me about these scars?"

"You look," I replied, "like a chicken thief who never heard of charged fences. Is that six-inch hexagonal grid all over you?"

Gallegher drew himself as nearly erect as any tramp rocket jockey will (they don't like to be mistaken for space Navy men) and said, "These are the heroic scars of a conductor on the underground railroad."

"On the *what?*"

Just then I was swept away by a loud argument between two diplomats famed for the personal and political enmity, but Galeg shouted, "Lunch!"

Over the second bottle of a sturdy Hock in the Embassy's great public dining hall, Gallegher leaned away from the dead luncheon plates and told me about the chicken wire.

The girl (he said) was an Israeli; that is, a citizen of the Greater Near East Co-Prosperity Sphere. It was the summer after I broke my ankle testing that crazy Englishman's "space bicycle" — you remember? It was going to make servicing the weather and communications satellites so easy? Well, I fell off Tiros Ten while it was in a north-south pass. I cratered in Central Canada, and the Toronto therapists sent me up north to the Arctic Ocean, so I could strengthen my ankle. I was staying at the Hilton T-5, on an ice island about a hundred and fifty miles from the geographic Pole, and hiking a random route over the pack ice every day. The up and down and sliding all were supposed to strengthen up my ankle ligaments.

One day I saw a girl stalking a polar bear. We were both wearing parkas, and I thought she was an Eskimo. The bear had tolerated her, just waving its paw and growling every now and then, but it saw me and decided two human beings on its trail was one too many. It just slid over the edge of the ice and took off for open water — or another ice island, I guess.

Harriet turned and saw me then, and came bounding over the ice, waving her spear and shouting. "You're supposed to help! I would have shared. Now I've lost the sport and you've lost the meat, freeze you!"

She saw the color of my skin just about the time I could see hers, and pulled up short. "Oh," she cried, "you couldn't be an eskimo, not with *that* pelt!"

"No, sweetheart," I replied, "and that Mediterranean profile and black olive complexion of yours never came from Hudson's Bay, either. I'm sorry I spoiled your game."

"Sorry all hagan! Every Earthman thinks he can make anything all right just by saying, 'I'm sorry.'"

That aerated my fuel a little. "As for that, I'm more Mars than Earthman," said I. "And a good day to you, ma'am, for the next two months of it."

She sank the spear point in the ice with pique, and muttered to herself. "She-hagan . . . another iron man — lost in space without a hot tube and a computer to bring him home."

Then I knew who she was, from the newstapes. "So-ho, you're the little Yemenite sailor-girl who made a fool out of Space Admiral Rogosovsky?"

She smiled a bit at that. "Oh, well, rockets can hardly deal with a craft like mine. A sun sailor moves with the organic forces of the universe . . . and besides, the light quanta pushes it so slowly a rocket is useless when it matches speed to the *Sunbeam*."

"Is that the name of your tube?"

"She's no tube. There's not even an auxiliary aboard. When I shove off from an asteroid and spin out *Sunbeam's* sail to the solar wind, I'm on my own." Her hood was thrown back now, and she smiled a real primitive grin, all over her face.

"Tricky navigation?" I asked.

"Oh well! You have to know how to do it. There's so much real estate in the Ring, though, that you can always make a landfall somewhere; unless you're fool enough to sail right up from the sun out of the Ring. Then you might broach to and let that old fireball blow you right up to Pluto."

It pleased me that she thought of that direction as "up." I've always felt myself it was "up" to Mars and "down" to Earth instead of "out" and "back."

You don't need to know all we said after she realized I was an old space hand. By the time we tramped back into the village, we were old bear-hunt mates, and she set out to recruit me for her crusade.

I wouldn't have believed her story, written out, but I couldn't disbelieve it when I was looking at her. She wore an anklet of those blue ceramic beads. After that first day, it might as well have been around my neck.

You remember the public part of it. Harriet appeared on the vidcasts when she was discovered sailing a long, serene track well inside the orbit of Mars. Admiral Rogossovsky reacted like the clockwork bureaucrat he is and made a heroine out

of her when she defied him and his whole Navy couldn't catch her.

Between the public's chuckling and the professionals' pleased appraisal of her antiboarding devices, Tojo Rogossovsky lost every round. It was bad enough that every time one of those hot Navy tubes would damp the flame down enough to match velocities with Harriet's *Sunbeam*, she'd float one of those glass bottles with a firecracker in it over and blow the Navy's matching trajectory into a Riemann parallel; but when the Old Man ordered his greenjackets to get out of their pipes and use their zot-guns to capture Harriet, they wouldn't do it. Who wants a firecracker in a glass globe up against his faceplate? And it's an all-volunteer service anyway, so . . . I should have known there was something about a girl who could think up a device like that. But she was only five foot two, about a hundred and twenty pounds, raven-wing hair that she could sit on when it was undone, and a way of hanging on to my parka and looking up into my face that made me feel I was somebody special.

She was somebody special, and her specialty was to subvert the economy of the Asteroids. Harriet was running an escape route for cyborgs.

That's why the sailing trip. She had chased down that asteroid with the eccentric orbit that brings it inside the orbits of the inner planets, and left there a half-living machine that she had stolen. She was actually leaving the inner solar system

when Admiral Rogossovsky and his radar techs picked her up.

I see you're shocked by the idea of cyborgs. You know they're illegal down here and on Mars. Don't forget there's *no* law in the Asteroids. By law, the Ring has been left free to find its own economy.

Just you remember this: anything that technology *can* do . . . at a profit . . . *will* be done, somewhere.

II

Harriet explained to me how it got started.

First thing, they have a lot of freak accidents in the Ring. One of the freakish aspects is that an accident is often catastrophic but not fatal. What's to be done, then, with a basketful of viable organs, missing only eyes and limbs, say, to be a person? Down here where it happens so much more rarely, we bany the pieces and throw away the personality. When we use the replacement parts, we have to suppress immunity reactions and put up with the fact that the pieces are the wrong size and all that. But we've got people running out of our ears. We can afford to discard personalities.

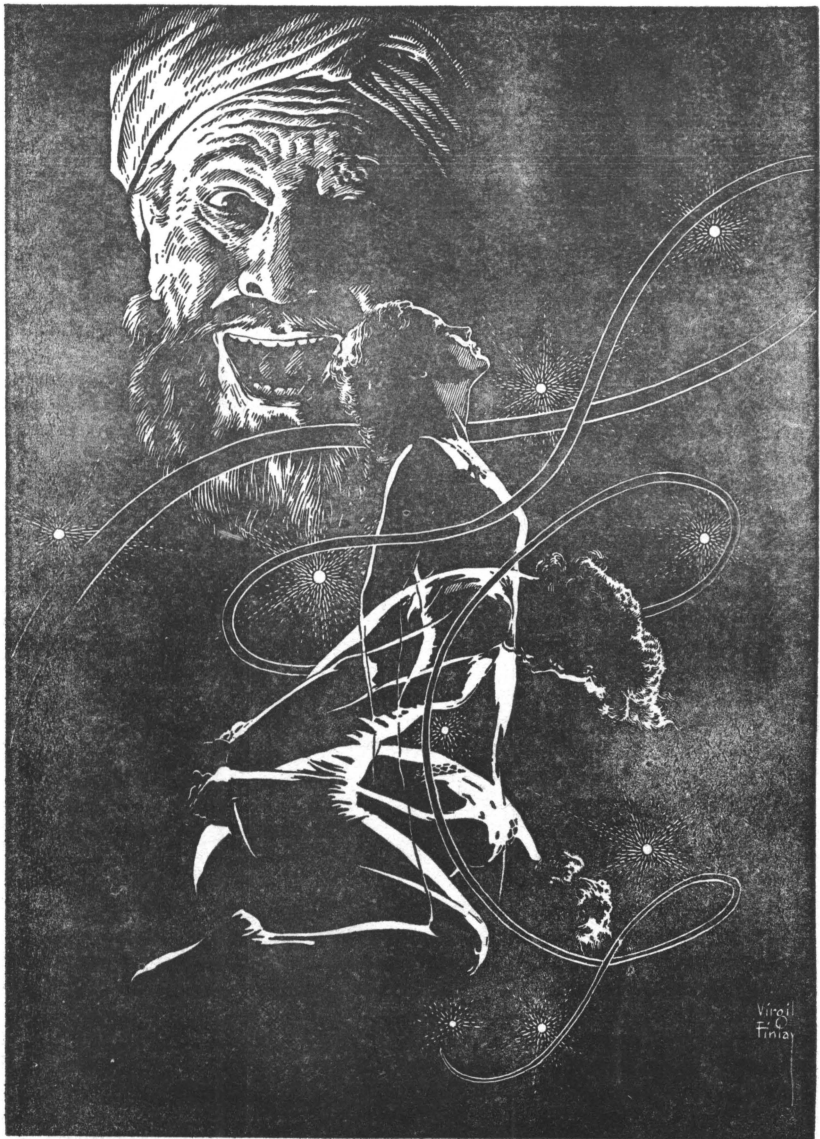
In the Ring, it's the other way 'round. They're few on people and many on machines; and a remnant really adapts better to nylon and platinum and stainless steel prosthesis than the individual organs do to being life-grafted onto somebody else. After the operations, you may have a something/somebody that's

just right for riding a big chunk of ore round and round the Ring, operating the smelter by being wired right into it, and dropping a load straight "down" to Earth when the two orbits are right.

That's were the Ring-wallahs make money: on the shipping. Costs are next to nothing. Gathering the stuff is expensive; and going up for a load after it falls into orbit around Earth costs money; but the low mass everywhere in the Ring makes shipping as cheap as vacuum. When the computer says, "Push," you can push a load with your hand or with one of those firecrackers — Tojo Rogo cocktails, they call 'em? — *in the right direction*, and that's all it takes.

Now, you turn half or three-quarters of the gathering over to a half-live machine that runs on a barrel of vitamins, a little greenhouse to recycle the oxygen and the wastes, and a yearly maintenance call to replace a few transistors and vacuum tubes, and hook the device into a "cyborg central" by radio, helio and teevee; and instead of a hole in the fuel tank, you've got a fuel breeder. Money's money, everywhere in the universe, even in enterprises that are theoretically cooperative, like a kibbutz.

So you see what happened, don't you? In the blurred legal nowhere of the Ring, it ended up so that who paid for the surgical operations owned the hardware; and *sad* to say, Mrs. Stowe and Uncle Tom to the contrary notwithstanding, when you own a being's body, you also own its/his soul.



And Harriet, poor Harriet, her clan hadn't even been moved out of Yemen until after the Greater Near East Co-Prosperity Sphere imploded from the war against the Pakistani Dictatorship. When she was thirteen years old, she was literally jetted a thousand years, from a pre-feudal patriarchy into a bustling industrial nation.

It was all a little much for her, and when she was eighteen, she shipped over to a mining kibbutz in the Ring.

The only person who kicked out to it with her was a boy from her clan. He was only fourteen or fifteen, so she was leader. Even in the kibbutz, though they cooperated cheerfully with its system of absorbing immigrants, the two of them constituted a kind of irreducible fraction. The kibbutz itself was breaking up under the pressure of the new economic conditions in the Asteroid Belt; every day a little less of a cooperative and a little more of a competitive enterprise.

Then her friend got hurt.

Oh, "Mordecai" was saved. "He" came out about the size of an IBM 00701, with bellows pumping and gauges registering, and three kinds of light receptors to see different bands of the spectrum; but not exactly adapted any more to wandering off to the shady side of a rock chunk and talking philosophy. He was anchored to a million-ton drift of cinnabar with a hotel room full of auxiliary machines. Then he started reducing the ore to flasks of mercury isotopes.

At that time, "Mordecai" could see and talk and had tracks on which he could move. However, it wasn't long until he got into an argument with the mine operator who owned his hardware. This man was a curious, cruel sort, well on his way to becoming the dominant force in the Ring. His methods were fast becoming any act by pointing to the competition. Harriet always called him "The Sheik," which ought to give you some idea of his attitudes toward people . . . and people/machines.

How can a machine feel cruelty, you ask. So did I. I hadn't stopped to think that these machines are sentient. The owner could switch one out of the television circuit, you see, for a mild punishment; or disconnect the light receptors, a little worse; or cut one out of the voice radio and restrict it to Morse. At the last, when the one rotter got really rotten, he would cut off everything except the restricted senses needed for the mine or the smelter.

The cyborg would just drift in darkness for a year or more, working without knowing when or if anything else was going to happen, not able to ward off meteors or monitor the sunlight.

The Sheik had lost the whole point, you see, and was indulging in cruelty for cruelty's sake. Originally, he promised incentives for more production or better shipping. He was going to go to color teevee for real producers. There was going to be rotation on the jobs, to break the monotony. A teevee band would

be left free for experimental drama and dance by cyborgs. Typewriters would be added to the circuitry of any cyborg that came up with a usable suggestion. Oh, he talked a machine dream, for a while.

None of these promises ever materialized, but he began to exact penalties of the milder kind: sight and sound. Fear followed . . . both ways.

The more he punished his cyborgs, the more he feared them, until at last his cruelties — lowering their available oxygen, shutting down their senses to the level of mechanical efficiency, beating them (get that bright and sharp on your mind's teevee, would you) so some of their mechanical members were bent, making it hard for them to work — his cruelties came to be done to exact *respect* and to, "keep the steel-colored sonofamarches in their place," rather than in any rational attempt to raise production.

Production was dropping, of course. The Ring was not a place for a slave economy.

He lost a couple of the half-living by shutting them down to machine status. Meteors smashed the greenhouse on one, and a sunstorm cooked the vegetation in another. He saw to it that the carcasses were displayed on the video. "Example to the insolent."

Worse than these calculated cruelties were the wanton ones. The Sheik carried a fifty-inch screwdriver to reach and tighten connections that otherwise would have required extensive dismantling, and

sometimes he would lay it across two or three exposed terminals, producing a shower of sparks. "Remind 'em who's boss," he would say, while the poor devil shook with oscillation, trying to restore the electric equilibrium.

He even wired his office record handler so that she shocked herself in handling the routine work load. Played hagan with the records, of course, but the Sheik didn't care. "Gussie loves me," he would say. "Don't you, you steel-colored old bucket of bolt?"

And if she didn't answer, "Yes sir!" cheerfully, he would punch in a sequence that always shorted her out.

Not all this madness was apparent. Harriet automatically suspicious, a little paranoid about herself because of her own history, telescoping years and light-years, you might say. She was a loner even when "Motl" had been fully human and fully movable. Her paranoia was fed by his accident, and that's when she began sailing.

While she was out there riding the winds of the sun in total isolation, hung in the center of that great main sheet, a single layer of molecules thick, she was anxiety free. Like a rich man sitting on a park bench, she could see in every direction. Nobody could sneak up on her.

Technically, or politically, Harriet was a full cooperative member of the kibbutz. Sun jamming was a popular sport, and nobody questioned her solitary sailing. Nobody realized, either, that she was hunt-

ing Mordecai. The way she told me, it would have been impossible to establish that his location was being concealed. But every set of coordinates the Sheik's "Gussie" gave her was wrong.

The second time it happened, she realized something more than a misplaced datum was operating. After that, she was too cautious to ask the office cyborg again and began to sail around the Ring in a series of exploratory curves that would have made a tight spiral around the "regular" Asteroid Belt if she'd had to complete it.

Lucky Harriet made a landfall on Mordecai's cinnabar eddy within a month or two of the time she started her purposeful search. Sure enough, the Sheik had cut him out of everything but the Morse circuit, deprived him of all light reception below ultraviolet and removed his tracks. There he was, not much more than a sophisticated monitor, when she began talking encouragement into his sound sorters. They worked out a plan that required he stay there and sweat bolts while she stole and roused enough of the others to tip the battle against the Sheik.

But she needed another hand.

She told me all this in her igloo. The blubber pile in mine was pretty rank because somebody had put a bar of perfumed soap in it, and the flavor of every piece in the pile was affected; but Harriet's was all nicely rotted seal, whale, and bear meat; so we were mostly in her place when we were inside.

Doesn't the whole story open up your seams? I tell you, she had

me oscillating in sympathy with those poor half-live coggers. There! I'm sorry I said that. She made me realize it's an opprobrious term; but it's hard to get out of old bad habits.

III

I helped her. I'm proud of that. Me, that never stole a machine in his life, not so much as an in-ear radio. I helped that chunky, spunky little girl cognap every shape and size of half-life you could imagine. "Coggerstealers" was the kindest thing the owners called us when they realized what was happening. We gloried in the name. We made ourselves as feared as oxygen pirates.

For a long time, we kept the operators in the dark about who we were. We had put up an awful good smokescreen by having become apparent lovers on the ice island. I moved into her igloo. I'd have almost done it just to get her blubber pile, but of course it's nice to have somebody to talk to. Before I realized her sympathy was reserved for the prosthetically extended, I told her a routine precautionary romance about how a tornado of cosmic rays had caught me over Mars on a cargo pipe and altered my gene structure so that I couldn't ever marry.

So it never occurred to her that a brother and sister, can't-tell-the-boy-from-the-girl-without-a-program kind of relation wasn't suiting me fine. I never could get the proper emphasis on the second day's in-

stallment of *my* story because she was so well launched into *hers* by that time, grinning and crying and acting out all the parts. She understood nothing had been altered about me but my genetic code. She just didn't think it was important. Harriet was accommodating enough; she was a nicely brought up girl; but there was no emotional investment.

I was ready to light the flame and get out of there in a few days and start rescuing the slave machines; but she felt we had to stay around for a couple of weeks to let our "love affair" become pretty well known. For a girl, she was mighty crafty.

I don't believe I ever really got her attention until the third or fourth day after I moved in with her. You've stayed in igloos, haven't you? Well, you know the heat comes from your own body and a little oil lamp, a soapstone bowl of whale oil with a moss wick. You wear those everlasting pants and boots and parkas all the time. Eskimos don't; but they like it cold; and there are always a lot of people in an eskimo igloo. I saw more of Harriet by the hotel pool than I ever did in the igloo.

But about sleep time the third or fourth day, I said to her, "How about blowing this lamp out? I've learned to savor the taste of blubber, but I can't learn to like the smell of it burning." Harriet giggled and said she'd only left the wick alight because she thought I wanted it. I snorted the flame out, and it was totally dark.

When I woke up, I wanted a light so I could see to get the wick burning again. I had a little old hand-squeezed generator flashlight — you remember, with the works visible through plastic sides? and you squeeze a little plunger handle? When you've got the armature turning fast enough, it generates enough electricity to light a little wire filament bulb. Gives about as much light as a second magnitude star peeking in a cave entrance.

About the second or third squeeze, I had enough light to see Harriet in midair. The flash had startled her out of a dream of sun-sailing alone.

Whatever the world's record is for the lying down high jump, she broke it. Turned over the blubber lamp too, so I had to keep squeezing the dag-blagged little machine to get enough light try to comfort her. Her irrational fright reaction had jarred my gyro too, and I couldn't think to crawl over and pull back the skins at the entrance tunnel. You don't get much light that way, but with the sun "up" twenty-four hours a day, you get enough to see objects.

Believe me, putting your arms around a fairly athletic girl clad in loose skin garments while she's running around the walls of an igloo in the dark, cursing and praying in the South Arabian Peninsula Hebrew dialect of her childhood, and you're squeezing a hand generator for what little light you can get, is a unique experience. Every time my hand would run down, she'd start hollering, "Ohr! Ohr!"



(Light, you know), and I'd have to start pumping some more.

I knew then what my grandfather meant when he gave me that little old antique. He was a New York politician, did you know that? and he kept that flashlight to help him home in the power failures. He laughed when he gave it to me and said that he'd always been safe in the blackout because he was a politician; he could see his way home just by shaking hands all the way. And my hand was as sore the next day as if I'd been elected President of the Federated U. N.

When I finally got her quieted down, we were a whole lot better friends than we'd been before. I wasn't so much in awe of the heroine who'd fought and sailed her way through the middle of Tojo Rogo's whole space navy. She'd had a new look at me, as somebody who didn't quit just because the seams were opening up. A woman always thinks more of a man who's lived through a helping of hysteria with her.

The one part of the happening that ought to have been significant to me, but wasn't, was Harriet's reaction when I wouldn't make her a gift of granddaddy's generator. She thought it was just a toy, you see; but when I told her the story and explained why I couldn't give the little momento away, she softened up and all at once.

She pulled me back in under the bed skins with her, and said, "Oh-h, you're a real person, after all. Bring your grandfather's little machine in here with you. I would never have guessed you are so sentimental."

I remembered that when it was too late to do me any good.

We finally shoved off to our work. If I ever have a honeymoon, I want to take it in a two-place sunjammer. Unfortunately, Harriet's little vessel (a loose fit for one) was snugger than the fat man's spacesuit in the story for two. We had to work out a kind of drill by the numbers even to work the direction finder or swing the sail. So we had to take a hot pipe to the deep space cosmological research station beyond Mars and launch our little candy wrapper from there.

Even so, I fell in love with sun-sailing. Barring the storms (and you know about them when they start up from Old Sol), almost nothing deflects you from a well plotted course. You spin the sail out to full circle, set your course by using two hand-wound gyros, and then you can switch off every device that makes noise aboard. You coast out there in that golden breeze of light quanta as unconcerned and easy as if you were in the womb of the universe, waiting for the first big bang. The sail's big enough to be washed by varying waves of sunlight, and it really does ripple, or seem to, anyway. You go outside and hook a mile of that monofilament line onto the after handling cleat, turn your toes down to the sun, and let the sail carry the ship up from you. The only noise you hear is your own blood stream, still counting Earth time . . . maybe your own digestive tract, con-

verting something or moving it . . . I tell you, you own the solar system.

You can't get lost. There's Sol at your feet and straight up over your head, there he is again, multiplied in a great shimmering mirror. One day I took a ten-mile hank of that line out. After all, how much mass has it got? Each fiber is just one long molecule, for practical purposes. They only make it up to the diameter of a blonde hair so you can see it. The strength of the line doesn't require that thickness.

I lay out there so peacefully I went to sleep and paid out the whole coil. When I woke up, for as much as a minute I believed I was alone, and the whole universe was just my idle daydream. Luckily for all the rest of you, I didn't change any of the apparent laws of our time and space before I came all the way awake.

Believe me, climbing a ten-mile line hand over hand, taking it up as you go, is a lot of exercise. You have to keep pulling, too, slow and easy. If you try to do it all in one jerk, your hand orientation may pull you a course half a mile from the craft. Then when you suddenly notice, you're about to pierce the sail, you've got to brace up so hard on the line that you impart a new direction to the vessel along a vector you can't even calculate because of the peculiar way you achieved it. When you get back aboard, you've got to switch on the direction finder and take on all that static that goes with it. Your eardrums aren't used to it any more, and it seems

somehow to shrink the solar system right down around your shoulders.

I was worn out when I got back in from that ten-mile gymnasium climb; but Harriet was furious. I thought at first she wasn't going to let me in. Believe me, the way we had to pull that little craft up around our hips to fit just so, I couldn't get in *unless* she let me.

I had got bored, hauling in, and pulled too hard and at irregular intervals. The peculiarity I had imparted to our course would have taken us right out the top of the solar system. Yes sir! Almost right-angled to the plane of the ecliptic. Well, we wouldn't have *gone*, because we were still in the plane; but our sail was edge on to the sun and beginning to crumple.

I was tired when I got inboard; but by the time we finished hand-cranking those two gyros to turn that little sun witch back ninety degrees into the true course and got the sail spun back out to the full circle, I was perishing.

By that time, Harriet was laughing at me, but she couldn't help me anyway. We'd had to go in and out to get the sail round rigged again, so we were full suited, helmet and all. When she blew out the air letting me in, we had exhausted one bank of air producers, and Harriet was laughing so hard she couldn't get the connections changed, and that was a job that only she could do, the way we fitted in. I had water in the suit, but no food. Who knew there was going to be a crisis?

I nearly starved before she calmed down and got the air pressure up to where I could rip off my helmet and ingest a couple of food bulbs. After all, I have moved and controlled enough mass to be equivalent to about a week of decathlons in high gravity.

That was the last of our high jinks on the trip. Somehow, when the dogs on the hatches were tight and we were back on course, we both got to thinking about the grim rock chunks to which we were bound; and although the rest of the voyage was just beautiful and we were just as isolated as before, something about the fact that we were bent on an illegal purpose made us feel that we were being watched and spied on. We both got a little twitchy.

When we were twenty-four hours down the plane from the administrative asteroid of her kibbutz, Harriet furled the sail. She went about it with great precision, and very quickly, but with an air of abstraction and watchfulness. When we were coasting, slowly closing on the big asteroid, and sure our course was true, she came back in, aired the chamber up full and rich, as thick as at sea level on Earth, took off her helmet, shook out her hair and laid her head on my shoulder.

In a minute, the collar of my suit liner was wet.

I did what I could, but I didn't know why she was crying. She called me a pet name, never mind what. "I never cared if it was just me . . . but I can't bear to think you might be killed; it's not your fight."

I had to lay on the nobility. I believe "the cause of all mankind" is what I called the crusade for cyborg civil rights. I wasn't ashamed to say it then, and I'm not ashamed to say it now. Finally, Harriet smiled and tossed her hair so it floated round her head in a black flame. She dogged down the inner ports to shut out the light on which we'd travelled so many knots. The instrument lights gave us about a foot-candle of dimness, and she grinned like a fourteen-year-old getting ready to kiss her first man. "I'm sorry," she said, "that I haven't got a blubber lamp for perfume."

But I didn't miss it.

IV

When we undogged the ports, a hot little rocket from the big asteroid was putting off to tow us in. We debarked, gave our identifying blood samples, put up with the single entendre comments of the "customs officer," and filed a "vacation sailing plan." "Vacation" meant we didn't have to stay in the communications net, as working sunjammers did; and I see you see that meant we could be anywhere. Nobody would know for certain. In fact, we were free to range the Ring committing our immoral thieveries of property for the moral purpose of freeing personalities from bondage.

If you can think of a better life than technically flouting one set of society's rules in order to adhere to another, more fundamental set of the same laws, and doing it in the company of a beautiful, intelli-

gent, accessible woman, tell me about it; because I can't.

Between forays, I enjoyed watching Harriet play the game in the kibbutz social hall. She was radiantly beautiful then, with her arm in mine, talking everybody's talk about us getting a couple of mines going and settling down. Then she'd wrinkle her nose and call for some old tune from the youngster who played the accordion, and in a minute she'd have the place in an uproar, doing a hora. Skipping and stomping in a circle where gravity isn't a hundredth of Earth's is something you have to participate in to believe. Within a minute after it starts, the line is up on the walls, and then the dome itself, and pretty soon your hora is spherical instead of circular.

Somebody, (Harriet, usually) would grab the accordion player and sling him into the center, about twenty feet off the floor. He was a sweet-natured boy, and he'd stay there indefinitely, turning in the air and working that stomach Steinway for all its worth, while the rest of us stomped and glided and shouted over and around him like a swarm of bees. Harriet would keep the dance going until people collapsed and she was nearly crying from laughing so much.

Next morning, we'd out sail and tack down the sun wind and steal another machine from some of the people we'd been dancing with. We were kept in orbit by feeling like liberators.

After the first few months, we would switch on the radio and

listen to the steady official tide of horror and revulsion at our piratical acts, and laugh a while. Then we'd switch out, turn in each other's arms, and coast down the eddies of the sun to our next raid.

We'd sail in on some poor devil who'd been deprived of most of his senses. He wouldn't know who we were, but our landing would joggle the fluids in his machine parts, and his dials and gauges would start to spin and tremble in fear that he was going to be shocked or have his senses turned down yet another notch. If we had been made of metal ourselves, we would have wept.

We'd connect up his sensors in a hurry, sight first, then sound and touch, so he could see right away we weren't owners, and hear our revolutionary slogans; and then have the pleasure of touching human flesh that wasn't hostile. We'd splice in a private voice line, one to Harriet and one to me, because sometimes they had physical needs (as distinguished from mechanical) that they were modest about discussing.

One of them was a woman at least a hundred years old, counting from her "human" life too. Her reconstruction dated from the first experimental days. The job wouldn't be done that way now, but the surgical engineer who patched her up had good, human instincts, all the same. The small of her back, with skin intact, had been saved along with the organs in front of and above it. The back section was in the construct next

to the greenhouse and there was a sphincter through the top of the greenhouse and another through one wall. Part of the maintenance routine printed on her casing was to stroke that piece of hide and give it a few pats every year. She told Harriet in a whisper that she was just itching for the touch of a man's hand. Too shy to tell me, you see. Didn't know what kind of man I was.

Harriet promised I wouldn't pinch or pound, and then I had to wrestle with those sphincters and with my glove, for my suit wasn't really set up for that sort of thing. I would have risked frostbite a half inch deep to make good on a promise Harriet had made.

The result was more than worth it. A man doesn't understand what gratitude can be until he runs his fingertips down a few spinous processes poking up against a few inches of skin and feels ten tons of machinery under him begin to purr. A sonofamarch who would deny that simple pleasure to a half-live must have had a corkscrew twist in every neurone.

I got caught up in the thing along about this time, you see. I started out, I guess, sort of humoring Harriet and maybe with visions of her and me on a big asteroid of our own with a few diggers and smelters supporting us in a family orbit. The cyborgs were still just things to me. But when I felt that old skin ripple under my hand and later, when I joined — hands? — with Harriet and a boss-smelter and danced rings around the rock after

we gave him back his treads, I began to feel for — no, not for, *with* these entities. Harriet had been programmed full of that wild Hebrew humanism when she was being rewired into today, and she could phrase it: in the time it takes a gram of fuel to explode, instead of "I-it," the relation became "I-thou."

And it was true. Before that, I had to watch myself to keep from calling them coggers; but after that, the opprobrious term never came easy to my lips in the Ring.

I guess the reunion of Harriet and Mordecai was the most touching and the most satisfying, too. For strategic reasons, we didn't go to him early; and for navigational reasons, we couldn't get to him at the time we wanted to; and he was completely out of the communications net. When we did home on him, the plot for our attack on the administrative asteroid was almost ripe.

Mordecai had a very sharp brain in his black box, he was a very sophisticated machine, and he was very young. All that made his sensory deprivations more poignant. He was designed to smelt and ship that huge drift of cinnabar; and to keep it together until he could extract the last kilo of quicksilver, he had been equipped with gravitators. He even had propulsion, so he could speed up the drift or slow it down to preserve a favorable shipping point in its orbit. All this had been robbed from him, as if he were dying again.

That boy was a fighter, let me

tell you. When we sailed in on him, there was little more function left than an egg candler or a bottle capper might have had, but he was still managing to sabotage the operation. He was breaking containers, overfilling them, and failing to move an empty into place when one was filled. There were wasted, contaminated globules of mercury floating all around him like silver buckshot. Some of them were half-ton globes. What defiance! What a mess, having one of those things plate out all over you!

We were an asteroid week working in to him and getting him to understand we were friends. Then, as we rewired him and threw the switches that turned his senses back on, it was like raising a child from a brat to a Ph.D. in six hours.

An affectionate Ph.D.

Harriet was crying, of course, and calling him pet names. "Motl, darling!" and "Muttie, raise the driver on your port forward quarter. That's it, sweetheart!" As for him, it was, "My sister! My dove; My white pouter pigeon!" and so on, all in the voice of a rock-crusher needing oil.

"Mordecai," I finally said, "raise all your grasping appendages. Good. Touch them together, over your greenhouse. Good. Please move each in a series. Good boy! you're cured. You can do anything you're big enough to do."

He swiveled a light receptor around toward me and said, in a very controlled thrum-m-m, "Mr. Gallegher, I am grateful for what you have done for me, and for my

fellows. But I think, after what I have lived through, and died through, I am not a 'boy.' Could you manage not to call me 'boy' again? That would be something nice for me, and it would not cost you much effort, I think."

"I saluted with a wrench. "Yes sir! What else can I do for you?"

I'll swear that seeing lens winked. "Hook me back into the 'iron grapevine,'" he said. "I'm ready to call on your war."

"Oh, now, wait a minute, Reb Mordecai," I temporized. "The instant I put that transistor case back in place and you energize that radio link, every telltale in the Sheik's office is going to go off. Let alone that he'll be hot-tailing it in here with a hardhead rocket to bust your greenhouse, the first thing he'll do is glide into that office and punch poor old Gussie into psychosis. No sir!

"You'll blow the whole thing just when we're at the gravity flip point. It'll all be down from here, if you just keep your lever off the jets for a minute."

"I won't stay here where Arful Abdul can find me," he rumbled back. "Anyway, I can cut on the radio myself. I just wanted you to feel good about one more thing. Let's pick an orbit outside the Ring from which I can drop back down when I'm needed."

Mercury Muttie! I believe he was the most arrogant hunk of metal I ever knew. I should have let him go ahead and cry havoc, though. Nothing could have been worse for me than what happened.

Harriet and I sailed straight back into the Sheik's arms. In the last minute, Gussie came screaming onto the radio to warn us. She had two lifeboats fueled and ready to flame, but she only got one off to us.

I shoved Harriet into it. She kicked and yelled, but it was her revolution. I was just there in the role of expendable hero. "Get my name in the history books," I hollered and then battened down to repel boarders.

Deep down, I was hoping Gussie wasn't dead, although that last, long, loud scream made me know she was. I cut the capsule loose from the sail, which went drifting on down to the big asteroid, while I broached to, hoping I could drift behind some rock and hide. If Gussie or Harriet didn't come back for me, I'd starve, eventually; but it would take months for that to happen.

Did you ever notice that a man can be crazy as hagan and still smart as a rocket? Well, that blooming Sheik just booted himself back down almost to the surface of his planetoid, took a perpendicular orientation to my sail, lit his flame for one short kick and came rifling up through the hole I'd left when I jettisoned the sail. There I was, near dead of humiliation at being caught as easy as a cold in winter. A-a-h!

He wasn't going to come within zot-gun distance of *me*; because he wasn't sure what I could do. We'd met socially, but he was afraid I

had a gram of high vol sewed into my jaw that I could explode by grinding my teeth, or something. Tyrants fear fanatics, you know.

I had one last laugh, even though it was the last for a good many days. The Sheik spangled a magnetic grapple on the bow of my capsule, meaning to tow me; but my little sailing cap was non-ferrous (saves constant correcting around large iron core masses), and his grapple wouldn't cling. So he had to get the rest of his night riders to come up with a net and gentle me down to the asteroid.

I was caught.

There was no pretense of trial. Those iron-haters snipped open my suncraft, took one look at my face, nodded all around and started me for prison, all in about the time it takes to throw a toggle switch assisted by a solenoid.

Now, you have to learn a little history. I only learned it after I nearly lost my mind. Constitutionally speaking, this organization was a kibbutz, which is something more than just a cooperative; and when they first exploded into the Ring, they had neither time nor manpower nor inclination for jails.

What they did have was a topological engineer, a real, genuine, fur-bearing, wild talent who dreamed he was a penological pioneer. What he built for his comrades to remember him by was a cluster of Klein bottles, made of transparent teflon spun over a frame of energy in hexagonal vortices.

Uh-huh! you may well glance at

these scars. All the same, to me they meant life and not death, though it took me a while to realize that. The Israeli feel some kind of responsibility about the whole thing, so I'm here, in hospital, you might say, while one of their celebrated skin-planers shaves these scars off me.

You know what a Klein bottle is? That's right, sort of a crookneck squash, with the neck growing back into the bulb, and the bulb opening out into a bell mouth which curves back and is the bulb. It's all one shell, you understand, and the result of its construction is that it's a quote hollow unquote object which has only one side. That is, it has neither inside nor outside. That is — hagan hagan, if you didn't learn all that like everybody else while you were still in rompers, I can't teach it to you now.

The point is that once you're *in* one of them things, you can't get *out*, because you're not *in* it anyway. I know you remember all this theory from headstart school, but you've got to realize the thing I'm talking about is not a little blown-glass artifact you can hold in your hand and shatter with a thumb snap, but a container of nearly pure energy that holds *you*, and that you can't get at, no matter how hard you try.

Pure energy the hagan, it's pure terror. Never in my life was I so punished. They left me suited up, so the sun wouldn't fry me right off. But they took my helmet. Then they fired me into the thing from an ejaculator with a blast of air,

and . . . there . . . I . . . was, tumbling end over end and holding my breath, and then gasping, wondering what I was breathing and why my blood hadn't already boiled out my eyeballs. I can't stand that feeling of disorientation that goes with not understanding what I'm happening to. In the worst saloon fight, even if I'm at the bottom of the pile, at least I know I'm *there*. The floor's on one side of me and the feet and fists on the other, all familiar and friendly.

But floating all alone in that abstraction! The vigilantes had ridden away in full halloo and left me to puzzle out what they'd done to me. I would have blessed them for killing me.

In a rotation or two, I saw three other bottles.

What was in each of them was a skeleton. They were my constant companions for what seemed a terrible time. I know now it was only a few objective days, but it seemed like a full revolution of the Ring around Sol.

I could not get out. In fact, I couldn't even touch the wall. If I jetted with my breath, the only means of propulsion I had, as I approached the skin, it simply receded. I could *see* the hexagons growing behind me when I looked over my shoulder until they seemed a mile on a side. Then I could turn my head back and way behind me, where I'd come from, I could see the energy lines pulled down so small I could hardly see between them. When I gave up and lay inert, the

— bubble? — would slowly flow around me until the system was at equilibrium again, with me in the dead center. Dead center was what I expected it to be, too.

There was no food and no water. Nothing but air.

I can't calculate the volume of air in there with me. It must have been cubic kilometers. My suit worked after a fashion, but it was no longer a closed system because the posse had taken my helmet, so I was eternally conscious of losing moisture to that giant volume of air.

I say giant, but there were no reference points, and sometimes I was sure the whole lash-up, me included, was very small. Hand size, lab size, above-picture-full-size size. That feeling was pretty bad, but there was worse. Subjectively, I was inside. Only when I thought, I knew I wasn't inside anything. There is no "inside" to a Klein bottle.

The horror came when I realized (or thought I realized) that if I should subjectively put myself "outside", the air would woosh off and I'd boil and freeze in the same blink of a beta ray. I would wake up with a jerk and a gargle from a dream where I was safe on Mars, and I'd have to shut my eyes and put my head against my knees, whispering over and over, "I'm inside. I'm inside."

The jerking and gargling came from the fact that when I slept, my own moisture and used air would ball around me, so that I was drowning and asphyxiating in my own water and CO₂.

I would shut my eyes, pull myself into the foetal position, and think, "There are convection currents here, because sunlight is here. I will sleep, and the convection currents will carry off my breath wastes. I cannot strangle." In a few minutes, I'd be fighting for breath and cursing the Sheik and his cohorts.

Much good it did me. I couldn't even commit suicide by staying in one place and drowning in spent breath. When I passed out, my reflexes would snap, crackle and pop me out of my ball of halitosis.

It was a bad time. And no radio — they had my helmet. I couldn't know whether our plot for a cyborg uprising had hatched itself properly, whether Harriet and Mordecai were winning, losing, compromising, or what. I made myself a promise. If Harriet came for me, I swore, I'd kill the flame for the last time, make one good planetfall and never straddle a hot pipe again.

I practiced my proposal forty thousand times, I guess. I'd offer to take her to Earth. I'd offer to marry on Mars. Sometimes I'd even promise to stay in the Asteroid Belt if I could just stay on just one, with a solid dome over me.

That was my best dream. The other two were putting on my helmet again and hearing all those cyborgs on the radio, cheering me in twenty languages and forty gears; and planning meals. But the ones with Harriet were best: I could propose and be accepted, marry and live through the honeymoon to the first

quarrel before I'd open my eyes and see that abstract impossibility turning around me and the other three nearby, each with its grinning reminder of what I was to be.

Grandfather's flashlight was around my neck on a string, sort of a good luck charm, and sometimes it would float up out of my neck opening and bump me. I was so machine tolerant by then that I would have believed it was trying to tell me something if it had been a little more complicated. I would squeeze the generator reflectively, and watch the filament glow, but I never got an idea from it.

As a matter of fact, I was looking at that little filament, half hypnotized, when the rescue party arrived.

VI

I didn't even see them galloping up until I heard Harriet shrieking thinly. She was riding on Mordecai's upper casing. Even then I thought it was a dream until I heard his bass rumbling with her.

The big cyborg did as good a job as he could of explaining to me what I was in, but I could see he was annoyed at having to put up with a mind that wasn't hooked up to even a simple computer. The key point I understood, though. He and Harriet couldn't come to me — because if they touched the system in which I was imprisoned, they would be imprisoned too, even though they were "outside" it. Once they touched the bottle, they would be bound to that endless plane.

So they were going to ship me down to Sol Three for a dreamer mathematician to uncork the bottle, but they needed the size reduced so they could crate it, with me. "Pull it in," they kept saying.

Finally they went at it the same way you would with the three-year-old in the bathroom. They came up to the "bell" and began talking in soothing tones. They told me the revolution was won and the Sheik and his gang mostly dead or fled; and they petted and praised me 'til it was almost as good as one of my dreams. Only I had to be modest about it all, which I hadn't had to in the dream.

Then Harriet said, "Look. It'll be easier if you get out of that suit. You're a part of the bottle *now*, and it of you, but you can't realize it. So you're not pulling it down around you small enough for us to get a teflon crate around it and shove the whole thing with you inside. We're going to drop you straight down the fastest curve we can make. Otherwise you'll starve before we get you there. Now. Come on. Roll out of that suit, baby, and push it right out the bell."

It worked, you know. That suit drifted straight away when I shoved it and right out the bell. Only it went inside out when it passed "from" the bottle. That gave me a turn. I was ready to panic again, but she cried, "There! Now you *know* it can be manipulated. You can control the Klein bottle as easily as you control your breathing.

"Now, one more demonstration, and then you'll do it."



"I've got nothing left to shove out," I cried.

"Yes, you have. And it's something you have to give me anyway. Take that flashlight off and pitch it out the bell."

She'd always wanted it, remember? I remembered then, but what could I do?

T flung the flashlight, and it looped out of the bottle and right into her hand. The reaction tumbled me heels over head, so I saw what happened in flashes, as I revolved. When the flashlight hit her hand, she snatched up an electric line that lay near her as she sat on top of Mordecai, clipped it and wired the two ends into the terminals of that little generator. I could see Mordecai reaching for her with wires, gauges on flexible tubes, pressure cuffs, every loose appendage he had, in fact, until she began to squeeze the plunger handle that turned the armature.

That big machine shuddered and flashed a few lights. "Turtle dooove!" he cried. "That hurrts!"

"Don't you forget it, big iron daddy," Harriet replied. "Next time I ask you to loosen up a pressure cuff, you do it, lover."

Suddenly I saw, with horror, that some of Mordecai's wires and fluid lines *weren't* loose. They ran right in under her skin. "Harriet! Harriet!" I shouted. "Harriet!"

She raised her head from where she had been staring into one of his light receptors, and smiled . . . smiled! "Oh, well, Galeg," she said.

"Motl and I are a *thing*. We always were."

I could *see* their thing-ness, and suddenly I didn't want her/them/it looking at me. I turned *in* on myself, and the next instant, the Klein bottle fell into my skin, and I flowed out along its unbounded plane. For an endless period, I was totally displayed, inside out, outside in, and then consciousness collapsed. The last thing I heard was Harriet snickering and Mordecai chuckling in duet with her. He sounded like a diesel engine at a mine head. "Did you *ever*," she asked him, "see such a weird *liver*?"

Gallegher shook his head sadly. "The next thing I knew," he said, "I was here, with these scars all over me from where the energy net and my skin fused. That melted teflon wasn't any beauty treatment, either."

I drank the last of the Hock, and said, "Well, they'll soon sand your skin down to its pristine state. But your heart, I suppose . . . still, better to have loved and lost. . . ."

Just then a blonde young woman in the sandalled uniform of the Greater Near East Co-Prosperity Sphere came up to us and said to Galeg, ignoring me, "Doctor's ready for you." As she swiveled away I saw an anklet of blue ceramic beads dancing with each stride.

Galeg stood up to go. With a wink, he said, "Whatever they do to me here, at least I ain't going to wake up soldered to anybody."

END