

WE THINK, THEREFORE WE ARE

EDITED BY

Peter Crowther

DAW BOOKS, INC.

DONALD A. WOLLHEIM, FOUNDER

375 Hudson Street, New York, NY 10014

ELIZABETH R. WOLLHEIM

SHEILA E. GILBERT

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Introduction

The field of artificial intelligence research was born at a conference held at Dartmouth College in the summer of 1956; participants included luminaries of the first generation of AI scientists who believed that it would be possible to create a machine that matched or exceeded human intelligence in less than twenty years, and founded laboratories and research programs that would dominate the field for decades to come. In the same year, the film *Forbidden Planet* made a star of Robby the Robot, a metallic version of *The Tempest*'s obedient sprite, Ariel. Robby was a charming and intelligent servant who could speak 187 languages, possessed a replicator that could make diamonds, and was incapable of harming human beings because he was bound by the Laws of Robotics. In short, he was the epitome of one of the best-known and enduring tropes of science fiction's Golden Age.

"Robot" entered the English language via Czech writer Karl Capek's 1921 play *R.U.R.*, or *Rossum's Universal Robots*. Capek's robots (from the Czech *robota*, meaning compulsory labor) were actually artificial but biologically based humans, but after the term was adopted into English, it was usually applied to machines. And in SF stories, robots were not only equipped with electronic, positronic, or mechanical imitations of the human brain, but they were also almost always humanoid in form. Despite Isaac Asimov's claim that he and editor John W. Campbell, Jr., developed the famous Three Laws of Robotics in the early 1940s to counter technophobic tales of rampaging robots, most of the early stories about robots were pretty sympathetic examinations of the ethical and philosophical problems of creating artificial, intelligent versions of human beings. For every Golden Age tale of a robot lusting after its inventor's daughter or planning to take over the world, there were many more about robots faithfully serving their creators or sacrificing themselves to save human lives, humans falling in love with robots, robots coming to terms with the fact that they would never quite be as good as their creators, or aspiring to become like and be accepted as human beings.

It wasn't until after the Second World War that attitudes toward robots and other forms of artificial intelligence in SF began to reflect both fears that governments could use technology to manipulate and control individuals and populations and a growing ambivalence toward science that gave us both antibiotics and the atomic bomb. The 1950s saw the publication of a swarm of technophilic stories about rebellious robots, homicidal robots, or robots masquerading as or being mistaken for human beings with diabolic or disastrous consequences. Even stories in which robots used their powers for the common good could be chillingly ambiguous. In the film *The Day the Earth Stood Still* (1951), a flying saucer lands in Washington, D.C., and discharges two passengers. One, an impressively imposing and indestructible robot, Gort, protects the flying saucer from attacks by the U.S. Army while the other, a human-seeming alien, Klaatu, attempts to deliver his message to the world's leaders. In a famous twist, Klaatu reveals that he's the servant and Gort is the master, and Earth will be reduced to a burned-out cinder unless its people renounce all violence and submit to the rule of robots like Gort. That universal peace can be achieved only through threat of destruction and constant policing by implacable machines says a lot about the political climate of the 1950s; that the all-powerful machines will take the shape of humanoid robots says a lot about the anthropomorphic bias that for a while blinded SF writers to the fact that computers were far better hosts for artificial intelligence than mechanical men like Robby the Robot.

SF writers somehow missed out on the beginning of the computer boom. In 1951, when "Klaatu barada nikto" entered the pop culture lexicon, EDVAC, the first fully fledged stored-program

computer design, became operational at Los Alamos. By 1956, when the term “artificial intelligence” was coined at Dartmouth and Robby the Robot was being signed up for his second film, room-filling racks of vacuum tubes were being replaced by book-sized boards of transistors. But as far as SF writers of the 1940s and 1950s were concerned, positronic robot brains weren’t computers but artificial replicas of human brains; computers were gigantic and immobile racks of vacuum tubes and looms of wiring. It didn’t occur to them that computers were infinitely adaptable tools that could be shrunk to fit inside metal skulls or almost anywhere else, or that the reign of the humanoid robot was almost over.

These days, those old-school mechanical men mostly survive as kitsch pop-culture artifacts like tin stamped-tin and plastic collectables that ornament my bookshelves. A few humanoid robots are employed as Disneyland attractions or act as experimental interfaces for expert systems, but roboticists haven’t yet cracked the “uncanny valley” effect—the more closely a robot mimics human, the more its nonhuman characteristics stand out, which is why most humanoid robots are as appealing and unsettling as walking corpses (conversely, the humanlike characteristics of robots like Robby, which only approximate the human form, stand out and elicit empathy). SF that uses robots and androids to explore what it means to be human, including much of the oeuvre of Philip K. Dick, inhabits the valley of the uncanny.

Out in the real world, there are plenty of robots making cars in assembly plants, clearing minefields, exploring the Solar System, and performing routine maintenance work in the cores of nuclear reactors, but none look much like human beings, and all are controlled by computers and computer software. Some robots are nothing *but* software, thriving in the virtual ecologies of the Internet. They bounce misdirected email with insincere apologies or crawl spiderlike from node to node, scanning millions upon millions of pages and compiling associative lists that we access every time we type words or phrases into search engines. Or they search for and infect insufficiently protected computers with parasitic codes that turn their hosts into zombies, enrolling them in a network of slave computers that hackers can use to email millions of pieces of spam, or blackmail companies with denial-of-service attacks.

True AI has proven much harder to achieve than predicted in the summer of 1956. No machine intelligence has yet surpassed that of a human being or even passed the Turing Test, but there are shards and sparks of artificial intelligence in expert systems and data miners, in the predictive text features of cell phones and the fuzzy logic of washing machines, the behavior of secondary characters in video games, or the software used by Amazon.com that suggests, after you’ve bought a copy of Kim Stanley Robinson’s *Red Mars*, that you might also like to buy a CD of Holst’s *Planets Suite*. Computers are getting faster; software is getting smarter. Sooner rather than later, say the indefatigable prophets of true AI, a computer or a loosely connected cloud of software or intelligent agents out there on the Internet is going to become, by accident or design, self-aware.

Maybe hyperintelligent self-aware computers will enslave us, as in *The Matrix*, or start World War III in an attempt to wipe us out, as in *The Terminator*. Maybe, as in Philip K. Dick’s *Vulcan Hammer*, Frederik Pohl’s *Man-Plus*, Greg Bear’s *Eon* and Iain M. Banks’s “Culture” novels, AIs will benevolently (and perhaps invisibly) guide and sustain civilization. Maybe, as in William Gibson’s *Sprawl* trilogy, godlike AIs inhabiting cyberspace will be mostly indifferent to us, touching on the lives of only a few humans recruited to help them pursue their remote agendas.

Or maybe they’ll change everything forever, and in ways impossible to predict.

Most SF writers used to believe that the pinnacle of the evolution of artificial intelligence would be the creation of robots that looked and thought just like us. A robot who served generations of our family is finally rewarded with recognition as being fully human in Asimov's "The Bicentennial Man;" in the film *AI*, based on Brian Aldiss's story "Supertoys Last All Summer Long," a little boy who is a robot longs, like Pinocchio, to become a real little boy. Most believe now that it's much more likely that true AI will create intellects vast, cool, and even if not actually unsympathetic, then certainly completely alien to our own.

Building on the idea that the first true AIs would quickly bootstrap their intelligence to unimaginable levels, Vernor Vinge, who's both a computer scientist and a SF writer, has suggested that true AIs will rapidly accelerate technological progress, outstripping the ability of human beings to comprehend or usefully participate in it. Beyond a point he named the Singularity, everything will have changed so radically that we can't begin to imagine what it would be like, any more than we can see what lies beyond the event horizon of a black hole. History as we know it would have come to an end. The human species would be either wiped out, or co-opted and transformed and elevated into a heaven of pure information. And it would be the end of all comprehensible stories about the future.

So far, we don't know if this rapture of the geeks is as inevitable as its adherents claim. Maybe it will turn out to be about as real as the Montanists and Amaurians, the Y2K "crisis," and sundry other millenarian panics and beliefs. Maybe there are limits to thinking big; maybe AI will never get out of John Searle's Chinese Room. But even if we are heading toward some kind of Singularity with unstoppable momentum, we still have a little time to create fictional speculations and entertainments about the future of AI, such as the stories you'll find here, crammed with rebellious AIs, giant robots like unto gods, gung-ho robot explorers and much more, when you turn the page.

Paul McAuley

London, October 2007

Tempest 43

Stephen Baxter

From the air, Freddie caught the first glimpse of the rocket that was to carry her into space.

The plane descended toward a strip of flat coastal savannah. The land glimmered with standing water, despite crumbling concrete levees that lined the coast, a defense against the risen sea. This was Kourou, Guiana, the old European launch center, on the eastern coast of South America. It was only a few hundred kilometers north of the mouth of the Amazon. Inland, the hills were entirely covered by swaying soya plants.

Freddie couldn't believe she was here. She'd only rarely traveled far from Winchester, the English city where she'd been born, and Southampton, where she worked. She'd certainly never flown before, hardly anybody traveled far let alone flew, and she had a deep phobic sense of the liters of noxious gases spewing from the plane's exhaust.

But now the plane banked, and there was her spaceship, a white delta-wing standing on its tail, and she gasped.

Antony Allen, the UN bureaucrat who had recruited her for this unlikely assignment, misread her mood. Fifty-something, sleek, corporate, with a blunt Chicago accent, he smiled reassuringly. "Don't be afraid."

The plane came down on a short smart-concrete runway. Allen hurried Freddie onto a little electric bus that drove her straight to a docking port at the base of the shuttle, without her touching the South American ground or even smelling the air.

And before she knew it, she was lying on her back on an immense foam-filled couch, held in place by thick padded bars. The ship smelled of electricity and, oddly, of new carpets. A screen before her showed a view down the shuttle's elegant flank to the scarred ground.

Allen strapped in beside her. "Do you prefer a countdown? It's optional. We're actually the only humans aboard. Whether you find that reassuring or not depends on your faith in technology, I suppose."

"I can't believe I'm doing this. It's so—archaic! I feel I'm locked into an AxysCorp instrumentality."

He didn't seem to appreciate the sharpness of her tone. Perhaps he'd prefer to be able to patronize her. "This shuttle's got nothing to do with AxysCorp, which was broken up long ago."

"I know that."

"And you're a historian of the Heroic Solution. That's why you're here, as I couldn't find anybody better qualified to help resolve this problem on Tempest 43. So look on it as field work. Brave yourself."

With barely a murmur the shuttle leaped into the air. No amount of padding could save Freddie from the punch of acceleration.

The ground plummeted away.

Tempest 43 was a weather control station, one of a network of fifty such facilities thrown into space in the 2070s, nearly a century ago, by the now maligned AxysCorp geoengineering conglomerate. An island in the sky over the Atlantic, Tempest 43 was locked into a twenty-four-hour orbit, to which Freddie would now have to ascend.

But before proceeding up to geosynchronous, the shuttle went through one low-orbit checkout. For Freddie, snug in her theme-park couch, it was ninety magical minutes, as the cabin walls turned virtual-transparent and the Earth spread out below her, bright as a tropical sky.

The ship sailed over the Atlantic toward western Europe. She wished she knew enough geography to recognize how much of the coastline had been bitten into by the risen sea. At the Spanish coast Freddie saw vapor feathers gleaming white, artificial cloud created by spray turbines to deflect a little more sunlight from an overheated Earth. Southern Spain, long abandoned to desert, was chrome-plated with solar-cell farms and studded with vast silvered bubbles, lodes of frozen-out carbon dioxide. The Mediterranean was green-blue, thick with plankton stimulated to grow and draw down carbon from the air. On the far side of the Gibraltar Strait, the Sahara bloomed green, covered in straight-edged plantations fed by desalinated ocean water. And as she headed into evening, she saw the great old cities of southern Europe, the conurbations' brown stain pierced by green as they fragmented back into the villages from which they had formed.

Asia was plunged in night, the land darker than she had expected, with little waste light seeping out of the great metropolitan centers of southern Russia and China and India. The Pacific was vast and darkened too, and it was a relief to reach morning and to pass over North America. She was disappointed that they traveled too far south to have a chance of glimpsing the camels and elephants and lions of Pleistocene Park, the continent's reconstructed megafauna.

And as they reached the east coast, they sailed almost directly over the Florida archipelago. Freddie was clearly able to see the wound cut by the hurricane. She called for magnification. There was Cape Canaveral, venerable launch gantries scattered like match-sticks, the immense Vehicle Assembly Building broken open like a plundered bird's egg. The hurricane was the reason for her journey—and incidentally, the ruin of Canaveral was the reason she had had to launch from Guiana. Hurricanes weren't supposed to happen, not in 2162. Stations like Tempest 43 had put a stop to all that a century ago. Something had gone wrong.

Antony Allen spent most of the orbit throwing up into paper bags.

At last the shuttle leaped up into deeper space, silent and smooth, and Earth folded over on itself.

“Tempest 43, Tempest 43, this is UN Space Agency Shuttle C57-D. You ought to be picking up our handshaking request.”

A smooth, boyish voice filled the cabin. “C57-D, your systems have interfaced with ours. Physical docking will follow shortly.”

“I'm Dr. Antony Allen. I work on the UN's Climatic Technology Legacy Oversight Panel. With me

is Professor Frederica Gonzales of the University of Southampton, England, Europe. Our visit was arranged through—”

“You are recognized, Doctor Allen.”

“Who am I speaking to? Are you the station’s AI?”

“A subsystem. Engineering. Please call me Cal.”

Allen and Freddie exchanged glances.

Allen growled, “I never spoke to an AI with a personal name.”

Freddie said, a bit nervous, “You have to expect such things in a place like this. The creation of sentient beings to run plumbing systems was one of the greatest crimes perpetrated during the Heroic Solution, especially by AxysCorp. This modern shuttle, for instance, won’t have a consciousness any more advanced than an ant’s.”

That was the party line. Actually Freddie was obscurely thrilled to be in the presence of such exotic old illegality. Thrilled, and apprehensive.

Allen called, “So are you the subsystem responsible for the hurricane deflection technology?”

“No, sir. That’s in the hands of another software suite.”

“And what’s that called?”

“He is Aeolus.”

Allen barked laughter.

Now a fresh voice came on the line, a brusque male voice with the crack of age. “That you, Allen?”

Freddie was startled. This voice sounded authentically human. She’d just assumed the station was unmanned.

“Glad to hear you’re well, Mr. Fortune.”

“Well as can be expected. I knew your grandfather, you know.”

“Yes, sir, I know that.”

“He was in the UN too. As pious and pompous as they come. And now you’re a bureaucrat. Runs the genes, eh, Allen?”

“If you say so, Mr. Fortune.”

“Call me Fortune . . .”

Fortune’s voice was robust British, Freddie thought. North of England, maybe. She said to Allen, “Human presence, on this station?”

“Not something the UN shouts about.”

“But save for resupply and refurbishment missions, the Tempest stations have had no human visitors for a century. So this Fortune has been alone up here all that time?” And how, she wondered, was Fortune still alive at all?

Allen shrugged. “For Wilson Fortune, it wasn’t a voluntary assignment.”

“Then what? A sentence? And your grandfather was responsible?”

“He was involved in the summary judgement, yes. He wasn’t *responsible*.”

Freddie thought she understood the secrecy. Nobody liked to look too closely at the vast o

machines that ran the world. Leave the blame with AxysCorp, safely in the past. Leave relics like the Wilson Fortune to rot. “No wonder you need a historian,” she said.

Fortune called now, “Well, I’m looking forward to a little company. You’ll be made welcome here by me and Bella.”

Now it was Allen’s turn to be shocked. “By the dieback, who is Bella?”

“Call her an adopted daughter. You’ll see. Get yourself docked. And don’t mess up my paintwork with your attitude rockets.”

The link went dead.

Shuttle and station interfaced surprisingly smoothly, considering they were technological products separated by a century. There was no mucking about with airlocks, no floating around in zero gravity. Their cabin was propelled smoothly out of the shuttle and into the body of the station, and then it was transported out to a module on an extended strut, where rotation provided artificial gravity.

The cabin door opened, to reveal Wilson Fortune and his “adopted daughter,” Bella.

Allen stood up. “We’ve got a lot to talk about, Fortune.”

“That we do. Christ, though, Allen, you’re the spit of your grandfather. He was plug-ugly too.” His archaic blasphemy faintly shocked Freddie.

Fortune was tall, perhaps as much as two full meters, and stick thin. He wore a functional coverall made of some self-repairing orange cloth, it might have been as old as he was. And his hair was sky blue, his teeth metallic, his skin smooth and young-looking, though within the soft young flesh he had the rheumy eyes of an old man. Freddie could immediately see the nature of his crime. He was augmented, probably gen-enged too. No wonder he had lived so long; no wonder he had been sentenced to exile up here.

The girl looked no more than twenty. Ten years younger than Freddie, then. Pretty, wide-eyed, her dark hair shoulder-length, she wore a cut-down coverall that had been accessorized with patches and brooches that looked as if they had been improvised from bits of circuitry.

She stared at Allen. And when she saw Freddie, she laughed.

“You’ll have to forgive my daughter,” Fortune said. His voice was gravelly and, like his eyes, older than his face. “We don’t get too many visitors.”

“I’ve never seen a woman before,” Bella said bluntly. “Not in the flesh. I like the way you do your hair. Cal, fix it for me, would you?”

“Of course, Bella.”

That shoulder-length hair broke up into a cloud of cubical particles, obscuring her face. When the cloud cleared, her hair was cropped short, a copy of Freddie’s.

“I knew it,” Allen said. He aimed a slap at Bella’s shoulder. His fingers passed through her flesh, scattering bits of light. Bella squealed and flinched back. “She’s a virtual,” Allen said.

Fortune snapped back, “She’s as sentient as you are, you asshole. Fully conscious. And consistent violations like that *hurt*. You really are like your grandfather, aren’t you?”

“She’s illegal, Fortune.”

“Well, that makes two of us.”

Two suitcases rolled out of the shuttle cabin, luggage for Freddie and Allen.

Allen said, “We’re here to work, Fortune, not to rake up the dead past.”

“Be my guest.” Fortune turned and stalked away, down a metal-plated corridor. Bella walked after him, looking hurt and confused. Her feet convincingly touched the floor.

Freddie and Allen followed less certainly, into the metal heart of the station.

To Freddie, the station had the feel of all the AxysCorp geoengineering facilities she’d visited before. Big, bold, functional, every surface flat, every line dead straight. The corporation’s logo was even stamped into the metal walls, and there was a constant whine of air conditioning, a breeze tasting of rust. You could never escape the feeling that you were in the bowels of a vast machine. But the station showed its age, with storage-unit handles polished smooth with use, touch panels rubbed and scratched, and the fabric of chairs and couches worn through and patched with duct tape.

Fortune led them to cabins, tiny metal-walled boxes that looked as if they’d never been used. A century old, bare and clean, they had an air of staleness.

“I don’t think I’ll sleep well here,” Freddie said.

“Don’t fret about it,” Allen said. “I’m planning to be off this hulk as soon as possible.”

They left their luggage here, and Fortune led them on to the bridge, the station’s control center. It was just a cubical box with blank gray walls, centered on a stubby plinth like a small stage.

Fortune watched Freddie’s reaction. “This was the fashion a century ago. Glass-walled design, every instrument virtual, all voice controlled.”

“Humans are tool-wielding creatures,” Freddie said. “We think with our hands as well as our brains. We prefer to have switches and levers to pull, wheels to turn.”

“How wise you new generations are,” Fortune said sourly.

Bella, with her copycat hairdo, was still fascinated by Freddie. “I wish you’d tell me more about Earth,” she said. “I’ve never been there.”

“Oh, it’s a brave new world down there, child,” Fortune said.

“In what sense,” Freddie asked, “is Bella your child?”

Allen waved that away. “Bella is an irrelevance. So are you, Fortune,” he said sternly. “We’re here to find out why Tempest 43 failed to deflect the Florida hurricane. I suggest we get on with it.”

Fortune nodded. “Very well. Cal? Bring up a station schematic, would you?”

A virtual model of Tempest 43 coalesced over the central plinth. Freddie had been briefed to some extent, and she recognized the station’s main features. The habitable compartments were modules hanging on long arms away from a fat central axis. A forest of solar panels, manipulator arms, and docking ports coated the main axis, and at its base big antenna-like structures clustered. The representation was exquisitely detailed and, caught in the light of an off-stage sun, quite beautiful.

Fortune said, “This is a real time image, returned from drone subsats. Look, you can see the wear and tear.” The habitable compartments were covered with white insulating blankets that were pocked with meteor scars, and the solar panels looked patchy, as if repeatedly repaired. An immense

AxysCorp logo on the main central body, unrefurbished for a century, was faded by sunlight. “Do you understand what you’re seeing? The purpose of Tempest 43 is to break up or at least deflect Atlantic hurricanes. Maybe you know that during the twenty-first century global warming pulse, a whole plague of hurricanes battered the eastern states of the old USA, as well as Caribbean and South American countries, all year round. Excess heat energy pumped into the oceans, you see.”

“And Tempest 43 is here to fix that,” Allen said.

“Hurricanes are fueled by ocean heat.” Fortune pointed to the antenna farm at the base of the station’s main axis. “So we meddle. We beam microwave energy into sea water. We can’t draw out the heat that’s pumping up the hurricane, but with carefully placed injections we can mess with its distribution. Give it multiple foci, for instance. We manage to disperse most hurricanes even before they’ve formed.”

“Where do you get your power from? Not from these spindly solar cell arrays.”

“We have a massive fission reactor up here.” He pointed at the top of the central axis. “One reason the habitable compartments are so far away from the axis. Enough plutonium to last centuries. I know what you’re thinking. This is a dirty solution. They were dirty times. You people are so pious. You kick AxysCorp now, and all the rest of the Heroic Solution. But you accept the shelter of the machinery, don’t you?”

“Actually,” Freddie said, trying to be more analytical, “this station is a typical AxysCorp solution to the problems of that age. It’s a chunk of gigantic engineering, and it’s run by absurdly oversophisticated AIs. But it’s robust. It worked.”

“It did work, until now,” Allen said darkly.

“You needn’t try to pin the Florida hurricane on me,” Fortune said. “The AI runs the show. I’m only a fail-safe. I’m not even in the nominal design. The station should have been unmanned save for non-permanent service crews.”

“You keep saying ‘AI,’ ” Freddie said. “Singular. But we spoke to one during our approach, and I’ve heard of another.”

“Cal and Aeolus,” Fortune said. “It’s a little complicated. The Tempest 43 AI is an advanced design. Experimental, even for AxysCorp . . .”

The station’s artificial mind was lodged in vast processor banks somewhere in the central axis. Its body was the station itself; it felt the pain of malfunctions, the joy of a pulsing fission-reactor heart, the exhilaration of showering its healing microwaves over the Atlantic.

And, alone, it was never alone.

“It’s a single AI. But it has *two* poles of consciousness,” Fortune said. “Not just one, like yours and mine. Like two personalities in one head, sharing one body.”

Allen said, “You’re telling me that AxysCorp deliberately designed a schizophrenic AI.”

“Not schizoid,” Fortune said, strained. “What a withered imagination you have, Allen. Just like my grandpop. It’s just that when building this station, AxysCorp took the opportunity to study novel kinds of cognitive architecture. After all there are some who say our minds are bicameral too, spread unevenly over the two halves of our brains.”

“What bullshit,” Allen murmured.

Fortune said, “The two poles were labeled A and C. Nothing if not functional, the AxysCorp designers. I gave them names. Aeolus and Cal. Call it whimsy.”

A and C, Freddie thought. It was an odd labeling, with a gap. What happened to B?

Allen said, “I understand why ‘Aeolus’ for your functional software suite, your weather controller. Aeolus was a Greek god of the winds. But why Cal?”

“An in-joke,” Fortune said. “Does nobody read science fiction these days?”

Allen said, “Science what-now?”

Historian Freddie knew what he meant. “Old-fashioned fictions of the future. Forgotten now. We live in an age of aftermath, Fortune. Everything important that shapes our lives happened in the past, not the future. It’s not a time for expansive fiction.”

“Yeah, well, there’s this old classic I always loved, with a pesky AI. Would have fitted better if the ‘C’ had been an ‘H’. Cal’s a dull thing, though. Just a stationkeeper.”

“So where’s Aeolus?” Allen lifted his head. “Are you there?”

“Yes, Dr. Allen. I am Aeolus.”

It was another synthesized male voice, but lighter in tone than Cal’s—lacking character, Freddie thought.

Allen said, “Let me get this straight. Cal is the station’s subsystems. Housekeeping, power, all that. Aeolus is the executive function suite. You fix the hurricanes.”

“Actually, sir, there’s some overlap,” Cal put in. “The bipolar design is complex. But, yes, essentially that’s true.”

“So what are you doing, Aeolus?”

“I am enthusiastically fulfilling all program objectives.”

“But you let one through, didn’t you? People died because of you. And a historic monument was wrecked, at Canaveral.”

“Yes, that’s true.”

“I’m from Oversight. I’m here to find out what happened here and to decide what to do about it. So what do you have to say?” Allen waited, but Aeolus offered no further explanation. “What a mess this is,” Allen said to Freddie.

“Actually, this is again typical of AxysCorp,” Freddie said. “Given immense budgets, huge technical facilities, virtually unlimited power, and negligible scrutiny, AxysCorp technicians often took the opportunity to experiment. Of course a willingness to meddle was necessary for them to be able to proceed with Heroic-Solution geoengineering projects in the first place.”

“They used the climate disaster as the cover for crimes,” Allen said. “The purposeless crippling of sentient beings, for example. We have to acknowledge their achievements. But it’s as if the world has been saved by Nazi doctors.”

“Humans are flawed creatures,” Fortune said. “Most of them are bumbling mediocrities. Like your grandfather, Allen, whose solution to the world’s ills was to exile me up here. To tackle monstrous problems, you need monsters.”

“Well, the hell with it.” Allen was growing impatient. “I need to study your bipolar AI. I’ve some

gear in my luggage. Freddie, this will be technical. Why don't you take a walk around the station?"

Bella said eagerly, "Oh, let's. I'll show you."

"And you," Allen said to Fortune, "show me back to my cabin. Please."

With bad grace, Fortune stomped off.

Bella gave Freddie a tour of the habitable module and its facilities: cabins, mostly unused, galley, washrooms, a virtual recreation room. Everything was drab, utilitarian, and old.

Bella told Freddie a little about herself. "My protocols are quite strict." She tried to push her hand into the wall. Sparks scattered from her palm, and Bella screwed up her face in pain. "I can't go flying around in vacuum either. I have to eat and drink. I even have to use the bathroom! It's all virtual, of course. But Fortune says he designed my life to be as authentically human as possible."

Freddie said carefully, "But why did he create you at all?"

"I give him company," Bella said.

Freddie, an academic who was careful with words, noted that she hadn't explicitly confirmed that Fortune had "created" her, as the AxysCorp engineers had created Cal and Aeolus, any more than Fortune had admitted it himself.

They soon tired of the steely corridors, and Bella led the way to an observation blister. This was a bubble of toughened transparent plastic stuck to the bottom of the module's hull. Sitting on a couch, they looked down on the Earth, a bowl of light larger than the full Moon. Freddie was thrilled to see the white gleam of Antarctic ice. But the fragmented remnant cap on that green-fringed continent was the only ice visible on the whole planet; there was none left on the tropical mountains, Greenland was bare, and at the north pole was only an ocean topped by a lacy swirl of cloud.

Bella's thin, pretty face was convincingly painted by Earthlight. "Of course, we're suspended permanently over the middle of the Atlantic. But you can see day and night come and go. And if I ever want to see the far side, I can always call for a virtual view."

She had no real conversation, under the surface. She was an empty vessel, Freddie thought. Beautifully made but unused, purposeless. But then the only company she had ever had was the reclusive Fortune—and perhaps the station's artificial minds, Cal and Aeolus. "I'm no expert. But I can see that this environment doesn't offer enough stimulation to you as a sentience. You've a right to more than this."

Bella seemed moved to defend herself, or perhaps Fortune. "Oh, there are things to see," she said. "It's a marvel when Earth goes dark with night, and you can see the stars. And you can see AxysCorp facilities, studded all over the sky. Sometimes you can even make out the big Chinese space shield. The Heroics, Fortune's generation, saved the world. You can see it in the sky."

Freddie suspected these views were just watered-down versions of Fortune's opinions, the only human mind Bella had ever been exposed to. "But people on Earth," she said, "don't always feel that way. AxysCorp did fulfil the Heroic-Solution strategy, to stabilize the climate and to remove the most heavy, dirty industries from Earth. Billions of lives were saved, and a global technological civilization survived and is now even growing economically. That was a great achievement.

"But the Heroics chose to do things a certain way. The whole Earth is full of their gargantuan, aging machines. Memorials erected to themselves by a generation who wanted to be remembered. *Look at me. Look at what I did, how powerful I was.* Maybe their egos had to be that big to take on the task

fixing a broken planet. But to live at the feet of their monuments is oppressive.”

Bella looked lost. “People ought to be more grateful.”

“You need to come to Earth. It’s not like it is for you, stuck here inside the machinery. Most people just live their lives. They don’t obsess about the Heroics and AxysCorp and the rest. Only historians like me do that. Because it really is all just history.”

A panel in the window filled up with Allen’s blunt features. “Professor Gonzales. Could you rejoin us on the bridge, please? I’ve made my judgment.”

Freddie hurried after Bella, through the maze of corridors back to the bridge.

The room was stripped of virtual displays. Allen sat comfortably on the plinth, the nearest thing to a piece of furniture. Fortune paced about, chewing a silver-colored fingernail.

Allen said, “We’ll need a proper debrief. But technically speaking, the situation here is simple, as far as I can see.” He showed Freddie the probe he’d been using, a kind of silvery network. “This is a cognitive probe. A simple one, but sufficient. I ran a trace on the AI pole, Aeolus. I can find no bug in the software despite the distorted sentience set-up AxysCorp left behind here. Nor, incidentally, according to station self-test diagnostics, is there any flaw in the physical equipment, the microwave generators, the antenna arrays, the station’s positioning systems, all the rest. Aeolus should not have let that hurricane reach Florida. Yet it, *he*, did so.”

There was a sound of doors slamming far off. Freddie felt faintly alarmed.

“My recommendation is clear. There’s a clear dysfunction between the AI’s input, that is its core programming and objectives, and its output. The recommended procedure is clearly defined in such cases. The AI pole Aeolus must be—”

“No. Don’t say it,” said Fortune, suddenly alarmed.

Allen stared at him. “What now, Fortune?”

“There’s no blame to be attached to Aeolus. None at all.”

“What are you saying?”

Fortune’s mouth worked; his metal teeth gleamed. “That I did it. That Aeolus sent a hurricane into Florida because I asked him to. So there’s no need for termination. All right?”

Allen was amazed. “If this is true, we’ve a whole box of other issues to deal with, Fortune. But even so, the AI acted in a way that clearly compromised its primary purpose—indeed, contradicted it. There’s no question about it. Aeolus will be shut down—”

Cal spoke up. “I’m afraid I can’t allow that to happen, Dr. Allen.”

The station shuddered.

Allen got to his feet. “What in the dieback was that?”

Fortune growled, “I *told* you. Now see what you’ve done!”

Freddie said to Bella, “Show us your external monitors.”

Bella hurried to a wall workstation and began calling up graphical displays. “Our comms link to Earth is down. And—oh.”

UNSA Shuttle C57-D had been detached from its dock. It was falling away from the station, turning

over and over, shining in undiluted sunlight.

“We’re stranded,” Allen said, disbelieving.

Fortune clenched his fists and shouted at the ceiling. “Cal, you monster, what have you done? saved Bella from you once. Couldn’t you let her go?”

There was no reply.

They stayed on the bridge. It made no real sense, but Freddie sensed they all felt safer here, deep in the guts of the station. Bella sat quietly on the plinth, subdued. Fortune paced around the bridge muttering.

Freddie and Allen went through the station’s systems. They quickly established that the station’s housekeeping was functioning. Air conditioning, water recycling still worked, and the lamps still glowed over the hydroponic banks.

“So we’re not going to starve,” Allen said edgily.

“But the AI’s higher functions are locked out,” Freddie said. “There’s no sign Aeolus is monitoring the Atlantic weather systems, let alone doing anything about them. And meanwhile, comms is down. How long before anybody notices we’re stuck here?”

“People don’t want to know what goes on with these hideous old systems,” Allen said. “Even in maintenance department, which is nominally responsible for them. Unless our families kick up a fuss or another hurricane brews up, I don’t think anybody is going to miss us for a long time.”

Fortune snorted. “Bureaucracies. The blight of mankind.”

Allen growled, “You’ve got some explaining to do, Fortune. Like why you ordered up a hurricane.”

“I didn’t think it would kill anybody,” Fortune said weakly. “I did mean to smash up Cape Canaveral, though. I wanted to get your attention.”

Freddie asked, “Couldn’t you have found some other way?”

Allen said dryly, “Such as waggle the solar panels?”

Fortune grinned. “Aeolus is compliant. When you have a god at your command, it is terribly tempting to use him.”

“So you created a storm,” Allen said, “in order to bring somebody up here. Why, Fortune? What do you want?”

“Two things. One. I want my exile to end. A century is enough, for Christ’s sake, especially when I *committed no crime*. I’d like some respect too.” He said to Freddie, “Look at me. Do you think I did this to myself? My parents spliced my genes before I was conceived and engineered my body before I was out of the womb. I haven’t committed any crime. I *am* a walking crime scene. But it’s me you’re punishing, Allen. Where’s the justice in that?” There was a century of bitterness in his voice.

“And, second, Bella. My sentence, such as my quasilegal judicial banishment is, clearly wasn’t intended to punish *her*. She needs to be downloaded into an environment that affords stimulation appropriate for a sentence of her cognitive capacity. Not stuck up here with an old fart like me. As a matter of fact, your own namby-pamby sentence laws mandate.”

“All right,” Freddie said. “But what *is* Bella? You didn’t create her, did you?”

“No.” Fortune smiled at Bella. “But I saved her.”

Freddie nodded. “A, B, C.”

Allen snapped, “What are you talking about?”

Freddie said, “There weren’t just two poles of consciousness in the station AI, were there, Fortune? AxysCorp went even further. They created a mind with *three* poles. A—Aeolus. B—Bella. C—Cal.”

“Oh, good grief.”

“B was actually the user interface,” Fortune said.

“Charming, for an AxysCorp creation. Very customer-focused.”

Freddie said, “Somehow Fortune downloaded her out of the system core and into this virtual persona.”

“I had time to figure out how and nothing else to do,” Fortune said sternly. “I’m extremely capable. In fact, I’m wasted up here. And I had motivation.”

“What motivation?”

“To save her from Cal . . .”

Inside AxysCorp’s creation, three centers of consciousness had been locked into a single mind, single body. And they didn’t get on. They were too different. Aeolus and Bella embodied executive capabilities. Cal, an artifact of basic engineering functions, was more essential. Stronger. Brutal. They fought for dominance. And it lasted subjective megayears, given the superfast speeds of Heroic-age processors.

“Cal crushed Bella. Tortured her. You could call it a kind of rape, almost. He did it because he was bored himself, bored and trapped.”

“You’re anthropomorphizing,” Allen said.

“No, he isn’t,” Freddie said. “You need to read up on sentience issues, Doctor.”

“I had to get her out of there,” Fortune said. “This isn’t the right place for her, in this shack of a station. But better than in there, in the processor.”

Allen asked, “So why did Cal chuck away our shuttle?”

Fortune said, “Because you said you would kill Aeolus.”

“You said they fight all the time.”

“Do you have a brother, Allen? Maybe you fought with him as a boy. But would you let anybody harm him—*kill* him? Cal defends his brother—and, indeed, his sister if he’s called on.”

Allen clapped, slow, ironic. “So, Fortune, even stuck up here in this drifting wreck, you found a way to be a hero. To *save* somebody.”

Fortune’s face was dark. “I *am* a damn hero. We were told we were special—the peak of the Heroic Solution age, they said. We were the Singularity generation. A merger of mankind with technology. We would live forever, achieve everything. Become infinite, literally.

“And, you know, for a while, we grew stronger. We were transported. Rapt. There aren’t the words. But we got lost in our data palaces, while the rest of the world flooded and burned and starved. And we forgot we needed feeding too. That was the great fallacy, that we could become detached from the Earth, from the rest of mankind.

“In the end, they broke into our cybernetic citadels and put us to work. And they made us illeg

retrospectively and imprisoned us in places like this. Now we're already forgotten. Irrelevant compared to the real story of our time: AxysCorp and their ugly machines."

"That's life," Allen said brutally.

"This is Aeolus." The thin voice spoke out of the air.

Fortune snapped, "Aeolus? Are you all right?"

"I don't have much time. Cal and I are in conflict. I am currently dominant."

"Aeolus—"

"I restored communications. I contacted your Oversight Panel, Dr. Allen. I received an assurance that a second shuttle will shortly be launched. The shuttle will have grappling technology, so Cal won't be able to keep it out. But Cal is strong. I can contain him but not subdue him. Mr. Fortune?"

"Yes, Aeolus?"

"I fear it will be impossible to fulfil further objectives."

Fortune looked heartbroken. "Oh, Aeolus. What have I done?"

"As you know, I have always fulfilled all program objectives."

"That you have, Aeolus. With the greatest enthusiasm."

"I regret—"

Silence.

Allen blew out his cheeks. "Well, that's a relief."

Bella was wide-eyed. "Am I really going to Earth? Is a shuttle really coming? I'm going to go look out for it." She ran out of the bridge.

The three of them followed Bella to the observation blister, more sedately.

"Saved by a god in the machinery," Freddie said. "How ironic."

"What an end," Fortune whispered. "Two halves of the same mind locked in conflict for subjective eternity." He seemed old now, despite his youthful face. "So it's over. What will become of Bella?"

Allen said, "Oh, they'll find her a foster home. There are far stranger minds than hers in the world in the trail of tears left behind by AxysCorp and their like. We try to care for them all. The station screwed, however. In the short term I imagine we'll reposition another Tempest to plug the gap. The we'll rebuild. And we'll let this heap of junk fall out of the sky."

"But not before we've come back to save Aeolus and Cal," Freddie said.

"You're kidding," Allen said.

"No. As Fortune points out, it's actually mandatory under the sentience laws, just as it is for Bella.

"I'd like to see Aeolus spared that hell," Fortune said. "As for Cal, though, that deformed savage can rot."

"But Cal is the more interesting character, don't you think?"

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