

# 0. Downturn

**7 Sep 2021, Washington, DC**

MELISSA WOULD always remember it as the day her finches died. She'd been excited that morning to see her first hawk, flying quite high, but the electronic binoculars let her see it clearly. Her class was at the North Lookout Point of Hawk Mountain Preserve in central Pennsylvania, the best place in North America to see raptors this time of the year.

Someday she wanted to come to Hawk Mountain physically, not a virtual visit. The book said it was a rough one-mile hike along a rocky trail to the lookout point. Too bad schools mostly had to use virtual experiences now. Still, the hawks they were seeing were actually flying past the mountain right then. It wasn't a recording.

The guide's words appeared at the bottom of her viewing field—important for her because she was deaf. Half a dozen deaf students went to her special school, Roosevelt Academy, but none were with her today. Two of them used hearing aids, although all could sign with her. Three of the teachers could sign also, and one, a young man, was on this outing. He couldn't sign well, though. It was annoying to follow his slow and clumsy, and often mistaken signing, and to slow herself down, making baby signs. He didn't make the right facial expressions either.

The guide was a volunteer but had worked at the mountain for years and was familiar with the preserve and its birds. "We used to have total counts for the four-month season of twelve thousand birds sighted. Since 1934 we've been keeping a count of the numbers and kinds of birds that come through. But the last

few seasons the counts have been down, especially with certain species. This season we may have eight thousand or so, which is worrisome because it's part of a downward trend. Also it's distressing to see several species disappear."

The guide, an elderly woman, seemed "distressed" all right, as if she was angry with them personally. The missing birds weren't their fault. Okay, maybe they were. The guide went on: "Experts don't see a single reason for the decline but think the falling numbers result from many factors, like insecticide use, air pollution, loss of habitat."

Melissa's biology class had regular environmental outings, usually one each week on Wednesdays. Even though Mr. Matthews, their teacher, tried not to be negative, the refrain in North America seemed always the same: drastic decreases, especially in the of number of species—the ever-decreasing diversity. He had been going to these places for years, although only recently virtual visits, and Melissa could see how disconcerted he was to see the changes, the losses. One time they had gone to what was billed as a beautiful wetlands area at the shore, but it was gone completely, just missing. Only the cameras were left.

\* \* \*

When Melissa got home from school her mother looked upset.

"What's the matter," she signed to her mother.

"Bad news," her mother signed. "I am really, really sorry. While we were off today, your finches died, all six of them."

"No, no. How could that happen? Let me see them."

"It might have been yesterday or last night. I didn't check this morning."

"I checked early, before I left. They looked fine."

The cage was outdoors still, as long as the weather stayed mild. The finches were all lying on the bottom. Melissa picked up each one separately to make sure it was dead. Raising a special breed of finch, called an owl finch, was a project she was

working on in coordination with the Washington National Zoo. They came from Australia but were commonly bred in America. The project was designed to get children interested in wildlife—not necessary for her, but still she was fascinated with the work and loved her finches. And the breeding had gone very well. She used a special nest box, and from two, she had gotten to six, with two batches of two little eggs, and then little finches, and now back to none.

Her mother was crying but not Melissa, who never cried. Why was it important to show no emotion or weakness to her mother? She didn't know, but inside she felt sick, as if she needed to throw up.

She looked at each bird again with a magnifying glass. Nothing unusual to see. She put them in separate plastic bags and stored them in the refrigerator. From her orientation at the zoo, she knew that for a later necropsy they must be sealed away and kept cold but not frozen. That night she had trouble getting to sleep, thinking about her finches, looking like tiny owls.

\* \* \*

Early the next morning she sent a message to Dr. Ratcliff, the bird specialist and veterinarian she had worked with at the zoo. She briefly stated the problem and asked to computer chat with her. At 10:30 she got the return call from Ratcliff and left the classroom to focus on what might have happened.

On her droid she used the account name “melten,” short for “Melissa-ten,” since she was ten years old, well, almost ten. Ratcliff knew she was deaf and that they would need to type back and forth.

**ratcliff:** Sorry to hear about your finches. Tell me how they died and if you noticed anything special about them, before or after.

**melten:** thanks for answering quickly. during the course of one night, at most 10 hours, they went from looking and acting normal to dead. i looked at each of them and couldn't see anything. i have them refrigerated in plastic bags.

**ratcliff:** Will you feel bad if I speculate about what may have happened? Unlike you, I'm accustomed to animal deaths, and I'm not dealing with my own pets.

**melten:** go ahead and speculate. i'm pretty much ok.

**ratcliff:** Since they all died, and over such a short span and without seeming ill ahead of time, one possible cause is exposure to some toxic substance in your home environment. Like a spray for roaches or other pests, even a deodorant spray, or maybe a toxin in their food or water. With a necropsy we would have a better idea.

**melten:** their cage was outside on the balcony, since it's still pretty warm, so they didn't get any kind of spray inside our apartment. they got the same seeds they always get and the same water mom and i use.

**ratcliff:** Perhaps a disease, then. Another possibility is just our polluted air. It could make them more susceptible to a disease, and once one of them catches something, it would spread to the others. We've had some bird deaths at the zoo that might be due to air quality.

**melten:** have you had many birds die?

**ratcliff:** I need to rely on your not talking about this to the media or friends. If we have a "celebrity" death of a popular animal, we end up with a lot of bad press. To avoid a backlash, we have announced some bird deaths, but we haven't talked about them much. Anyway, we've had an alarming number of deaths similar to yours. We

haven't found much of anything wrong with our birds. The absence of other possible causes may point to respiratory problems. I'll be honest. Normally we wouldn't do a necropsy on pet birds like yours. Our resources are limited. In this case I want to, just to get another sample from outside the zoo with the same illness symptoms. Can you bring your birds to my office? Even today before 5 if that works for you.

**melten:** yes, i can make it, but it may be close to 5.

**ratcliff:** That's fine. Keep them on ice when you bring them here. Thanks.

**melten:** Thanks for your help. i'll see you at 5.

Melissa signed off. She decided not to return to the class she'd left. What a stupid class anyway, just geography. Why were geography classes always worthless?

After school she stopped by the apartment to get the birds, packing them along with ice inside an insulated lunch box. Since her mother wasn't home, she didn't need to argue or listen to cautions about being careful. She caught the Metro at the Rosslyn station, changing at Metro Center, and then going up to the station past the Zoo station, since then you could walk downhill to the zoo instead of uphill. The trip took an extra half-hour due to missed trains, but she had allowed plenty of time. Any more she expected bad service.

Dr. Ratcliff was in her combined office and lab. She put Melissa's birds in a refrigerator. They communicated a bit awkwardly for a few minutes by writing notes to one another. At one point Ratcliff wrote "Canary in a coal mine" on her paper and then wrote that there were canary warnings all over now, everywhere. Already ten years ago there had been the collapses of bee colonies, and the deformed frogs in "fresh" water. Now birds were dying of the air.

Later Melissa looked up records of air quality for the Washington DC area. That data showed a steady degradation for years but with so much variability that it wasn't as startling as it might have been. A lot depended on how the wind was blowing, from local winds to the jet streams. Demand for electricity in the central states west of them was a big influence on pollution. Another major part came through the upper atmosphere from coal-fired power plants in China. In the past few weeks pollution from power plants had been particularly bad, augmented by huge quantities of dust, also from China and from North Africa.

She gripped the edge of the table before her in anger. Her finches were gone, due to human actions, more than any other factor the insatiable demand for electric power, power generated by dirty black coal from under the earth.

## 25 Feb 2022, New York City

I RECOGNIZED THE MAN immediately as he came into the restaurant. I had picked “The Full-gorg’d Falcon” as a place to meet because it was very expensive—anything to make the right impression. Greg Hinman looked older than the picture in the folder Konrad had assembled. That’s all right, though. Many people use pictures of a younger version of themselves. A tired-looking, middle-aged man in a rumpled suit, so certainly not a banker, but you would never guess he was an important computer chip designer. We chose him because he seemed vulnerable, and needy, and angry with his company—a much better prospect than the two employees I had interviewed earlier. If he was a failure we would need a different approach.

I stood up and walked over to him. “You must be Dr. Hinman,” I said. “Glad to meet you.” Yada, yada, the usual stuff. Must not be garrulous (a word I had just learned). Hinman

seemed smart, analytical, watching me carefully.

“Please call me Anton,” I said, “and if I may, I will call you Greg.” Anton Richter was the name I was currently using, for more than a year now.

I invited him to my table. An obscenely large tip had produced a beautiful view of the city. I waved to my new waiter friend, who handed us menus. I suggested a drink to start with, recommending the restaurant’s whole page of martinis. Hinman picked a dreadful-sounding one full of flavored vodka and fruit liqueur. He lived in California, after all. I ordered a similar drink, forgoing my usual cognac; all the sacrifices I make to advance my agendas. We talked through various topics: life in New York City, the horrendous situation in Africa, the huge red bloom in the Caribbean. At my suggestion, we had another round of drinks. Earlier I had settled it with my waiter that my guest’s drinks would have more alcohol than mine.

Essential was to convince him that I was a technical person, one who could almost function as a peer. I also needed to get to the subject of the chip project. I started in with security. “For two years now we’ve been working on a secure operating system. My orientation is more on hardware, but my group includes good software people. We based our OS on the old open source Minix 3.”

“Oh, yes,” he said, “Minix 3. By coincidence I’m familiar with it. I read some of Tanenbaum’s book, from, um, fifteen years ago. Very elegant, minimalist. But they’ve already used it to make a more secure OS. Several companies market what you’re talking about.”

“Of course. But all the work is open source, so instead of starting from scraps, uh, I mean, from *scratch*, we combined features of different projects. And we are pushing ours for general-purpose use instead of small embedded systems.”

I continued this way, as if I were making a real pitch for

my product, as if I cared about it. After describing the system's features, I said, "My people named it 'Minus' as a sort of word play." In fact, they were geeks, living in a closed world where each software system should be a self-referential acronym.

"Uh, Minus? Sorry, but I haven't heard of it. I've been pretty well tied up lately...."

"Trying to get the StackForce line out the door," I said, completing his sentence.

"Some of our PR people would be upset to hear that word. They haven't released the name yet."

"A company I gained partial control of two years ago is working on specialized components for your project, with the usual non-disclosure agreements. So I thought I could throw out the name with *you*."

"Yeah, what do I care," he said. "It's been a tremendous effort, but they're getting closer to a product."

In fact I knew a great deal about their chip: a radical design with a base chip and auxiliary chips stacked above, ultra high-speed vertical optical connections. "It should really shake things up at the high end."

"They hope so," he said, "but it's an extremely competitive market right now 'at the high end' as you say."

"We want to create a system based on our OS and on StackForce. We need the standard stuff: technical specifications, a chip simulator—so we can get preliminary work started. It might be a money maker for us." In truth, the money meant nothing to me, but I wanted to push this hardware.

"You don't need me for that," Hinman said. "It's routine. We have a group getting vendors like your company up to speed. The chip set is complicated to program, but they've got tools to help."

"Yes, I know about that group. I want to pay you personally to help us with StackForce and maybe talk you into doing more



work for us.”

I had already decided on partial honesty. “Greg, I’m going to lay my cards on the table, so to speak. Some of my cards. First of all, I have heard rumors about you. Nothing secret, just facts anyone could find out. I hope you have no objection.”

“I don’t know. Depends on what you found out.”

“That you are one of your company’s best people. That considering your skills and value to the company, you are undervalued and underpaid. Forgive me for bringing up such a sensitive issue.” I knew much more—that he was short of money, because of a divorce and his low pay, and most of all because one of his children had health problems. My people had found out that he resented terribly the way his company and its health bureaucracy had cut him out of certain benefits for his son.

He was working on the third drink and should be feeling mellow, except that I knew he was not a mellow type, even full of alcohol as he was.

“Are you offering me a job?” he said.

“Well, yes, as an occasional consultant to help us use the new chip set. I’ll work on getting your company’s permission, because as you said, they already have people doing this. They’ll do anything to push their hardware. Your CEO would sell drugs to his children or put his own mother into the sex slave trade to help his sales—what a terrible person.”

“You’ve got that right. He’s been all over the news lately.”

I went on about how lucrative the consulting work would be, mentioning an amount of money larger than anything he could have expected.

“You’ll have that as an electronic cashier’s check this very evening, a fee for your, ah, consultation with us today and tomorrow. Everything will be out in the open. You tell your supervisor about the consulting. You don’t tell them how much, but you pay taxes on the fee. Nothing under the table.”

“This all sounds strange. I don’t know....”

“And I want you to do a little more for us than what I have said so far.”

“Well I’m damned. You’re talking about industrial espionage, aren’t you. Why don’t we kill someone while we’re at it?” Not a happy person. “You’ll get me fired, disgraced, in jail, broke. Do you think I’m crazy?”

“No, nothing like that.” I was trying hard for the complaisance of a courtier (more of my study of English).

I finished my own low-alcohol drink and signaled for two more. “It’s simple. You take the fee, talk with me some more, and if you don’t like what I say, go home happy. What about it? I want you to hear me out but in strict confidence. In exchange for the fee, you will tell no one what we discussed. If this works out, there will be many more consultations.”

“Isn’t there some law against conspiracy?” he said.

“Lighten up, Greg, as you people say. It’s only a conspiracy if you seriously consider doing something. We’ll talk only, nothing else.”

After some further persuasion, he agreed to take the fee and to have our further “talk.” This was a step I had not reached with Hinman’s two colleagues when I interviewed them.

I decided to tip-toe in the direction I wanted. “Now that we worry less about software viruses and about worms and trojans, it seems to me one final vulnerability is a weakness hard-wired into the chip, deliberately inserted. Have you heard of anything like this?”

“Well, years ago there were some ‘hack the microprocessor’ experiments. They got a chip to inject firmware into its own memory, firmware that let them get access to the machine using the chip, the hacked chip. That approach wouldn’t be possible with our chip. People also talk about the Grand Opera of attacks, where a virus would attach itself to the computer code

that manufactures a chip, and it would insert a flaw directly into the hardware chip itself. I don't think it could be done now. Even if it could, they'd probably find the flaw in the final chip."

We talked about other matters over more drinks and dessert, an excellent soufflé. At this final moment I was nervous, but what did I have to lose, except the whole game and a lot of time wasted? "Do you think it would be possible to put flawed logic directly into a major chip? Not using a virus, but directly."

"It might be possible, sort of theoretically, but very difficult, even for an insider. Impossible for an outsider. And suppose you could do it. You understand they do lots of testing of these chips. Initially of the high level description. Later testing is mostly for manufacturing defects, but even that might uncover flawed logic."

He continued before I could say anything else. "For years the DoD has been paranoid about deliberate flaws in military chips, say for a weapons system or a satellite. Make a chip that will fail randomly; that wouldn't be so hard. So a satellite lasts only months instead of years. But DoD is worried about actual flawed logic inserted—like a backdoor. It would make a good cartoon for a chip trade magazine: a swarthy middle-easterner, wearing one of those Arab headgears, and carrying a Kalashnikov over his shoulder, marches into a fab plant and changes the instructions for a chip. Good luck with that. And how do they propose to communicate with their special logic? They've got the same paranoia with a commercial chip like ours. It's all preposterous."

He stared at me more intently; I hadn't exactly been subtle. "Let me make my case, and then you can say no, okay?" He just nodded, still focused and staring. "First, why would I want to do this? Because of the challenge. Because I think I can. It would go beyond anything ever done before. I have money and power and influence, but this is a special toy I want."

I paused, and he said nothing. “I admit that you could be found out, but if you help, your exposure will be limited. Separate from you, I have access to part of the chip design, something my group has to submit. We’ve been working on this for more than a year, with preliminary designs submitted. They are placing more functions onto the main chip. They had to farm out some exotic parts, and our group is just transferring established designs as hardware blocks. The main chip group will patch our blocks into the overall chip. There goes your interloper with the AK-47. We put in a unit from outside, at a late stage. And your name won’t be used anywhere. You will only advise us outside your plant.”

“Then why do you need my help?”

“I don’t think we can put it off, um, *pull* it off without an insider. Our blocks will have many millions of gates, though of course just a tiny fraction of the whole chip. Buried inside the final chip will be several thousand gates, perhaps five thousand, and those will have the critical functionality. All the description is at a high level and tested first there. We have the flaw disguised as legitimate logic. But as you said, they will test in sophisticated ways. We need help to pass those tests, along with tests for the unauthorized parts.”

I cut in before he could say no. “You’ll be part of the greatest deception in human history. If we are caught, I personally promise not to give up your name. But nothing will point to you, no evidence at all.

“I’ll not make use of this for years and then for a subtle gain, the use hidden inside a possible software exploit they will blame, even though they cannot see how it could work. You’ll be off on a beautiful white beach when news breaks of an unexplained hack.”

Soon he started asking more-technical questions. Mostly I had answers, though twice I had to put off his question till we

saw a key hardware employee tomorrow. “How will you get a signal into your special circuits?” he said. I explained that it would be like normal signals, but with special parameters triggered by an illegal operation the hardware was asked to perform.

He brought up the issue of trust. How could he trust me? And why would I trust him? We both knew that “trust” is a big deal in computer security. I said he had little reason to tell them about my plans. He had nothing to gain, and they might fire him immediately. This very fact made me more likely to trust him.

As for him trusting me, he would be able to see his own minimal involvement, his name appearing nowhere. Only one other person would know about the extra work he was doing. And I would get nothing out of betraying him. For once I was being honest; I believed in this explanation.

Finally he said, “I just don’t know. I need to think about this overnight. We can meet again tomorrow.”

“I have one more ... card to play. I always intended to offer you this; I’m not just desperate now at the end. But the issue is touchy and private. Please do not take it the wrong way. May I go on with something that is your own personal business?”

“Sure, sure,” he said, “go ahead. You seem to know everything about me anyway.” Now finally I was getting something for the drinks I had pushed into him.

“I know about your dispute with your company and its insurance carrier, how angry you are. I know about your health insurance difficulties involving your younger son. You have gotten to their maximum payment for this year, and they are bleeding you dry, trying to get blood out of you the turnip.” Ah, how I loved the English language. “In addition to the other financial incentives I offered, I can get you supplemental health insurance for your son, starting tomorrow. You just have to be my employee, part-time. This will cover the special therapy that your son needs and your own insurance company refuses to cover.”

He seemed actually stunned. I knew he was in New York to do something about his son's insurance, and he had gotten nowhere. "There's no attempt here to manipulate you. You're going to do something for me, and I can do this for you."

It was painful to see how vulnerable Hinman was on this subject. He twice started talking and each time stopped, trying to get his emotions under control. Finally he said, "Tomorrow I was ... going to say no to your offer. But, I don't know, maybe I could do this, yes, maybe. I wouldn't mind screwing the company over. But with that said, I need ... I need to say something more. Hell, it's not in my interest to tell you this, but ... I think your project is likely to fail, no matter how cleverly you have it arranged already, and no matter what kind of help you can get from me. The chip is unbelievably complicated. True, that will help to hide your special parts, but their automated testing may uncover it. And in the end it may not work as you want. Failure will speak for itself."

"I know, I know. Your understanding of the difficulties is why I want your help. Having you with us increases the chances of success, nothing more. There are no guarantees."

Of course I knew they would test their project from top to bottom. And at best we would have only marginal tests of our critical parts. One huge advantage we had, though, was that they would use our own software to test my company's blocks. And these were not critical for the whole chip, not even as to timing.

"They are under pressure to finish soon," I added. "They'll overlook things. You'll see."

We talked a while longer. He seemed more relaxed, not stressed as he had been.

"Let's get to sleep, both of us," I said. "Tomorrow, the first thing, we will sign you up as an employee and get insurance for your family. Your son should be able to resume his treatments in two or three days."

It had worked. And the flaw would work too. This new chip set was going to be a huge success. In a few years, hundreds of millions of them would be in computers all over the planet, including large, important systems. Hinman did not know how much he would help. Years from now after it is too late, he may realize that I have a special method indeed for communicating with my flawed logic: direct and simultaneous control of those hundreds of millions, obtained without any need for zombies or botnets or worms, which are now harder to arrange than in the old days. Hinman might think it is bad that I will be able to take over any computer I want, not realizing how much worse it is. But his son gets the essential medical care that was withheld by his filthy company; he gets to sabotage that company; and I get fearsome power—the kind that keeps computer people awake at night.

## 9 Apr 2029, Diary Entry

yesterday was the total eclipse—it was so neat, with the dark racing toward us. i had expected a noticeable darkening while the sun was still a thin crescent, but it wasn't like that at all. only in the last instant before totality did it start to look dark. the full eclipse was fantastic, a very dark sky, a pearly light around the black sun, tiny bright orange beads at the edge.

if we hadn't heard about it a few weeks ago, it might have taken us unawares—we are still partly isolated here, but dad says the country sees this eclipse as a marker from the old to the new, a sign of hope and renewal.

i've read that anywhere in the world you'll get an eclipse like this once every five hundred years on the average. in ancient times two armies at war stopped fighting cold because of an eclipse. and isn't it odd that eclipses occur yet are so rare—it's because the sun and the moon are the same size, well, the same apparent size, so things must match up perfectly to get a

total eclipse. but think about it. when i was younger i wrote a science fiction story about this strange coincidence. (hey, maybe it's a message.)

not too hot today and with a breeze so i'm sitting in our shop writing this and watching mom sharpen razors—she's good at it, using the leather strop. the next razor must have needed extra work with a stone. we're the only place nearby for men who still want to shave. i just signed mom if she wanted help but i knew she'd sign back no—for someone not deaf mom signs really well.

mom looks tired, and old now that i think about it—is she happy? life here has been hard for us all, particularly hard for mom, with all the people dying, with matthew dying. a boring place for her, too, when she talks about washington and new york and berlin, about the opera, about museums and concerts. well i've also suffered. i feel that i should suffer without complaint, and i usually manage it. but for me the boredom is often horrible. there are so many things i miss: the whole online world with its connectedness and stimulation. but i've been forced to see more of the natural world, and that helps.

dad seems so calm and patient, never loses his temper and fits in with the town much better than mom or i do—he's liked and respected, and yet there's an edge to the respect, care with how they treat him. for a long time i didn't understand this, but now i think i do. dad is always polite but still people wonder what he would be like if he ever did get mad—almost unfair since there was only the one time and that was with the man who broke into our house—i get a bit of that careful treatment—they think i'm his daughter—yeah, i sort of think that, too.

maybe part of the respect comes from his guard dogs: our huge turkish shepherd dogs that i write so much about—important for the town for sure, and people like having them on account of strangers, but dad is the only one who can handle them. they're afraid of the dogs and he isn't, so that gives them pause. well, i'm not afraid of them either, and i love my



antalya—I was with her when she was born—she'd die before letting anyone hurt me. sometimes i take her with me when i go for a walk, and then people are especially polite.

i barely see water through the window over the forge—the lake, and i can't look at it but to think of little jimmy, sam webster's son—he drowned in that lake last winter—should not have gone out on such a windy day. jimmy with his energy and his good-natured smiles and his face marked up from the smallpox. mom hadn't liked his burial service, any more than matthew's service before his—she misses the old steady traditions even in her religion. both our ministers died a long time ago, one from the red plague and one from an unknown sickness, so when the sweepers came through they included words for jimmy along with their usual strange rites. anyway, these two sweepers, a man and a woman, both young, came on bicycles, carrying next to nothing, spent the night with a sort of revival, and then they were gone.

mom and bethany traded off translating for me during their peculiar evening service. they talked about the parable of the good samaritan, but from the point of view of the victim. for him, help from his enemy the samaritan was a complete surprise. instead of obeying the “love your enemies” command, he should be enjoined to “allow your enemies to love you.” the sweepers gave a new rule: “in the kingdom of god you will find unexpected friends among your enemies.”

and they went on to describe a sort of world they called the kingdom of heaven or the kingdom of god, parallel to our own, but completely different from the regular world, difficult to discern, with everything reversed. in that parallel world the first will be last and the last first. it's a world filled with the poor and the meek and the poor in spirit. they said you can't know what that world is like; if you think you do, then you are wrong. what happens to you will always be a surprise; usually the help you get will be unexpected and sometimes it will be outrageous:

offensive help that comes to you when others less worthy have received the same reward as you. if you grow accustomed to living in that world, then you'll expect to find friends among enemies, and you'll start to treat enemies differently. so you really will find friends and it won't be unexpected. there was a lot more to it, kind of like a magic spell that held me even though i don't believe in christianity anymore, strange as this version is.

and things really are looking up for the town. we just got in a load of screen—good quality galvanized stuff, to help people get through the summers. we have traffic along our road every day now and not always just bicycles. people here, those still left, are waiting for more, for everything to start up again, for water and power, for technology, for computers, for the internet....

but as for me, i feel the world weighing me down. i'm caught in a feedback loop, with thoughts grinding around and around on the same track. no help for it.

# 1. Lowdown

**1 Nov 2024, Washington, DC**

**I**N THE DARKENED ROOM David Warburton seemed ordinary enough—a tall and powerfully built man sitting before a holographic display, large flatscreens on either side. His short-cropped dark hair and square face made him look military or like a police officer. A closer look in the light of the displays showed extensive scarring on the left side of his face, from just below his ear, down his neck and into his shirt. He gestured at bright green letters with his right hand and dragged a portion to the center with a left hand missing two fingers. The liquid letters formed as he dictated:

... on schedule, with no hitches so far. It's like planning a wedding. The German is doing the hacking, I'm not sure how. That shit little Japanese college now has a research department that will detect the radioactive gas. The company had to endow their monitoring station. Your contacts will be ready according to plan. It will all come together. You mentioned the expense, and I won't deny it, but so much money has come in, I have it to piss away now. Carl, I want to get you out of there, to speak to you again in real time, you and Richard and Vasily, all three of you. Just four weeks more.

With voice commands and hand gestures he corrected the text and saved it to be handled like all mail to and from Carl.

Next he sent a voice mail to Asya Lifschitz, his contact at the Federal CISA, telling her he was ready for a review of contract work with the Social Security people. To his surprise she was

online and asked for a realtime voice connection. He was glad she hadn't wanted a video link.

"Ms. Lifschitz, if it's too late for you ...," he said. "I work odd hours—thought you'd answer in the morning when you got to work."

"David, call me Asya, please," she replied. "We've been mailing each other back and forth for months now, after all. I finally forced my daughter off the Internet and to sleep—now I can get a little work done. So you've got something for those nitwits in Social Security?"

Warburton always felt tense when he talked directly with anyone. "Yes ... Asya. I think I've got good recommendations for them. To you I'll say the approach is simpleminded but it should work, and I dressed it up for company. Actually, simple is best for these people."

"You're my best contractor; keep it up. I'll go over the report and probably send another assignment on Monday."

He thanked her and signed off. He finished up the contract work he'd talked about, then switched to Carl's video game product and to a secret project associated with the game. Carl had conceived of a game that was like a soap opera in a more interesting world than most people experienced. The game grew quickly because users created most of it. Carl had outsourced the development work, and the maintenance was still outsourced, but he and Carl had taken over the main networking engine. This engine had also been written by others, and the most challenging technical work Warburton had ever done was to understand and extend the game's networking tasks.

He made a bit of progress, then decided to go online. He put on his helmet, the gloves, the attachments on arms and legs, and transferred to the City he belonged to. Funny how quickly everything had changed: You lived in a city, but you *belonged* to an online City, with a capital "C." And a virtual City could

be anything, from mythological to futuristic—one was even at the Earth-Moon Lagrange L5 point. Computers and connectivity kept getting cheaper, and physical travel more expensive and time-consuming and sometimes impossible, so that ever more activities took place online.

He talked over several ideas, discussed recent events, and generally socialized in the Club until nearly dawn, what was early afternoon in his City. Finally he broke contact, stretched, and walked down a hall with a slight limp, past the weight room to his kitchen for a snack. He looked with satisfaction at all the food on hand, enough for months. The apartment was laid out with obsessive neatness: books, equipment, food, clothes—all in their proper places, often labeled.

Soon it was time for his early morning jog to clear his head. He had tried running in the middle of the night, but people thought it strange, and it could be dangerous. Just before dawn was a better time, when other early joggers were around. Three months ago he'd had to interrupt his routine for a week because of smoke from the terrible fires in the west. The smoke was gone but the whole country was still stirred up to a crazy degree, with checkpoints everywhere and suspicion directed against any foreigner.

His fancy eighth-floor location on Connecticut Avenue made for a short walk to some favorite animals at the Zoo when he was done running, before sleeping all day. He pushed himself with the jogging, ignoring twinges in his leg, and put in a little over four miles on his standard route, which ended on Connecticut at the entrance to the zoo.

He loved the reclusive Pallas's cats, but even early as it was and with few people around they were hiding again. He didn't mind the animals looking at him but he avoided people by reflex. Halloween last year had been painful, when a serious little superhero thought at first he was in costume and then had be-

come frightened. He watched a huge type of praying mantis from Africa for a long while, one that looked like a withered brown leaf. In the wild and not moving, it would be invisible to predators and prey alike.

Invisible. That's what he should have been when he was hit—jammed back into whatever hole was available with as little as possible showing. Instead, he'd also been the computer specialist and was typing at an old-fashioned keyboard right in the midst of combat, not trying hard enough to be invisible.

Months of surgeries and rehabilitation had followed but that was four years ago. After his recovery there was plenty of money but nothing else he really wanted. He'd had fantasies of getting even, revenge on a world that didn't care about him. The anger gave way to boredom and apathy, interspersed with an online life. He long ago realized that his friend Carl had worried about him. Carl dreamed up the networking project for the game partly as a way to involve him in something, give him interesting work. The two of them had a great time planning and arguing, and so it served a kind of rehabilitation goal. But the whole project worked out better than either of them imagined possible, supplying lots of money to their new firm.

Then Carl died in the accident. He took the death hard—his best friend, his only good friend, was gone. Warburton had been mostly done with the four or five stages of grief, depending on who was listing them, and having a problem with resignation or acceptance, when over the course of a week he came to realize that Carl was still alive after all. It was the closest he had ever come to a religious experience: Carl had been dead and yet he was alive.

Now Carl's plight and that of Carl's two friends had really pulled him out of his routine, given him lots more to think about and work on in a orgy of activity. He was going to get the three of them out of that terrible place if he had to stir up half the

globe. Later he would worry about consequences, unintended side effects, problems for him personally....

\* \* \*

He went to sleep and dreamed of being lost—in an oriental city like Tokyo or maybe Shanghai. He was heading to his room in a ten-story hotel. He took an empty elevator up, but missed his stop and kept going upward. And there was no top floor—the elevator car just leveled out and continued horizontally, as if the hotel had been built at the base of a cliff. Through windows in the car he could see a strange landscape: vaulted hangars, mysterious constructions, tracks and other cars. He stayed in the car for a while but it was just getting ever farther from his room. So he got off, hoping to take a car back, but he found a maze of tracks with cars on them, none going back. He wandered lost among the tracks.

## 1 Nov 2024, Arlington, Virginia

**A**SYA LIFSCHITZ WALKED through her small apartment to the back bedroom to make sure her daughter had finally gotten to sleep. Melissa seemed beautiful and innocent lying there. Asya had taken her trick-or-treating in their building with the Williams' girl. It was just a joke the two girls enjoyed, but for once Melissa wasn't expected to say anything. Later, after she was online, it was hard to get her off. Asya wondered if this was one more thing to worry about: a daughter addicted to the Internet.

The humidifier hummed in the background as a fine mist drifted out to help Melissa with her asthma. Asya was in awe of her own daughter, sometimes afraid of her. Her little girl was a prodigy, so very smart and quick to learn—and only thirteen

years old a month ago. Melissa seemed to have a perfect memory, a true photographic memory. Why had she never checked to see how good her daughter's memory was? Asya sometimes felt guilty about how she had pushed Melissa intellectually, but what choice did she have? Melissa was deaf after all, and early on Asya learned that the deaf often have poor language skills. She had decided that sign language was not enough—her daughter needed to master written English. At least in this Asya was successful, as the little girl started reading when she turned three years old.

All Asya wanted was a normal, healthy child, but the reality of Melissa's deafness was such a shock that Asya went half crazy in those early years. It destroyed her marriage, and now from the perspective of ten years she could see that much of it was her fault and not Robert's. Two years or so after Melissa's birth, well after it became clear the girl was deaf, they proceeded with an operation to restore partial hearing. The operation didn't seem to work, but maybe she hadn't tried hard enough, with getting her daughter to hear and with the marriage itself.

Asya and Robert had fought constantly: let her use sign language and grow up deaf, or operate again and try to get her to adjust to an implant so they could mainstream her. Before the issue of implants became contentious with Robert, Asya learned ASL—American Sign Language—in a frenzy of effort. Later she hired a deaf baby sitter to teach Melissa to sign ASL properly.

Asya studied the subject of implants carefully and solicited endless advice. Far from helping, this overload of confusing and often contradictory information paralyzed and terrified her as she tried to decide what they should do. Even without the implant some people said that Melissa could learn to talk and be understood, while others said that course was nonsense and would destroy her daughter. In the end they never tried to get her



to speak, and she seldom made any sounds at all.

Robert didn't have the time or inclination to learn to sign, so in the first few years, before they divorced, he remained resentful with no good way to communicate with his daughter. But that was a long time ago. Lately now, Melissa mailed her father almost every day.

Asya closed the bedroom door most of the way and returned to her computer. That strange contractor David Warburton was right then sending her mail, what one used to call email. He did good work so she wanted to encourage him. After talking with him briefly she answered mail from her brother, who lived in Berlin. No real news from Alex but she set up a time to "meet" with him later that night.

Now time for entertainment even late as it was, since she could sleep in tomorrow. Asya got out the virtual reality helmet she'd bought a year ago. The market provided many devices, constantly improving, but this one was popular now and a good compromise between expense and functionality. Melissa had begged for it, so Asya bought two of them. She carefully fit it over her head. Of course they belonged to a City. Several years ago she had signed up with Lagrange L5, the City at the vertex of an equilateral triangle with the earth and moon at the other vertices—a virtual City, even if there were cameras at the L5 point. As a gimmick to promote themselves, they gave dwellers access to the entire universe—*virtual* access, but still you could visit the planets, and the stars, and even distant galaxies. This was interesting at first, but then it grew boring.

Last year Melissa had picked out a new City for them: Atlantis, the largest and fanciest of them all. One attraction was a Club for the Deaf. She hounded her mother until they were signed up. Along with the helmet, Melissa could wear special long gloves that picked up hand and arm and shoulder locations used for signing, plus the helmet relayed her facial expressions.