



THE SINUSOIDAL  
**SPAGHETTI**

THE SINUSOIDAL SPAGHETTI

J.-M. PERELMUTER

J.-M. PERELMUTER

J.-M. PERELMUTER

# THE SINUSOIDAL SPAGHETTI

J.-M. Perelmuter

Copyright © 2006 by Jean-Marc Perelmuter  
ISBN-10: 0595417132  
ISBN-13: 978-0595417131

# CHAPTER 1

The radio beam traveled far and saw the Earth a giant friendly face with the city lights of New York, Chicago, Tokyo and Paris like a thousand sparkling eyes, and the Himalayas a long interesting nose, the continental drift a wide and welcoming grin, and the radio telescopes dotting the surface of the Earth like a thousand patient ears. It poured over the planet like an intelligent rain knocking at the door of humanity to let it in.

With the dishes of radio telescopes constantly draining the sky for meaning, the signal finally trickled through their metal mesh into the electronics of the system, emerging on the screen of a couple of radio-astronomers as a benign sinusoidal spaghetti which they labeled PSR2100+09, or PSR21.

“I’ll be damned!” exclaimed Meni.

His hands lying very symmetric on his desk, he brought his face close to his Sparc-20 workstation and squinted through his thick framed glasses.

“Look,” he said to the man sitting next to him, “is this periodic or what?”

The man rolled on his octopus legged chair to the front of Meni's console and to appease him declared, "Yeah sure," then added, "so what?"

Meni remained fixed on his monitor, pleased with himself and at one with his environment. Using both hands, he caressed his keyboard a few times as if it were the head of a grinning animal decked with a hundred teeth marked Q, W, T, Enter and Shift. Each time, his fingers started from the center and moved outward, the right hand perfectly synchronized with the left. The man smirked and pointed his gaze to Meni's hands.

"It's got to be tip-top symmetric, doesn't it?" he said.

"Tip-top," Meni responded as he adjusted the position of his glasses onto his glabella, the point where nose and forehead meet.

A short silence befell the room and the two humans let the computer hard drives, the laser printer, the fluorescent bulb, and a small fan pivoting in the corner do all the talking. Meni Mendel's oily black hair, parted on the side, clashed against his partner's short well-groomed curls, and his stout slouching body was the nemesis of the other's slender physique and perfect posture. Meni brought his face closer to the monitor and waited for his colleague

to join him, but the other man was already rolling back to his side of the desk.

“Did you hear,” he said propelling his chair with his feet as if it were a paddle boat, “about the guy who found some periodicity in the redshift of a bunch of quasars he was observing?”

Meni twitched then twirled his ergonomic chair to face his co-investigator, Jonathan Finkelstein. Periodicity is the cocaine of the scientist. It’s an event or a number that keeps recurring at regular intervals, it’s a pattern, and what is science but the pursuit of patterns: in climates, in ocean currents, in human behavior, in the fabric of space. The universe is filled with patterns if only we deemed to look. Meni peered into Finkelstein’s eyes, searching for something. Good faith perhaps. Here they were at three in the morning digressing from the pattern of the century.

“Well,” Finkelstein continued, “turned out the periodicity of the quasars came from the coffee pot.” He waited for some reaction but got none. “So this guy, sitting perhaps on the same chair as you are now, would go and boil himself some water every twenty minutes to stay awake.”

The astronomer noticed a furtive glance from his single audience toward the electric coffee pot that sat

behind him on a tall file cabinet. Just a minute earlier he and Meni had wrestled with one of the drawers to remove a couple of star charts.

“Yup,” he went on, bringing his hands to the back of his neck and reclining comfortably in his seat, “that’s the one. Every time the guy plugged it in, the surcharge created a glitch in the electric circuit to which, as we all know, the radio detector is also connected.”

Finkelstein paused for a minute, waiting for something to appear in his colleague’s eyes. Revelation perhaps. Finally, he straightened himself up in his chair and rotated back to face his computer screen, but not without adding, “To make a long story short, my dear Dr. Mendel, a couple of months after this Dr. so and so came out with his great periodicity find, some smart ass graduate student published a paper in the *Astrophysical Journal*, ‘Predicting Coffee Habits from Quasar Periodicity’. And let me tell ya, I don’t want anyone deducing my hang ups from our pulsar survey.”

The room returned to its previous muteness with the computer drives humming and the faint hammering of Finkelstein’s keyboard in the background. Meni Mendel remained nailed to his chair like Christ on his cross. Even he was supposed to have had an instant of doubt. Who was

Meni not to have one then? He uttered very rapidly, almost in a machine-like intonation the syllables ass and hole which bounced off Finkelstein without even registering. The man had heard it all right. So what? He had made his point. Artifact is the antichrist of science. It biases the experiment. Ruins a reputation. Destroys a career. Page 99 in volume 1 of the *Illustrated Encyclopedia Scientifica* describes it more subtly as ‘an object, substance, or effect introduced by some external agent or action’—like a coffee pot. It creeps in, unbeknownst to the scientist, distorting facts into two headed monsters, bending theories into pretzels and all this, ironically, by the scientist’s own hand.

It comes to mind how the discovery of cold fusion and its rapid refutation came about. How a courageous group worked relentlessly on achieving perhaps the last great engineering feat of the Twentieth Century, on par with the Wright brothers’ first flying machine, or the Aswan Dam riding the Nile, or the Apollo project which reached the Moon! And these pretentious scientists dared believe in themselves, in their ideas, in their research, in taking four nuclei of hydrogen and turning them into one of helium without even using huge reactors heated to Dantesque temperatures, but at room temperature no less.

How daring! And how the physicists working on that experiment having finally detected helium, promptly shouted 'Eureka, fusion at last!' when in fact their laboratory had been contaminated with helium from a previous experiment.

And so humanity's most human dream, that of turning ordinary metal into gold, had once again been revived and we've named it fusion. Isn't it always about transforming matter in one form into matter in another? And what is that but playing God? Never mind that Einstein couldn't unify the four forces of Physics into one. Or that Newton couldn't transform copper into gold. Never mind. We go on trying, undeterred by the failure of our geniuses. The best scientist is the cold blooded bastard. There's no falling in love with an equation or feeling attached to some particular data. There are those who become infatuated with such and such a theory, but they are the lost souls of research.

Meni remained glued to his seat staring at the Y on his keyboard. To an external observer, he would have seemed like a beaten man, a false messiah whom Judas just uncovered. But when a physicist looks dreamy, bored, or like a wax figurine, it means deep inside he or she is running a marathon. It's all in the process. You ask a



physicist ‘Hey, isn’t it amazing we went to the Moon?’ and you’ll hear the clickety-clack of the brain interpreting it as: there’s a clown on the Moon waving a flag. Had it been useful to wave a flag in outer space, the space program wouldn’t have been such an under-achiever since. There’s really no point in having a space shuttle if it’s just to play with a crystals growing kit from Toys-R-Us. You’ve got to shuttle between Earth and something, instead of Earth and nothing. What’s the use of going to the North pole? To the South Pole? To the top of mount Everest? To the Moon? What’s so good about being one hundred and five years old on one’s death bed? What’s great, the physicist answers, is getting there.

At that moment the idea of an electric coffee pot being at the source of his discovery, of the intelligent signals he had detected in the pulsar data, seemed quite exciting to Meni. He chanted “TUT! TUT!” then tried to remember the last time he’d boiled himself some water or warmed something in the microwave, or turned the lights on in the corridor. He canvassed all the details he could think of, each one a runner in a mental race to truth. Which of you bastards, he asked himself, fucked up my PSR21 data or did you?

Meni rocked his seat back and forth a few times, producing a squeaking sound from the chair's springs and annoying his partner. With one keystroke, he made the spaghetti floating on his screen disappear and replaced it with a clean royal blue rectangle crisscrossed with yellow lines. He pressed the F1-key and small white diamonds popped up all over the rectangular slab. With two more keystrokes, one on the L and the other on number 3, he fitted a sinusoidal noodle through the data, also called a third order Legendre polynomial.

“TUT! TUT!”

Finkelstein didn't look back. “What did you get?” he hollered.

“Rotation period for PSR21, one point four seconds—Dickweed.”

“That's a slow baby,” commented Finkelstein almost in a congratulatory tone.

“But is it real,” Meni retorted, “maybe all pulsars are coffee pots in space?” He paused for a second then followed with a couple of train-like whistles, “Hee-heeeee! Hee-heeeee!”

Finkelstein bowed his head, shaking it a bit.

“Okay, you little weirdo,” he said laughing, “show me.”

No one else got away with calling Meni Mendel a weirdo. Meni accepted it from Jonathan because he knew with the certainty only time can forge, that it was meant in a certain way, a brotherly term of endearment. The two had met at summer camp when they were twelve, been roommates in college, fellow students in graduate school. They were like siblings who would get on each other's nerves but who wouldn't take it from anyone else but each other. As things went, they ended up in different parts of the continent, Meni a research associate at The Johns Hopkins Center for Astrophysics in Baltimore and Finkelstein a junior scientist at the Canadian Institute for Theoretical Astrophysics in Toronto. Now they searched the starry sky for pulsars.

## CHAPTER 2

Stars are like people. They are born, they live, they die. One cause is at the root of it all: gravitation.

The classical view on this is we don't know why matter attracts matter, but it sure does. Newton saw the apple fall as if it were attracted to the ground and his genius was to identify the force behind this event as the same which attracts the Earth, Mars, and the other planets to the Sun. Never mind why. Do you ask why people want to be with people? So matter wants to be with matter. For people it's sex appeal, for matter it's gravitational attraction.

An alternative way to see this, however, is to think of outer space as a pillow. What happens if one lays a ball on the pillow? It creates a dip. Let's say that a smaller, lighter ball is also laid on the pillow: it too will produce a dip in the fabric, though not as deep. Imagine now that a small marble is dropped at midpoint between the two balls. Where is it going to go? Clearly, the marble will roll towards the bigger, heavier ball. Why? Because the trough molded into the pillow by the heavier ball creates a steeper slope in the fabric than the lighter ball does. If you understood this, you've just understood the general theory

of relativity. If space is like a pillow, then planets and stars all produce dips. The more massive the body, the deeper the trough and the steeper the curvature of space in that region of the universe. The Sun being the heaviest body in our system, it creates the broadest dip, which explains why the Earth rolls towards the Sun and not Mars or Jupiter.

Our planetary system was born of a thin pillow of particles floating around aimlessly but in which one spot had a slightly higher mass density, forming a dip. Particles fell into it creating a ball of matter, and as more fell the ball grew heavier sagging deeper into the fabric of space. In classical terms one would say that gravity grew stronger and was strongest at its center. The central part formed a compact core which kept on shrinking. A nice way to describe this is to say that the ball of gas is imploding.

Seen from the particles' perspective, it feels like things are getting a bit cramped. Ever been at a party thrown by Edgar Allan Poe? You come early, then people start streaming in and it feels crowded. But in fact he fooled you to think it was crowded by moving the walls of the dance hall closer and closer together. Likewise, an atom at the center of the ball of gas sees all these other particles rushing in, and they keep on coming and coming. It may

feel like the ball's getting fuller but really, it's shrinking. And you know what? It's getting hot too. You're dancing, there's a ton of people around you, next thing you know, you're taking your sweatshirt off and your tee-shirt too. Same thing inside the ball of gas. One hundred, two hundred, three hundred degrees, it's getting hot! The ball shrinks some more. Five hundred, seven hundred, one thousand degrees, it's cooking! Gravity is having a ball. At some point the temperature is so high, atoms take their coat of electrons off and dance naked as bare nuclei, just like you at the party. Watch out, the walls are closing in! Particles slam-dance against each other as the ball collapses. And you know what they do, them partying particles, don't you?

They melt into each other's arms. They make love in a frenzy of energy. And in the process, they die. They die for the sake of a bigger, better particle. But not without one last shout, a scream so loud even the walls must hear it and tremble. Ten to the power of thirty eight nuclei of hydrogen atoms fuse to create helium in one single second. To give you an idea, one billion is ten to the power of nine. Their cry of death is a burst of light so powerful it's been given its own name, radiative pressure, and it's been thought to stop the ball from imploding. At least for as long

as there's hydrogen to fuse into helium. After all, the Sun's still here, ain't it? Well, that doesn't mean the theory is right. But that's what our two radio-astronomers thought.

Meni brought the palms of his hands together as if in prayer while the tip of his fingers touched the line dividing his nostrils, making sure his fingers were exactly at midpoint. His computer monitor let out a small parasitic sound as the monitor went into rest mode, automatically dimming itself.

"You know," he started out again, "how we fit the pulsar radio signals to get its period?" Meni's eyes blinked in unison, "TUT! TUT!", he continued, "...without ever investigating the data any further?"

Finkelstein crossed his arms. "Yes professor," he said teasingly.

Meni shut his eyes and pointed his index fingers at his temples as if he were about to shoot himself.

"What if," he started then paused and opened his eyes, "what if I told you that there is a signal encoded on top of the pulsar data?"

Finkelstein didn't react. Were these supposed to be electrodes connected to his partner's head, he wondered? He would have liked to laugh but remained silent, shifting

the mental gears of thought process instead. He sized up his lecturer, summarizing in his mind Meni's respectable resume. Dedicated in grad school, couple dozen articles published, now and then a conference, small grants here and there. What is he talking about? A pulsar's a pulsar, a star rotating (rather fast) and emitting a beam of radiation in one direction, like a beacon in space. You measure the time between pulses and get the period of rotation. Now it was his computer monitor's turn to doze off into sleep mode gently emitting a whimper of electrostatic noise. The glare that had illuminated his friend's face disappeared and he realized Meni had been waiting for an answer with his index fingers gunning at his temples.

“A secondary beam is not out of the question,” said Finkelstein, “it's been observed before. Two magnetic fields on the same pulsar?” He was thinking aloud. “Okay, I can buy that,” he declared as if to reassure himself, “is that what you're talking about?”

The word shmuck resonated back into Finkelstein's ears, bouncing like a rubber ball against the walls of the small room. Like every other of Meni's obscenities, it was spat out in a fast robotic intonation. His symmetry loving hands had somehow departed from his temples and made two fists on his knees.



“The signal,” Meni yelled, “is on top of the pulsar, not blended in—shmuck—two beams would show up as a double humped sine wave. What I’m saying—”

“Hey,” interrupted Finkelstein.

“What?” asked Meni, a little dazed by the sudden interruption.

“Nothing.”

“Asshole,” Meni spat out, “tell me already.”

“Do you know the one about the Jew in Nazi Germany?” asked Finkelstein.

“No,” responded the other.

“He’s very lonely,” Finkelstein began, “he’s hiding. Nazis hot on his tail.”

“Run!” Meni couldn’t help yelling.

“He can’t shake them,” said Finkelstein. “So the man goes to the town’s main radio station armed with a gun he stole. Something’s in his mind. He zooms by the receptionist, climbs the stairs two steps at a time, rushes to the top floor... ”

“He’s gonna jump!” cried Meni.

Finkelstein went on, “The Jewish guy finds the broadcasting studio and enters at gun point.”

Meni’s eyes widened, “He’s gonna broadcast German troop movements!”

“Nope.” said Finkelstein, “Guy goes in and expels the announcer from the small room. He throws his gun carelessly on the floor—”

“Oy!” Meni let out, crushing his cheeks with his hands.

Finkelstein continued, “He grabs the microphone, turns the volume knob to maximum and screams from the top of his lungs: help!”

Dr. Jonathan Finkelstein ended his story with a smirk. He felt like the guy in the joke except he was listening for help. He’d made his way into the studio of the world’s largest radio station and his microphone was the world’s large radio dish, the Arecibo radio-telescope. His co-investigator, Dr. Meni Mendel, also felt that way. He got up from his comfortable chair shaking his head, face twitching, grimacing, struggling between a hidden smile and an expression of desolation. The twitchy astronomer started to pace, drawing a small circle in the middle of the control room, alternating between rearranging his glasses, hooting, and tapping his two middle fingers against his temples.

“TUT! TUT!” he said.

“I take it you liked it,” said Finkelstein.

At that, the hooting redoubled and the pace quickened. The two computer monitors zapped back to life, mistaking the vibrations of Meni's footsteps for user friendly hands on their mice. The screens' glare bathed the man going around in circles like spotlights on a Hollywood star. Jonathan Finkelstein joined the merry-go-round and placed his right arm around Meni's shoulders to slow him down.

“Okay, okay,” he said gently. “Just a joke. Now tell me about that signal you found humping the pulsar data.”

Meni stopped in his tracks.

“Ah-Ha!” he declared.

## CHAPTER 3

It was a tradition during the final doctoral examination at The Johns Hopkins University Henry Rowland Department of Physics and Astronomy to ask students as their last question something conceptual. Something that any scientist at any epoch should be able to answer. This being an oral examination, part of the ritual was to scare the living daylight out of the candidate. Five examiners sat in row. Needless to say, Meni had to restrain the hooting to a minimum and keep a lid on the obscenities. Still, all things considered, they failed him miserably. He was just too different and too nervous and so instead of asking him the traditional last puzzle, one of the professors surprised everyone with something in the vain of, “So what’s with the hooting anyway?” The whole gang burst into laughter.

The second time around—and you’re only given two chances—Meni was ready. He had prepped himself both physically and astrophysically. *Mens sana in corpore sano*. A sane mind in a sane body. True, during the entire test he had paced back and forth. But he responded skillfully, his diction at an all time best, even the examining

board behaved within reason. Finally, the moment he had been waiting for arrived. The ultimate question hung in the air. Something conceptual, yes, something unusual. Until then, they had been standard, predictable, you knew your stuff or you didn't kind of questions. This one, however, would be unlike any other. For this question you needed a brain and a user's manual. It was up to one of the examiners to pop it on Meni, out of the blue, something new and never asked before. The judges hung back on their chairs, some leaning sideways toward their whispering neighbor. One senior character, with a most academic beard and tweed jacket kept turning his head left and right, right and left, making sure he caught a glimpse of every one of his colleagues' facial expressions. Meni noticed a tightening of the man's chin and a couple of nods to the assembly. Then combing his facial hair with his long nailed fingers, the old professor broke the silence.

“Mr. Mendel,” he began in a most doctoral intonation, “you're—uh hum—an alien. Just arrived on Earth. First thing you see is... a mailbox. Now, how would you determine its properties?”

The graduate student tried gathering his wits.

“Can I open it?” he inquired.

“Mr. Mendel,” the old professor retorted with a smile, “am I asking you for a postal code?”

“No, I...”

“Are you taking a postal examination?”

“Well no, but..”

“Really?” interjected the professor, “Then just which examination are you taking, Mr. Mendel?”

A smirk traveled onto the other examiners’ delighted lips.

“Physics and astronomy.”

“Well then, Mr. Mendel, think like a physicist not like a mailman.”

Anticipating his own reflex, Meni covered his mouth and muffled the syllables ‘shithead’ from making its way to anyone’s ears. It’s not that difficult, he reassured himself, just think it out. He imagined himself a physics graduate student from Mars.

“Okay,” he began anew, “height, width, length. Dimensions first. Then illuminate the object to obtain its color and reflectivity index. Its albedo too. Use a differential x-ray or electron beam to get a density profile. If that doesn’t work—and it won’t—an acoustic or vibration test will reveal an empty cavity inside. Now send a non-invasive probe to get basic data, such as surface

temperature. Magnetic properties should determine a metallic composition but no magnetic field. An electric conductivity test will confirm the hypothesis.” Meni’s confidence soared, “Spectral analysis will reveal steel, aluminum and a large amount of a petroleum based coating, paint. Using the mean density of these elements, the dimensions of the alien object, and assuming a value for Earth’s gravitational constant, we can derive an estimate of the weight of the object,” Meni paused for an instant and his eyes turned inward searching for other properties his examiners from Mars may be expecting to hear. “Polarimetry inconclusive,” he went on, “I Don’t think we could determine the contents of the box without a more invasive analysis.” Suddenly, Meni’s expression changed entirely, “You know what?” he said, “I have to go poo!” and with that, he darted through the door.

The examining board members reacted nonchalantly. They were used to interruptions. Students crying, passing out, barfing. So they chatted about the decay of protons, randomly checking the time on their watches, subtly signaling to the old professor that they had seen and heard enough, they were busy geniuses. Meni returned to the small room, thinking, like most, that he had

exhausted the topic. But a young pedant who clearly hadn't yet caught on to the subtleties of graduate teaching tried showing off to his colleagues.

“What about the mailman?” he hollered proudly.

Some of the other professors rolled their eyes at the young Turk, one of them let out a derisory giggle and two others leaned over to get a clearer view of the idiot. In the world of Physics there's no pity for unintelligent remarks. This is mainly because everyone is competing for the 'brain of the year award'. Idiocy in this context is akin to blood in shark infested waters. Sensing the other examiners wouldn't have liked anything better than to put down the punk, Meni joined the pack.

“Humans,” he replied with confidence, “are uninteresting. Mostly hydrogen and oxygen. The rest of them carbon and phosphorous, calcium and all kinds of crap they get from pollution, like mercury and silver. What's interesting,” he went on emphatically, “is not what about the mailman but *how* about the mailman. How he got made in the first place.”

The student had metamorphosed into a free thinking agent right in front of the examining board members. He had their undivided attention. His chin instead of a long



gray beard displayed a zit which he kept pressing as though calling an elevator.

“Look at inter-stellar material,” he said, “it’s almost all hydrogen with a speck of helium. So the question isn’t what. What a human’s made up of is obvious. The question is, how did the carbon and the oxygen in the mailman’s body get there? Now that’s hard!”

Meni gesticulated as coherently as he could, his intonation mutating from that of an insecure student to an arrogant professor and they loved it.

“When the universe first formed,” he told them as if they were children, “it contained exclusively energy. What’s that, energy? Could it account for the elements in our bodies?” The newly born academic caught his breath for an instant. “An old man too tired to get out of bed doesn’t have enough of it, a kid asking ‘what’s next?’ every other minute has too much of it. It’s hard to pinpoint what energy is—TUT!—Some say it’s a measure of heat or of how fast things move, or of the potential to move. Some even say,” and Meni foresaw here the perfect opportunity to conclude, “that energy is just being!”

The examiners laughed hard. There’s nothing like a joke with an equation in it to make physicists chuckle. And this joke referred to the equation. So, really, it had to be

hilarious. The equation was  $E=mc^2$  and had been hypothesized by Albert Einstein almost two thousand years after Jesus Christ had seen the light. The big deal behind the formula was that even the most minute person or thing, represented by the letter 'm' which stands for mass, corresponds to a certain amount of energy symbolized by the letter 'E'. The  $c^2$  is merely a number like 1, or 5, or 3 billion, its value is irrelevant\*. The important thing is that as soon as something has mass it has energy. Conversely, by the same token that  $E=mc^2$  signifies that having mass implies having energy, the reverse is also true. Divide the equation on both sides by  $c^2$  and you get  $m=E/c^2$ , which means that having energy implies having mass. Practically speaking it means you can create matter from energy.

This transformation is observed daily inside large machines that look like gigantic doughnuts. Physicists fill a doughnut with high energy and out comes specks of matter, or they inject specks of matter at high speed, make them collide, and out comes energy. The doughnuts are called particle accelerators. The speculation is that at that one moment when the energy is turned into matter, man is

---

\* For the record,  $c^2$  is the square of the speed of light in vacuum. It can be expressed in units of miles per hour squared or frog leaps per year – also squared– it's just a number.

doing just what God did a dozen billion years ago, if He was there. This is how from a universe with pure energy we ended up with a universe with matter such as protons and electrons. At first, almost all of our universe's matter was in the form of hydrogen and helium. A few additional elements were also forged during that transformation period, but they resembled hydrogen and helium in composition and were nowhere near oxygen, calcium, or phosphorous in structure. So how did these elements come to be, and how did they end up in our bodies? How come there are mailmen?

Evolution started in outer space. Inside immense balls of gas, matter evolved like Lego pieces put together to make a bigger piece, ready for stacking to build the beautiful toy we call world. It's all because of the pillow thing, gravitation. Listen: there once was a big ball of hydrogen which was shrinking under its own weight. The more it shrank, the more its interior heated up and the more particles collided with each other. At some point, nuclei of hydrogen atoms started slam-dancing really, really hard. So much in fact, that four of them would literally fuse to make a nucleus of helium. In the process they radiated a burst of

light so strong it created an outward pressure that balanced gravitation.

Seen from the outside, the ball looked beautiful and bright because of these bursts of light and it came to be called a star. The Earth too is a ball but it doesn't produce light on its own, that's why it's not a star but a planet. Fusion occurs mostly at the center of a star, so newly fused elements are located in its core. As time goes on, the temperature at the center of the star increases and all kinds of fusion reactions produce new elements such as carbon, nitrogen, oxygen, and more. If we were able to slice the star in half, its cross section would look similar to that of an onion with each layer corresponding to a different fused element. The first and outermost layer of the star would be made up of the embryonic material, hydrogen. Peeling the space onion further, we'd find the more recent products of fusion, elements produced later in the life of the star: helium, carbon, nitrogen, oxygen, all the way to iron and nickel for large stars. The amazing thing is, it looks like this object we call star is manufacturing just what is needed to make a mailman. This must be where the oxygen and carbon in our bodies come from. There's only one problem: all this stuff is locked inside stars. How is it going to get out?

## CHAPTER 4

Meni rolled his sleeves up one more time even though he had just buttoned them a minute earlier. He battled between the heat emanating from his frantic body and the arctic cold blown by the air conditioning unit satiating the computers' thermal demands. Following his every movement, Finkelstein sat arms crossed with his back to the console, slowly pivoting in his chair. The Hopkins genius paced obsessively from one end of the control room to the other. He took big steps, repetitively touching his forehead with both hands, connected as they were by the invisible strings of compulsive obsessive behavior. Sometimes Meni addressed Finkelstein, sometimes himself.

“Let me ask you this,” he said interrupting himself, “—Goddamit! Do you believe in the devil?”

“Excuse me?” said Jonathan.

“The devil. The little red guy with horns and the big fork.”

Finkelstein smiled. “Oh, that guy! No, I don't. I believe instead people are responsible for their own actions.”

“My, my,” said Meni, “what an ethical man—  
Goddamit!”

“The best kind, Sir,” Finkelstein responded.

“TUT! TUT!” Meni went on, “But I do seem to  
recall that you believe in God. Isn’t that correct?”

Finkelstein had the uneasy sensation the  
conversation was about to take a turn.

“Wait a minute,” he said awkwardly, “what does  
that have to do with pulsars?”

“Ah,” Meni sighed, he had brought his palms  
together and touched his lips and nostrils as if he were  
praying and picking his nose at the same time. Part of his  
gesture seemed to acknowledge the gravity of the topic. He  
walked with his eyes down, concentrated as he was in his  
mantric pacing. He pressed on, “How do you reconcile  
believing in God but not in the devil, my friend?”

“I hate when you do that,” said Finkelstein.

“What?” said Meni.

Finkelstein smirked dryly then jerked his thumbs at  
his own chest, “Putting me on trial so you can prove your  
point, that’s what I’m talking about.”

The game had stalled. Meni returned to his seat  
muttering a series of okay.

Crossing his legs, he tried to remain poised. “But you do realize there’s a contradiction here, right?—TUT—”

“Yes, yes, so what? Who says there should be a devil anyway?”

“Religion,” replied Meni.

“Well, I’m not religious. There. Now what?”

The two men stared at each other. A little sound could be heard exuding from Meni’s throat. Mmmmmm... It sounded like a very faint but high pitched liturgical tune. He stood up and started to pace anew.

“Jonathan,” he said in his most candid intonation, “do you think there are other Earth-like planets,” he turned his eyes sheepishly to the ceiling, “out there?”

Finkelstein felt more at ease in science.

“That’s easy,” he said, “the answer is, of course. I mean, the physics of planetary formation shows it is possible.”

He paused for a second to observe Meni maneuver through a curve. The astronomer pivoted a few inches from Finkelstein’s chair then turned his back at him and paced away with a brief hooting like a ship bidding farewell. “I am listening,” hollered Meni.

“The planets orbiting our sun,” Finkelstein went on, “provide unambiguous experimental verification. One of almost ten planets comes out with a cacophony of a hundred million species. I’d say that’s not bad. Whether this experiment can be repeated elsewhere is dependent on reproducing friendly initial conditions. Given a large amount of qualifying stars, say one billion, mostly G-K type stars, and a long enough span of time, say fifteen billion years, which is the age of the oldest globular cluster in our galaxy, you’ve got a real-life Monte-Carlo simulation by the Master himself.

“It takes on the order of a few hundred million years to form a planetary system, batteries included. So you’ve got lots of time and heaps of opportunities to make a solar system other than our own. If the conditions are easy to recreate then there’ll be plenty of them, if they’re difficult then that number decreases. Simple, no?”

Finkelstein felt quite proud of his exposé. His confidence rested upon the clarity of his logic. Crystal, he thought to himself.

“Good,” Meni said, slightly accelerating his pace. “Good, good.”

“Thank you,” Finkelstein replied, “anything else I can help you with?”



“This isn’t about helping me—TUT—dickweed.”

The two men stared at each other blankly.

“It’s about the devil,” added Meni.

Finkelstein squinted his eyes, “Man, what are you talking about?”

“Do you believe,” Meni said to the ceiling, “that there’s life outside?”

“Outside like in outer space?” Finkelstein asked carefully.

“Of course outer space—TUT—where do you think I’m talking about, outside Wal-Mart’s?” Meni shook his head disapprovingly. “So?”

“Well...” Finkelstein felt cramped, his friend was driving him to say something he didn’t want to. “I’m not so sure about that. Life’s a completely different issue.”

“Ah!” Meni said, “but you believe in God!—TUT—You see, you’re illogical.”

Finkelstein grimaced, “What’s the matter with you?”

Meni stopped at the opposite end of the room pointing his two index fingers at Finkelstein.

“You believe in God, right?”

“Yes,” Finkelstein answered.

“But you don’t believe in the devil?” Meni continued.

“Right, but...”

Meni was unstoppable.

“Okay. Why? Why? Because of religion, right? It doesn’t prove it, right?”

“Man,” said Finkelstein, “let’s just calm—”

“Right or not?” Meni demanded.

“Okay, fine. Right!” Finkelstein gave in, “I believe in God because I have faith, whatever that is. But I don’t believe in the devil because it’s an invention of religion.”

“But if science proved it—TUT—then you’d believe in it, right?”

“Yes. I guess. I mean, what does it matter?” said Finkelstein.

“Oh, yes is yes. It matters, yes, yes. Because—TUT—it means that if you believe in planets,” Meni raised both hands above his head in a rabbinical gesture as if the sky were about to open up and swallow him whole, “then you must believe in life out there.” The man was on automatic pilot, “And yet, you don’t. Ha! Not sure... That’s illogical!”

In a couple of huge steps Meni leapt back to his console. “Look,” he said pointing at his screen, “this is it.

This is the devil! Science proved it, not religion. Can't you see it?"

Finkelstein stood from his comfortable chair and slowly approached Meni's computer monitor which seemed, at that moment, a mere extension of Meni. They stood there, torsos bent over, staring at the screen. A fifth order Legendre polynomial wiggled its way through a bunch of data points.

"Okay," said Jonathan Finkelstein, "I see here some kind of a fit."

"Not any kind—TUT—" said Meni, "this is the residue of the subtracted pulsar!"

"So you found some periodic signal. It's probably the coffee pot syndrome, remember?"

"Dickweed! Don't you understand?"

Finkelstein had to understand. If he didn't, then no one would. He was bright, objective, respected among his peers and he was lending an open ear only because he was a friend. Meni knew that if he couldn't convince this man, then there'd be little chance anyone else would believe him. At least no scientist would.

"Look," he went on, "what I sub-TUT-racted from the pulsar. It gave me this. And I decomposed it. And—hic—"

Finkelstein brought Meni a paper cone filled with cold water. “Here,” he said.

A fit of hiccups had taken possession of Meni’s body. “Li-hic-sten, the residue is—ahic—order Legendre poly-hic—”

Finkelstein’s face was contorted, “Come again?” he said.

Meni stood up, a terrified expression in his eyes. He spoke a hybrid of hiccups, onomatopoeia and English.

“You... haven’t under-hic-stood what I’ve been saying all this—ahic-TUT! TUT!—time!”

“Just calm down Meni,” Finkelstein pleaded with him, “trust me. Just calm—”

“You’re do-hic-ing it on purpose,” Meni yelled back, “Jerk.”

His face had turned fire-engine red, nearly evaporating a tear that had escaped from the corner of his right eye. He buried his cheeks in the dampness of his sweaty palms. Finkelstein’s warm paw clasped him gently close to his neck.

“You’ll feel better later,” he said.

But Meni knew better.

They left Arecibo the following morning and parted in Miami. Jonathan Finkelstein headed for Canada with a

headache and the rotation period of thirty seven pulsars,  
Meni Mendel for Baltimore with a nervous breakdown.

## CHAPTER 5

All great thinkers are alike. Not because they answer intelligent questions, but because they ask stupid questions.

Sir Arthur Stanley Eddington's first book, *The Internal Constitution of Stars* (Cambridge University Press, 1926), addressed a simple but difficult question: what makes stars shine? He shrewdly noticed that when passing near the Sun the tails of comets invariably blew away from it, whatever their path, even if they traveled away from the Sun. Whirling through space at vertiginous speed, comets look like the Solar System's Formula 1 race cars and their tail a scarf around the neck of the racecar driver. But unlike scarves, comet tails do not blow against the direction of motion. There's no air in space so things like scarves, hair and comet tails aren't blown back whatsoever. What is pushing the tail of comets?

Sunlight, concluded the English scientist. He then proceeded backwards to derive physical properties not of comets but of stars. Surely, thought Eddington, as he tossed a sugar cube in his cup of tea, if the Sun's light can push against the tail of a comet, it can also push against its own

atoms. At the center of the Sun the pressure exerted by sunlight must be quite intense—gulp—maybe large enough to balance gravitational forces.

The day Sir Arthur Stanley Eddington realized this, was the closest an Englishmen had come to an epiphany for nearly two hundred and fifty years. That is, since Sir Isaac Newton got bonked on the head by an apple. Things, however, weren't that easily resolved. The Sun, it seems, is a glutton for energy. To get a sense of this statement, one must compare the amount of light emitted by a regular home light-bulb to that emitted by the Sun, if they were the same size. A light-bulb radiates an anorexic one hundred watts over a five square inch area while over the same surface area the Sun radiates more than two hundred thousand watts. Eddington probably did a similar calculation using a candle instead of a light bulb (slightly dampening his epiphany). The Sun's incredible source of energy was rather confounding to say the least. Maybe pressure by sunlight balanced gravitation, but where did its energy come from?

One theory asserted that the Sun was heated by falling meteors. True enough, meteors do release large amounts of energy upon impact. Furthermore, they are

incessantly bombarding the Sun and therefore heating it. Eddington, however, remained unconvinced. Based on the rate of meteoritic impacts on Earth, he showed their effect on the Sun would be quite insufficient for the purposes of feeding its bad habit of shining all day. Furthermore, had the rate been high enough, the number of meteors crashing into the Sun would have doubled the star's size in less than thirty million years.

It was then postulated that gravitation itself provided stars with the energy to shine. When an object is moved from a table onto the ground, it loses the potential to fall to the ground, also known as gravitational energy. Likewise, when a star contracts by a certain amount, it loses the potential to fall by that amount and so loses some gravitational energy. Some scientists thought this lost energy got converted into sunlight which halted the star from contracting any further. Now this seemed like an interesting possibility if it weren't for the fact that stars were not observed to be shrinking. In fact, according to this model the Sun's maximum lifespan before shriveling into a luminous apricot was less than one hundred million years



whereas geologists were dating Earth rocks in the billions of years<sup>\*</sup>.

The answer rests at the center of stars: it's fusion that provides the energy. At the center of stars, nuclei of hydrogen fuse into helium and shine a burst of high energy starlight which then travels to the surface of the star. Not just travel, it must push its way through the gas filled star. The gas on the other hand is drawn toward the center because of gravity. When the pushing up and the falling down balance out, the gas is in equilibrium. As long as fusion lasts, it prevents the star from collapsing under its own weight.

Still, how can starlight exert pressure when it seems so immaterial? Imagine walking along a beach front when suddenly a gust of wind pushes you forward. Isn't the wind also immaterial and yet strong? What happened was that particles of oxygen, nitrogen and pollution collided against your back and communicated their momentum to you, so you felt pushed. Radiative pressure works in a similar way. The particles of light, called photons, impart their

---

<sup>\*</sup> Radioactive dating suggests the oldest rocks on Earth to be 3.8 billion years old. The same method estimates the age of rock samples retrieved from the Moon to be 4.2 billion years old, and meteorites approximately 4.6 billion years in age.

momentum to the material against which they collide, creating a pressure which balances gravitation.

A star spends most of its life fusing hydrogen into helium and releasing light in the process. It proceeds to fuse helium into carbon and then on to increasingly heavier nuclei. Here are the elements of life locked in a huge, high temperature vault that keeps on fusing as if it were going out of style. Nucleosynthesis, the making of nuclei, is, it seems, the only thing on a star's mind. But the life of a star is not all that simple. Like all of us, it has its ups and downs. That is, when it doesn't do its work right, fusion is low and gravitation gets the upper hand. The ball starts to shrink. As a consequence of this contraction, nuclei bump into each other even more, which stimulates fusion and increases the amount of light released. Radiative pressure rises and in turn over-compensates for gravitation. The star expands. This goes on for most of the star's life. Isn't your life just like that?

LIFE'S A BITCH, THEN YOU SUPERNOVA.

The death of a star is no laughing matter, three main funerary styles are available. The long sneeze goodbye, the

big squeeze, and the black hole. What determines the choice between any of these rituals is the mass of the star.

The long sneeze goodbye. Small stars, better known as low-mass stars, go through a series of pulsation, as was just described. The cycle is repeated again and again until the star runs out of fuel. The inner part of the star collapses instantly into a tight dense ball. The outer part of the star, however, still has some unburned fuel in it and expands into a thin cool shell. It's a bit like when you sneeze, your lungs collapse just as you exhale. The following analogy will shed additional light into this process.

Imagine you're working at a peanut farm storing bags of peanuts. Some bags are large, others small. Your job's to reorder those stored on the second floor of the barn to make room for more. So you go up, grab the bags stacked up front and throw them towards the back. Now, if you throw a small bag a little too far or too hard, it breaks. The seeds are scattered everywhere. But in the middle of your mess is what's left of the bag: a pile of peanuts pressed together from the fall. The compression is strongest at the bottom of the bag.

Likewise, when fusion stops in a low-mass star, the outer shell is smeared around a dense inner core. This core

is a compact size star, called a white dwarf, somewhat like the bottom of the peanut bag. The white dwarf is surrounded by a cloud of debris floating around it. Though it doesn't produce light by fusion, the white dwarf's so hot it's incandescent. And the radiation it emits lights up the surrounding debris into what is called a planetary nebula. But the light from the central white dwarf not only lights up the surrounding shell, it also exerts radiative pressure upon it. In time, it blows it all away, much like a long sneeze.

The big squeeze. Let's say the bag of peanuts is a little larger than previously. Again, you think you're Schwarzenegger and you throw it too damn hard on the floor. Again, the bag rips and spills, but the bottom survives. This time, however, the left-over bag is totally squeezed. The peanut shells are crushed and what's left of the bag looks like a bunch of peanut seeds and shells pressed together like sardines.

Likewise, a large star at the end of its life has little fuel to burn, fusion falters and gravitation overcomes radiative pressure. One way to visualize a high mass star collapsing onto itself is the central part rapidly compressing into an ultra-dense core. This time, however, the efficiency of fuel burning was high and the heavy central core attracts

the rest of the material inward. The material falls into the inner core but bounces off because it's so dense. The star looks like it exploded. This can only happen if the core is squeezed to the max. The explosion is known as a supernova. The crushed peanuts that make up the remaining bag illustrate matter inside the surviving star. Electrons are pressed onto the nuclei like peanut shells onto peanut seeds, and the electrons and the protons combine to make neutrons. The outcome is called a neutron star.

Contrary to common sense, even though it is heavier than a white dwarf, a neutron star is smaller. The original star being heavier, the contraction was stronger, which means it got that much more compressed. Typically, a white dwarf will have a diameter half that of the Moon and weigh a little more than the Sun. Whereas a neutron star will be the size of San Francisco and weigh a couple of Suns. To put things in perspective, a sugar cube of Earth would weigh the equivalent of a nice size cucaracha. A sugar cube of white dwarf would weigh as much as a rhinoceros. And a sugar cube of neutron star would weigh the equivalent of all the whales that inhabited the Earth for the last two thousand years, that should add up to one hundred million tons. These are ball park figures, of course.

Astrophysicists think themselves lucky if they can get an estimate to within two or three times the actual value.

The black hole. This time you really did it. You lifted the heaviest bag of the pile and threw it as far back as you could. That wasn't very smart. Next thing you know, it's gone. You take a few steps toward the spot you thought it should be, and low and behold, there's a hole.

Apparently, the bag went through the wooden planks. Nothing kept the bag from going through the floor, and nothing can stop high-mass stars that are dozens of times the mass of our sun from complete collapse. Remember how space is like a pillow? What makes the pillow dip is not exactly mass but rather density. This is understandable since if you were to uniformly cover an entire pillow with marbles, it wouldn't produce any prominent dip but instead make the pillow thinner. However, if all the marbles were concentrated on one spot, the pillow would sag immediately. In fact, the more packed the marbles, the deeper the trough.

In the case of a black hole, imagine all the mass of the star compressed, not into a compact core or ball, but into a single point in space. The volume is infinitely small, therefore the density is infinitely high, and the trough on

the pillow becomes infinitely deep. It's important to understand that the black hole itself has a finite weight, say twenty solar masses, but its density is infinite. A sugar cube of black hole is inconceivable because the density to calculate its weight is infinite, implying an infinite weight for the cube (while that of the black hole itself remains finite). Welcome to the largest burial ceremony in the universe.

When a star dies, it spills its guts. In speaking of peanut bags, when a bag fell and broke, peanut seeds were scattered onto the floor. Likewise, when a star supernovas and part of it is blown out, newly produced nuclei are disseminated into space. These are the elements produced during a lifetime of fusion: helium, carbon, oxygen, phosphorous. They are not lost but recycled into new generations of stars and planets. At one point, they made their way into our bodies, and at one point our bodies will give them all back. When our solar system dies, and it will, our constituents will take part in new generations of stars, planets, and, who knows, perhaps even alien mailmen. Our bodies are made from fragments of shattered stars. No wonder Narcissus loved himself so much.

## CHAPTER 6

There are two kinds of people. Those that jump out of bed as soon as they awake and those that pull the sheets over their heads. Madonna Petri, literary agent extraordinaire, belonged to the latter more relaxed class. Her boyfriend, to the first.

The mattress sagged under the weight of the six-foot-six rugby player and the woman next to him naturally rolled onto his hairy chest powerless against gravity and the sloping mattress. She slowly opened one eye then the other. Neither eyelid was fully raised when she felt her spine bob up and down, displaced by the tsunami of the man's waking body. Without moving limbs unnecessarily, she reached out for the sheet pushed away by the human tide. She stretched for a brief moment then abandoned her muscles to relaxation. "Aaaah," she let out, rolling on her back and spreading herself diagonally over the springy surface underneath. Her pink nipples poked at her white tee-shirt like two masts at a circus tent. She wondered if would she feel any better if the earthquake that slept next to her left her life like he had just left her bed. This single proposition sobered Madonna from sleep. Not because the



answer was obvious, but because she had been asking herself that same question every morning for the last few months.

She diverted her thoughts to her work. In the other room an Eiffel tower of manuscripts awaited her attention. She sat up and saw the large man sipping from an imposing mug by the bedroom door. On the woman's tee-shirt was written, I love Prague. 'I' and 'Prague' were written out, but 'love' had been replaced by a red heart, which added an extra dimension to the man's discomfort. He felt as though even the inanimate cloth knew of his intimate problems. Madonna loves Prague said the tee-shirt, but she does not love you.

The blond haired woman decided to avoid his pleading eyes and went straight to the kitchen. She poured herself a fresh cup of coffee from her Black & Decker programmable coffee maker then, guessing his presence, said, "Well, what's today got in store for you, Erik?"

"Why," he responded smirking, "love of course!"

Two creases of annoyance burrowed the woman's cheeks. "Well, you're not gonna get it here," she said, and brought her head down, forcing herself to peer into her own coffee mug.

Every morning the same scene. He was crowding her, with his remarks, with his presence. Between seven a.m. and seven p.m. this was her office, not home. It had been agreed that he'd leave during the day. But to do what? The young man lowered his head too, slowly shaking it from side to side as he stared at a single spot on the carpet, a stain. He crushed his lips together then made for the door. Erik left silently like a giant squirrel. Madonna's only thought was, I wish he'd slam it.

As soon as he was gone, the woman snapped into business mode. The phone rang. The voice at the other end of the line was familiar. Too familiar. The voice's name was Augusta Augustina, though the royalty checks were made out to a Nancy Malloy. Her first book, *Do Ants Dream?* sold over forty thousand copies. Not bad for a first timer. The second book, a mix of new age spiritualism and fantasy, told the story of a soul that started out as a crystal then migrated into a prairie dog that happened to lick the crystal, then into a truck driver who ran over the quadruped, then into a mass murderer who killed the trucker while hitch hiking across the country and who was finally caught, electrocuted and cremated, thereby returning the soul to its original mineral state. The book ended with

the crystal wondering whether it had dreamt the whole thing or whether it really happened. The author's call was much less filled with self-doubt, however. She'd been calling non-stop since submitting the final draft of, *A Day In The Life Of A Crystal*. How likely was it to sell? Very. So Madonna grabbed the bull by the horns and decided to remain her agent even though this wasn't really her genre. She had no genre, she was trying to make it. But Augustina, or Malloy, or whoever her soul had chosen to be that week was pushing the envelope.

"No," Madonna was saying, "no takers yet. Be patient, okay?"

Augusta Augustina wasn't satisfied with the answer. "I feel... some negative energy. Something which is impeding the flow."

Madonna remained silent.

"I don't know," Augustina went on, "when I woke up today I knew something was wrong."

"Look," Madonna started patiently, "you've got to give it time. Now, I need to work on my end which includes finding you a publisher. You just finished your book, you're wound up. Go travel, take some down time. By the time you get back, something should be brewing."

“Oh, but you don’t understand,” insisted the spiritual writer, “my work is part of my energy field. I can’t separate myself from it, I’m plugged into it.”

“Well... pull the plug out!” exclaimed Madonna. Nancy couldn’t believe her ears, “Excuse me?”

“Look,” said the agent, “you can’t call here for the next couple of months. The way I’m acting now is for your own benefit. But if you can’t recognize that, then so be it.”

There was a three second respite.

“I’ll wait for your call,” said the soul called Nancy Malloy, “but the magnetism doesn’t feel right.”

Madonna lit a cigarette then gently pulled a large folder labeled A Day In The Life Of A Crystal from a tall pile and wedged it back towards the bottom. Now staring blankly at The Venusian Traitor, she exhaled wearily. Maybe I need a vacation too, she thought, my magnetism hasn’t been all that hot either. She pushed her chair away from her desk and took another drag of her cigarette. Her lips enrobed the filter, gently, firmly, and her cheeks collapsed slightly as she sucked on the thin cylinder.

An electronic buzz startled the woman in mid-inhalation making her gag on the smoke and almost swallow the entire filter part. The downstairs bell continued to ring persistently. Madonna growled. I bet Erik forgot his

keys, she thought, and the doorman was probably indulging in one of his three favorite activities which consisted exclusively of fetching himself a cup of coffee, drinking the coffee, or pissing it. Madonna pressed a button imprinted 'Main Entrance', then unlocked her unit's front door which drifted open a few degrees. As she sat herself down and started concentrating on her work again, a knock at the door surprised her. Erik wasn't supposed to come back to the apartment so early but he didn't have to knock, for God's sake! The young woman squinted towards the entrance.

“Special delivery,” hollered the door.

She jumped out of her seat, “Coming!”

Madonna signed a receipt. The letter was from a Dr. E. E. Manukian, director of some mental institution in upstate New York. Gee, she told herself, they come and find you now!

## CHAPTER 7

Lunatic (loo'ne-tik)—joyfully insane, foolishly giddy, bonkers. 'The crazy professor wasn't insane, merely lunatic.' [from Latin *lunaticus* meaning *from the Moon* (luna).]

It's not every day that a literary agent receives a query from a mental institution. Madonna Petri had just started her own agency, The Literary Pulsar Inc., specializing in science fiction and fantasy. On her business cards she had engraved, representing authors throughout the galaxy. So why not from an insane asylum on Earth?

The young agent took off before sunrise on the Saturday of Labor day week-end. The asylum was located in the Adirondack park in upstate New York, a few hours drive North. Madonna planned to combine business and pleasure by relaxing there after the meeting which, in the back of her mind, she predicted would be an interesting flop. Still, the woman welcomed the break so she could think about her agency, Erik, and who she was or wanted to be.

As the Saturn veered North onto the wet interstate 87, Supertramp's Dreamer started in the background and Madonna began reorganizing her life. She'd stop smoking immediately, stop eating junk, and rearrange the piles of queries which had turned her office into a literary Appalachian trail. Cyberpunk on the left, fantastic erotica on the right, heroic battle cruisers further on the horizon, and in the middle, a valley of self-help manuscripts (to make ends meet). She didn't notice that the light rain had stopped until the windshield wipers started to whine. The cringing tone reminded the young woman of Erik's plaintive voice.

"Give me a break," she cracked back at the wipers and turned them off.

It had been almost five years since that graduation party after Erik's doctoral defense when they both sat amidst the remains of the festivities. She was an associate editor at Lingo Books, he a graduate student in medieval studies. 'Now what?', she'd asked him. Making love was answer enough. It's not like medieval studies is a highly marketable field. For a while he taught history as a substitute teacher, then he drifted like a ghost ship with a broken mast. But now he dragged her down like a lead ball tugging at her ankles. Madonna caught herself smiling at an

unfocused point on the horizon. Hadn't he been there for her too? After all, he was the one who suggested she start her own agency. And for a while, they lived on his meager graduate student salary. Five years is a long time though. How long could she wait for him to get on his feet?

The clouds made way for a merry sun and the agent was buoyed with confidence. She veered off at the first exit and pulled over at the drive-in window of a fast-food restaurant. A sticker bragged in bright colors 100 Billion Burgers and Counting, the equivalent of a thin slice of a sugar cube of neutron star. She pushed on a button and her window descended without a sound.

“Egg MacMuffin and a large coffee. No cream, no sugar. Black like the night.”

“You're our first customer of the day,” said the attendant, “it's our policy to offer our first customer the first dollar off their order. Congratulations! Would you like to try our new MacFee coffee quencher?”

“What's that?” Madonna asked as nonchalantly as she could.

Two sparks illuminated the attendant's eyes, “Made from natural soy bean and corn syrup. Tastes just like coffee!”



“Is it decaffeinated?” she asked.

“Yes ma’am,” responded the joyous voice,  
“naturally sweetened too.”

“Oh no,” she said deviously, “I’ll have the regular coffee then. No cream, no sugar. Black.”

The woman extended some money and grabbed the recycled unbleached paper tray with her breakfast on it. The car naturally glided to the neighboring gas station. In a state of near hypnosis, the young woman circled around her automobile toward the front of the glass booth.

“Pack of Winston, please.”

A young man gave her a stern look. “Are you at least *sixdeen* years of age?” he asked.

“Very nice of you,” she said, “do I look like I’m still in high school?”

“I’m sody,” he responded, “dat’s de law. Do you have identification, please?”

Madonna arched her carefully plucked eyebrows. Her wallet was out anyway.

“Here,” she said smirking, “don’t look at the picture.”

The gas attendant glanced at the old license and returned the ID. “Bery good,” he said, then showed her four fingers, “it’s four dollars please.”

Madonna handed him a fiver, “No discount for your first customer of the day?”

She grabbed her smokes then got back into her car, the man’s voice fading fast behind, “Would you like some gas with dat, madam?” Madonna lit a cigarette, rapidly glancing at the car’s gauge to make sure she didn’t need gas. She’d have to wait for the Egg MacMuffin to cool. That’s how she liked it, cold. Refrigerated was even better, but that wasn’t feasible right then, she was neither at home nor going home. She was going to a nut house. The strange letter that had inspired this crazy journey flashed in her mind.

Dear Madam,

I am writing to you on behalf of Dr. Meni Mendel, a resident at Tupper Lake Estates, a psychiatric center of which I am the director. Our institution, established in 1927, is reputed among the best in the country. None of our patients are severely impaired, but they require personalized therapy which, unlike many centers, we provide.

Dr. Mendel has expressed an interest in having a certain manuscript published. And following the suggestion of his treating psychiatrist, I decided to query your agency on behalf of the patient. Dr. Mendel is a very talented and accomplished astronomer (not astrologer). Last year, he was awarded the Presidential Young Investigator Award for his work on pulsars.

Because of the specifics of the situation, which I mentioned earlier, it would be more practical, and to your advantage, to meet Dr. Mendel personally. Though we could make an exception and have him speak with you over the telephone, I would be grateful if you could take the time to visit us. Naturally, your travel expenses would be reimbursed. I take this opportunity to extend to you an invitation to stay in our guest house. Our property is located in one of the most beautiful parts of the country, the beautiful Adirondacks.

Sincerely,

E. E. Manukian, MD, Director

Tupper Lake Estates and Mental

Care Clinic

The agent steered her car onto the last exit before her final destination. She pulled up at the first coffee joint and went directly into the restroom. From her bag, she pulled a tooth brush with a specially designed head to reach even the most remote corners of her mouth, a sample size anti-bacterial anti-plaque anti-tartar anti-yellowing tooth paste, a cherry colored anti-chapping lipstick, and a simple anti-static hair brush. The blond haired woman examined herself in the bathroom's stained mirror. After gargling for five full seconds she spit a fluoride cocktail into the sink. If cleanliness could taste like something, that'd be it. She applied the lipstick, pressed her upper lip upon the lower, rubbing the two gently, then produced a wide grin exposing her sparkling white teeth. She removed a couple of red marks with a paper towel then made a couple of funny faces at the mirror. Inside her chest, the Marine band drummed an old Yankee beat from the war of Independence. Novelty, she said to herself, stalks me at every turn of my life. Maybe even behind this door...

Giddy (Gid'ee)—frivolous, foolish, lightly insane.  
'Drinking the spirits made her giddy.' [from Old English  
gyd-ig, *possessed by a god.*]

## CHAPTER 8

A prominent sign forged in wrought iron greeted the driver. It curved like a rainbow above the entrance and read, THE TUPPER LAKE ESTATES, surmounted by a smaller sign, WELCOME TO. Thank you, thought the driver. She drove into the property through an earthen alleyway. The well maintained dirt road sectioned a lush and sparsely wooded expanse into two, like a part on a choir boy's head. Wise oak trees dotted the lawn. Autumn had already set some of their leaves on fire. By the end of the season the red tint would consume their entire bodies and then, they would fall.

Madonna drove up the road oblivious to the human reality behind the gates, enchanted by the fresh air, the harmonious colors and the gentle sounds that surrounded her car. A few people could be seen strolling calmly, while others leaned against trees reading peacefully, and still others had set up their easels and were painting images of nature. One could hardly have guessed this was anything but the garden of Eden. She noticed a few bungalows dispersed through the park and finally a large mansion appeared at the end of the road.

From his second floor office window, Dr. Holland Floor eyed the two shapely legs emerging from the gold colored Saturn. The woman came out of the car breathing the air as if it were for the first time, her eyes were shut and a smile was drawn upon her lips. She paused and looked around contemplatively, stretching her torso, exhibiting her fine body to the hidden psychiatrist. As she reached back into her car, he squinted his eyes and bent his knees a little in an effort to peer an extra few inches up the woman's dressy gray suit. Overwhelmed with glee, the man rushed down the stairs to welcome the visitor. He arrived just as she extended her hand to the receptionist. Holland Floor walked up to them and without a word interrupted their hello's. His excitement was so blatantly sexual, he embarrassed the receptionist. But the newly arrived woman was still under nature's charm and expecting a cuckoo house she thought it was only normal that this man should act a little crazy.

"You must be Dr. Manukian," she said, extending her hand to him.

"Not at all," he responded, his eyes widening enough to swallow her whole. "I'm Dr. Floor. Holland Floor. And you are?"

The woman's hand was left hanging in thin air.

“Madonna Petri, I'm here to see Dr. Manukian. Do you know where can I find him?”

She let her hand down but the man caught it in mid-fall and shook it vigorously. His voice seemed to rise from a crushed larynx, as if his vocal cavity were too small to allow each sound to fully expand.

“Welcome to Tupper Lake Estates!” he said nervously. “You mean her,” he added.

“Well?” she asked.

The man continued to hold the agent's hand.

“Find her,” he said. “Dr. Manukian is a female Homo sapiens you see.”

The signature on the query letter, E. E. Manukian, flashed in Madonna's mind along with a few attempts at matching the initials. Eva, Enya, Eleonora, Esmeralda.

“I see,” she said, forcibly removing her fingers from the man's clamp, “so where can I find her?” she asked, her patience a tidy bit thinner.

“Follow me,” the man responded and darted across the hall toward a wide stairway.

Holland Floor was a tall thin man with a bird-like face. His head was as bald as the surface of the Moon with a Saturnian ring of light brown hair orbiting the top half.



The man's long legs easily grabbed two steps at a time, and Madonna had to run just to keep up with him. Floor came to rest in the middle of a small circular hallway around which congregated four rooms. He pointed to the right-hand most chamber which was contiguous to the stairs. Its doorless frame showed wall-to-wall cedar bookshelves filled with leather bound volumes.

"Library," Floor stated like a zoologist describing a specimen.

Madonna nodded imperceptibly.

The psychiatrist pivoted his rigid body, his arm at ninety degrees to his trunk, index finger fully extended.

"Interviewing office," he went on. "Couch, arm-chair, table, video-cam, small garbage."

He proceeded counter-clockwise, each time rotating himself with Swiss precision, his arm long and straight as an arrow as if it were the minute hand on a cuckoo clock. He paused at the third door, skipped it without a word, and continued to the last left-most door.

"My office," he said, his arm still defying gravity. The psychiatrist wiggled his eye-brows up and down a couple of times then pivoted back to the mysterious third door.

“This,” he said emphatically, “is Dr. Manukian’s office.” His tone turned border-line moronic, “let’s see if she’s in.”

Madonna stood like a guest on Sesame Street, somewhat wary of whom she was going to meet next. The man unwound from his Swiss clock impersonation and knocked exactly twice on the large wooden door. A feminine voice responded with a long and dragged out yes. The man cracked the door and popped his head in. He brought it back out almost immediately.

“Miss, Missus or Doctor?” he asked cockeyed.

“Mizz Petri,” responded the agent.

She heard him whisper something back into the room then saw him reappear.

“Doctor Manukian will see you,” he announced.

Beneath a white lab coat, a well dressed woman came forward with her hand outstretched.

“Thank you for coming,” she said, “I’m Dr. Manukian.”

Madonna was instantly surprised by the director’s appearance and manners. She was a self-confident woman in her early forties, and seemed surprisingly normal.

“Please have a seat,” she said, pointing to an empty chair in front of her desk.

“Madonna Petri,” the agent declared matter-of-fact. She sat in the chair as the other woman returned to her own seat.

“Yes, I know,” she said over a faint smirk. “I see you’ve met Dr. Floor.”

“Actually,” Madonna replied, “he met me.”

The other woman smiled, “Dr. Floor is a bit overanxious when new visitors arrive.” Her face now took on a more serious expression, “But he is a brilliant and dedicated doctor. As you can see we are a small operation so devotion to the patient is essential.”

Madonna nodded, “You weren’t kidding in your letter about the location. It’s gorgeous around here. One would barely think—” She cut herself short and blushed.

“Thank you,” continued the director, “we do pride ourselves on having one of the most beautiful funny farms in the nation.”

A faint smile appeared on the agent’s thin lips.

“All our patients,” Dr. Manukian went on, “are functional and none are violent. We try to provide them with a stress-free environment while empowering them with responsibilities regarding their day-to-day lives. We

feel this allows us to focus on their condition without making it a focus.”

“When can I meet the author?” inquired Madonna in a matter-of-fact intonation.

The director pressed a button on her telephone, a muffled voice responded through the intercom.

“Yes?” it asked.

The director bent slightly into the intercom, “Hi, could you come over for a moment?”

“Be right there,” the voice answered.

“I thought we should have a little briefing about the patient beforehand,” she gestured gently at Madonna, “nothing much. Just an information session.”

They waited in silence for a brief instant.

“This is a special place, isn’t it?” Madonna asked the director.

“In a way,” the other woman answered. “For one thing, we’re not here to cure anyone. All our patients come here fully diagnosed. We know what they have and they know what they have.”

“So, what do you do then?” inquired the agent.

“We teach mind management,” declared Manukian. She stood up from behind her desk and peeked through the window. “We like to think of ourselves as mental

managers. Typically, patients come here with exacerbation of anxiety, mania, depression. We believe that a lot of these cases could be controlled if the patients filed their emotions under the correct headings in their mind and that's what we help them achieve, or try to achieve."

The door swung wide with Holland Floor hanging from the doorknob.

"Ms. Petri is the literary agent," the director told him.

He nodded. Madonna rolled her eyes.

The director turned back toward her, "Dr. Floor is Meni Mendel's treating psychiatrist."

Floor silently made his way behind a chair next to the agent's but did not sit.

She continued, "We practice both classical psychoanalysis and a behaviorist approach. For the most part, our patients are on some type of medication. Practically speaking, we spend a great deal of energy assessing the right drug therapy for them, if it is right for them. With psychoanalysis, we determine whether the drugs help them regain control and be more like themselves or whether it creates a new individual, and whether that's good or bad.

“A lot of effort is invested in identifying an activity that enables them to channel their emotions in a thoughtful manner, such as painting, reading, writing, or what have you. The goal is to stimulate self-analysis, even if indirectly.”

“Kind of like in a retreat,” Madonna ventured.

“More like a supportive community,” Floor interjected, “patients at Tupper Estates are not passive subjects, they learn to involve themselves in simple but psychologically fulfilling activities.”

“It’s all part of healing,” added the director.

“What about Mr. Mendel,” asked Madonna, “why is he here?”

## CHAPTER 9

It's been said that the first few seconds of an encounter can determine an entire relationship. Some believe it's about sensing pheromones or establishing dominance, others say it's a question of astrological compatibility, and others yet that it's a déjà vu between souls that have met in previous lives. More pragmatic minds think it just doesn't take that long to judge someone; style of speech, length of fingernails, type of shoes. Whatever it may be, it is an uncontested truth that most people hit it off or hate each other within ten seconds of meeting.

In the case of Madonna Petri and Meni Mendel, one might suggest an unusual set of circumstances brought them together at a special point in their life and that thereafter fate took over. Then again, you may not believe in fate.

Madonna found the astronomer sitting in the garden not far from the mansion, an empty chair by his side.

“Hi,” said the woman, “I'm Madonna Petri. You must be Meni Mendel.”

“Cute!” he exclaimed, “Glad you came.”

Madonna disregarded the man’s comment, “I believe Dr. Manukian and Dr. Floor told you a little about me,” she said instead.

“Yes, yes,” he answered, signaling her to sit, “TUT—and they must have told you a lot about me, right?”

“Sketchy,” responded the agent. She settled into the white plastic garden chair next to the astronomer like a white cat on a pillow. She said, “I can’t even check the oil in my car so you can imagine neurology.”

Meni Mendel grinned back. They both sat quietly peering at each other with curiosity, separated only by a small folding table surmounted by a thermos and two glasses. On the grass underneath the man’s chair the agent had already spotted a thick manuscript laid in an empty box of Old El Paso bean and cheese burritos.

“It’s no big deal,” he interrupted the silence, “thousands of people suffer from the same condition.”

Madonna nodded, “Uh-Huh.”

“Gilles de la Tourette,” stated the man, carefully repositioning his glasses.

“Good movie,” she said.



“Cute!” said Meni. “That’s Jean de Florette—I’m talking about Gilles de la Tourette, a physician whose name coined my condition.”

The agent bit her lower lip, “I’m such a moron.”

“You’re right,” nodded Meni.

The woman’s eyebrows shot up in disbelief.

“Good movie though!” he exclaimed.

She let out a laughter.

“Lemonade?” he inquired.

“Love some,” she grabbed a glass while the astronomer unscrewed the top of the thermos.

As he poured the lemonade, Meni spoke into the containers. “My condition is called Tourette’s syndrome,” he said speaking into her styrofoam cup. “I’m—” a short grimace interrupted his speech, bobbing his glasses up and down his nose, “I’m an astrophysicist and I still can’t understand neurology. All I know is what it does to me.”

“Like that?” she couldn’t help asking.

“Cute! Yes,” he went on, now speaking into his own cup, “tics are one thing. Some of us tend to make distinct noises as well. Almost like a verbal imprint. This guy I know, he lets out something of a cross between a sneeze and the hissing of a snake—TCHHH!—and this

buddy of mine from the support group sounds like a soda can being cracked open every five minutes—POP! POP!”

The man took a sip of lemonade and caught his breath, “I personally don’t indulge in any of these verbal regurgitations, though I do take to honking my horn once in a while—TUT!”

The agent was so engrossed in the man’s explanation, she hadn’t noticed one of his hands on top of her shoulder, like a parrot, gently but persistently pecking at her collar.

“Just music,” continued Meni, not really aware of his fingers tap-dancing on the woman, “the real problem comes with the compulsive mannerisms and uncontrollable bursts of obscenities—TUT—Echolalia for example, when a word is repeated again and again. Have you counted how many times I’ve called you cute already? I might end up repeating this word a hundred times before my subconscious decides to go on to something more juicy. And there’s coprolalia. Compulsive, obscene phrases,” Meni’s fingers flew off the woman and landed on his glasses, “not everybody who suffers from Tourette’s exhibits these symptoms—in fact, most don’t—they come in varying degrees. Cute! I guess I’m somewhere up there.

By the way, I'd like to apologize in advance for all the stuff I'll be saying."

"What for?" she replied embarrassed, "don't worry about it."

The astronomer readjusted the rim of his glasses with respect to the horizon, "TUT!" he let out again, "It's weird, you know, even for me. It's as if the playpen withholding my inhibitions is suddenly unlocked and my most bawdy opinions are let loose. Like I'd meet this guy for the first time and start commenting on his acne, or shout 'hooties!' at a lady with large breasts—I hope I'm not offending you..."

Madonna blushed, "No, no."

"Good," he said, "I just happen, once in a while to vocalize what everyone's thinking all the while—TUT!"

"Well," she said, "at least you're honest."

"Cute!"

"Anyway," said the agent, adopting a businesslike intonation, "I was told you have a manuscript for me."

"Correct," he replied.

"Why don't you give me a brief synopsis," she asked gently, reaching forward deep into her purse. She took out a notepad, a blue ink Bic, and sat at attention.

The astronomer rocked his body a couple of times.

“It’s somewhat of an autobiography...” he said rather awkwardly. “That is,” one of his hands mimicked a wavy horizontal, “more or less.”

Madonna laid her pen down, “You do know I only take on science fiction and fantasy novels, right?”

“Oh yes,” Meni responded, his index and middle fingers now massaged his temples on either side of his head, “but this one, this one is a true science fiction story—TUT! Like the autobiography of a planet.”

Madonna grabbed her pen, “Go on.”

When concentrating, Meni’s hands often joined in prayer right under his nose, fingertips pulling on the skin dividing his nostrils.

“This planet actually exists,” he began saying, then corrected himself, “but don’t mind that. Forget I even said it—TUT—What’s important is the manuscript. Think of it as an inter-planetary history book. The struggle of one man, well a Kulturan really, trying to make up for a deadly mistake. Sexy! One that is bringing his people to the brink of extinction. But really, the planet is alive too. And so it’s also the tale of the planet, how it struggles to survive.”

“Interesting,” she said for lack of anything better to say, “does he save the day?”

“The day?” Meni asked surprised, “funny you should ask that. They can’t survive without it.”

“Really?”

The bean and cheese burrito box landed on her lap.

“Read,” said the astronomer, “and you’ll understand.”

# CHAPTER 10

## EMPIRE OF THE SEVEN SUNS

decoded by Meni Mendel

*All of this is true, kind of.*

The seventh sun rose slowly, illuminating the permafog covering the surface of Kultura, a lonely planetoid orbiting the second of seven suns in the system. The third and first suns had just sunk beneath the skyline, creating an aura of blood where they had plunged out of sight, like ripples on a pond surrounding a few sinking stones. Following their path, the sixth and last sun up descended into the exploding horizon while the seventh sun ascended in the opposite direction. It rose at a right angle with the skyline, straight up into the air, defying the course of the other stars in the sky. Every day, it climbed further, imperceptible in its progress, undeniable in its divergence.

Sitting on the edge of an old forbidden walkway, Kee admired the glorification of everlight, light's eternal presence. Goose bumps covered his epidermis and confusion teased his neurocells.

“How can such beauty come from such discordance?” he pondered.

The answer, as he and everyone else on Kultura had been taught, was a cocktail of partial differential equations and philosophical assumptions. When all bodies of light seemed to have nearly disappeared beneath the hills, there came the seventh sun. That it moved counter-clockwise, opposite to the other six, was seen as another expression of the grand design of everlight, of the grand scheme of things. It implied certainty that the planet would always be bathed in light, that at least one sun would sit above the horizon at all times. Faith dictated the orbits, and gravitation nurtured faith. This symbiosis, this marriage between symbolism and astrophysics, filled awareness with a measure of meaning like thought fills brain, with substance, which Kee perceived as beauty.

For a moment, a wine tinted gradient covered the overhanging hemisphere, then the sky turned progressively more uniform in color, approaching a fluorescent cardinal red.

“Quick,” Kee thought to himself, “I’d better get back before the second rise.”

He picked himself up, still pondering on the discordant sun, and headed back to the biosphere. He walked briskly on the thin bridge, but the second sun outpaced him. It rose directly behind the outline of his destination, as if it knew where to point him to, and turned the sky to rust, decisively making him late. The frail walkway merged with a wider bridge which led to yet another. Seen from above, they formed a network resembling a root system symmetrically arranged about a circular hub. A side view would have revealed a ball cut at its lower third by a thin line above which Kulturans could be seen walking, while underneath five thick stilts kept the entire structure high above the thick smog. The peripheral pathways, where Kee had been, were plainly exposed to the outdoors and were therefore forbidden. The rest lay under glass. All led to a



central geodesic dome. With its clear glass polygons, it looked like an oversized crystal diamond in the middle of a water lily.

The Kulturan arrived at the fifth interface and zigzagged through the moss lined walls of the filter chamber, soft leafy plants rubbing against his fine body from head to toe. He stopped only once to assess the damage on a few growths. Several of the leaves were clearly infected, fungal spores covered the leaves and stems. He plucked one of the infected leaves and stuffed it in his right pocket, then gathered a bunch that appeared intact. He stuffed those into his left pocket. He proceeded toward his meeting and, before he knew it, found himself facing the door of the board room.

The speaker interrupted herself as soon as the Kulturan entered.

“The sky is orange,” she told him reproachfully.

Kee quickly sat down. His smooth skin turned to a deeper shade of blue, and he bit his lower lip lightly.

“Sorry,” he said, thinking that would settle the matter.

The speaker stared at him. Albeit silent, her intimidating eyes screamed disapproval. Never mind, she told herself, I’ll talk to him later. “Alya, report.”

A young and chubby Kulturan rose from her seat.

“Three births,” declared the fertility supervisor. She looked straight into the board director’s eyes, “all three deformed,” she added, and sunk back into her seat.

There was a small commotion, a brouhaha, a shaking of heads.

“How many scheduled for next month?” Maya asked. The pertinence of her question alone restored silence and order to the meeting.

“Two,” Alya replied.

The speaker took mental note of it and turned to the Kulturan sitting across from the cherub.

“Kalyan, report.”

A plump dark blue Kulturan stood. He kept the tip of his trembling fingers touching the table at all times.

“I have good news,” Kalyan said, trying to smile. “The permafog hasn’t increased for several rises in a row,” he paused for an instant but no one seemed overjoyed, “well, it ought to be good news for the new moms!” he glanced toward Alya, then went on, “Furthermore, all toxins are at an all time low in the water distribution tanks, the soil, and in the air supply. That is, except for some abnormal peaks in the fifth zone.”

He looked around the table, searching for a friendly smile, but found none. Finally, he caught Maya’s warm eyes.

“Are these peaks statistically significant?” she asked.

“Two point five sigma,” he replied, “looks like a fluctuation but—”

“Thank you architect,” she told him reassuringly.

It was as if her voice pushed him back into his chair.

“Kee,” she uttered authoritatively, “report.”

“Same,” he responded nonchalantly. He didn’t mean to defy her, but why waste anyone’s time? They all knew where they stood: survival. Just do what you can and hope for the best.

The speaker squinted her eyes. She was younger than him, yet more mature. Was that the problem, she wondered.

“Would you mind refreshing our neurocells?” she asked him.

Kee stood up. His chiseled blue cheeks and chin clashed against his thick lips and sunken brown eyes. He turned to Maya. Staring at her, he was keenly aware that he saw not just the speaker of the board but a neighboring piece in the puzzle of life, one that might fit right next to him. He smiled coyly at her question.

“First,” he began in a confident tone, “a small organism is attacking the fifth bio-filter interface. Worms doubtful. Retro-fungus, very probable. Second—”

“Wait, wait, wait,” Maya interjected, “One problem at a time. Kalyan just reported abnormal peaks of toxins in the same zone.

“Now I remember. Last meeting you mentioned there were abnormal lesions on this bio-filter. Are you telling me this has turned into a full blown infection? What’s the damage so far? Should we expect this to spread to the other interfaces as well?”

The Kulturan’s keen mind took Kee by surprise. He raised his left eyebrow and tried to concentrate. What was it she had that made him lose his composure? He removed a leaf from each pocket and laid them side by side on the table. One leaf showed a perfect complexion, the other was covered with fungal spores.

“That’s the damage,” he declared, “is it gonna spread?” Kee pressed his shoulders up and arched his lips downward, “Can’t say.”

Kalyan leaned over the table and inspected the damaged leaf with his unsteady hands. “Huh,” he snorted, as if to himself, “if it got to one bio-filter, there’s no reason the others won’t get infected as well.”

Maya produced a grimace, “What do you mean?”

“Well,” he said, “the bio-filters function independently. That is, there’s no risk of contagion. But although they are isolated from each other, they all are exposed to the same surroundings, outside air that is. The only way the fifth chamber could have become infected is from airborne organisms. And so there’s no reason to believe the other filters won’t be exposed to the same agents.”

Maya turned to Kee and the rebel’s naked beauty struck her. “Kee,” she asked, “you’re the bio-engineer, what’s the course of action?” She watched him intensely.

“There is none,” he responded.

## CHAPTER 11

Meni Mendel gulped another cup of icy lemonade. As the liquid traveled through the astronomer's windy esophagus, a cooling sensation propagated down his throat, past his chest, all the way into his stomach.

"Aaaah!" he exclaimed. A red bird sporting a black Zorro-like mask landed in the grass a few feet from the astronomer's white plastic garden chair. Meni followed the bird's flight path.

He said, "Isn't this place gorgeous?"

"Sure is," said the literary agent.

It's a wonder what a few instants of peace and quiet in the woods can bring. Madonna hadn't felt this relaxed since... Well, she couldn't recall.

The man next to her tilted his head slightly, "How long you staying?"

She stared dreamily at the bird hopping about, "Oh, till tomorrow. I've got to leave this mental institute so I can embrace the insanity of New York."

"Tweet-tweet," went the red bird.

"TUT! TUT!" followed the astronomer.

The woman smiled coyly and looked at him from the corner of her eyes, “What if I turned the question around,” she said, raising her left eyebrow, “how long will you be staying here?”

Meni Mendel brought his right arm across his chest and pointed to the left at the second floor of the estate’s mansion, a couple hundred feet from where they sat. “Why don’t you ask him?”

Madonna twisted her body and followed the astronomer’s index finger. She did it just in time to catch a silhouette retreating from a semi-hidden position behind French lace curtains. The material was still swaying when Holland Floor appeared at the window and waved at them, feigning he had just arrived. Seeing him, Meni felt an overwhelming need to voice one of his favorite onomatopoeias. A cheery version of the world’s most famous train’s whistle which, as a boy, he’d heard in a movie. He had forgotten where his taste for whistling had come from, but his brain hadn’t.

He was a kid in a large movie theater, hypnotized by the breath of the silver screen, swallowed as he was by a chair larger than his own mother, and watching an impressive locomotive release a cloud of steam. Suddenly the machine ripped the screen with a penetrating shriek that



lifted the boy high above the audience. “Hee-heeeee!” went the steam engine. “Hee-heeeee!” echoed the boy. And as if by command the title appeared in empirically huge white letters, *Murder on the Orient Express*. Ironically, the owners of the real *Orient Express* never allowed the film producers to get anywhere near the original train for fear the movie might sully its fine reputation. And so, it was an engine from the Chesapeake and Ohio Railroad Line that provided them with the immortalized piercing sound, while the real locomotive lay buried in a junkyard outside Istanbul.

“Hee-heeeee!” Meni hollered, “Caught you red-handed, didn’t I, Holland?”

Madonna squinted at the window, “What’s with this guy, staring at us from behind drawn curtains?”

The astronomer gyrated back toward her, his eyes wider and darker than a pair of newly born black holes.

“Why—TUT—Dr. Floor’s a spy,” he said, “a spy in the house of ego.”

The woman frowned at the window.

“Cute!” Meni Mendel exclaimed. “Here, have some more lemonade.”

The wrinkles on the woman’s forehead subsided in proportion to the amount of liquid that entered her house of

intestines. Unbeknownst to her, the radio-astronomer had spiked the juice with a measure of his favorite liquor, Agua de Loco, manufactured in Chili and exported under the trade name, Bedlam Genie. On the label underneath the logo the American distributor claimed, ‘If it doesn’t make you go crazy, then you must already be nuts!’

“Okay,” she said, “what else can you tell me about your manuscript?”

Meni Mendel gulped another mouthful. “I didn’t write it,” he declared.

The agent laid her cup down. “What do you mean, you didn’t write it?”

At the time of mixing, the astronomer lost count of the number of shots he’d poured in the thermos and decided to lean on the liberal side of things. His head felt like a slowly rotating pulsar. He took another sip of the mix.

“Alien wrote it,” he claimed flatly, “I deciphered it.”

Things started to take shape in the woman’s mind, either this man was crazy or he was honest.

“You mean,” she ventured a guess, “an illegal alien wrote it, and you translated it into English.”

Meni shook his head from left to right, “Mmm-Mmm. Space alien wrote it. Yours truly received it, and deciphered it for everyone’s benefit.”

She finished her cup, “Didn’t know the US Post Office was so far reaching.”

He smiled, “Cute! More like a letter in a bottle though.” He checked the thermos but it was empty. “An electromagnetic bottle,” he continued, “—TUT—which I opened.”

Her eyes widened, “And?”

“There was a story in it,” he declared, gently tapping his heels against the Old El Paso box.

Madonna drew a smile of amusement and disbelief, “Really?”

“Look,” he said, “I didn’t believe in aliens either—Babe! Babe!—but there’s evidence.”

She slanted her head, “What kind of evidence?”

The astronomer checked his glasses were still on his nose, “You know what a pulsar is?”

“No,” she said, a little embarrassed.

Meni took a deep breath then exhaled, “Pulsars are the big mouths of outer-space.”

He raised his right hand signaling a pause and brought the styrofoam cup to his lips, tilting it steeply, trying to use gravity to extract one last drop of Agua de Loco. Failing that, he turned the container upside down on his lap and drove his index finger through the bottom of the cup. A popping sound echoed in the cavity followed by a plaintive styro-moan as he slowly removed his finger from the newly poked hole.

Madonna pressed her shoulders together, “Ooooh, that must hurt.”

“Not really,” he responded.

“Not talking to you,” she said, “talking to the cup.”

The woman smiled and waited for the man’s laughter or at least his staple utterance, but he was busy peering into his new toy.

“Look,” he finally said, “look at the Sun.”

She squinted her eyes toward the celestial body, “You want me to go blind? I won’t be able to read your manuscript.”

Meni Mendel stood up and interposed the cup between woman and Sun, placing the perforated bottom facing her. He slid the container along an invisible axis joining the two, drifting closer to the Sun until her face was

completely shaded. It was as if he'd poured all the sunlight straight into the styrofoam cup.

“A pulsar,” the radio-astronomer said, “is what’s left of a star after it’s gone supernova. It’s a super-dense object, called a neutron star, rotating rather fast with a magnetic field funneling energy out.”

“Funneling?”

“Look,” said Meni, he pointed with his other hand at the hole in the styrofoam, “See here? There’s a beam of light coming out this hole, right?”

A thin ray filtered through the bottom of the cup.

“Right,” she echoed.

He went on, “Instead of a cup, a pulsar utilizes magnetic fields to focus its energy outward. Pay attention—”

The man slowly rotated the cup with his wrist, careful to keep the woman’s face shaded from the sun. The beam of light trickling through the hole began to move, illuminating in turn her left arm, then her chest, then her right arm. The scientist continued his explanation.

“See what happens when it rotates?”

“Blinds the heck out of me,” she said.

“But just for an instant. Like a lighthouse, right?”

She nodded, “Like a lighthouse.”

He removed his hand and the clarity of the sun suddenly hit her. The man sat down.

“That’s it,” he said, like a dentist after a simple procedure, “—TUT! TUT!—You have been a witness to the universe’s first styrofoam pulsar. In reality, we use radio telescopes to detect the beam coming from a pulsar. The time interval between each pulse measures how fast the neutron star’s rotating.”

“Thanks,” she said, “that was rather painless. Now, how about our alien literati?”

The man jumped out of his chair, cup in hand, and returned to his previous location. He angled the cup just so, and the ray landed on her bellybutton. Madonna looked down, chin tucked in, at the spot on her blouse. Suddenly, it started to blink. Three short blinks then three long ones.

“S.O.S.!” she shouted.

Looking up, she saw the radio-astronomer’s index finger alternately obstructing and clearing the hole in the styrofoam cup. He repeated the series then raised his head.

“Get it?” he said.

“Morse code for S.O.S.” she repeated.

“Yes!” he shouted, throwing the cup up in the air.

She was aghast, “The aliens sent you a message in Morse code?”

“No!” he said, “Shmuck!”

The woman blushed.

“I’m sorry,” said Meni.

“It’s okay,” she tried reassuring him, “you already apologized for everything you were going to say, remember?”

“Can’t help it,” the man confessed.

He sat down and Madonna laid a soothing hand on his. “Frustrating, isn’t it?” she said.

Meni Mendel held his mouth open for a moment but someone else’s voice seemed to escape from it.

“Greetings,” said Holland Floor.

## CHAPTER 12

To survive the toxic fog which enrobed Kultura, five bio-filters interfaced the bio-dome with the outside air, acting like a quintuplet of lungs. Bio-filters were Kee's invention, live organisms with metabolisms that used light to break the air down into two components, one toxic, the other (mostly) nontoxic. The filters' lining absorbed the toxins for nutrition and exhaled the rest, regaling the compound with clean air. As a result, a low shushing sound permeated the geodesic village, as if it were breathing. Since there were no seasons on Kultura, there was no need to worry about variations in the linings' rate of growth.

In effect, every inch of the planetoid's surface was heated by the seven surrounding suns, so the temperature was rather uniformly distributed over the entire globe at all times. That is to say, at any time but during a conjunction, when several suns congregated in one region of the sky tilting the thermal balance and triggering furious winds. The



planet then looked like a delirious ocean of permafog.

But this hadn't always been so. At one time, there was no toxic fog. At one time, there were five villages on the planetoid. Most of the land was used for mining, but natural resources were dwindling fast while pollution and waste seemed only to increase. A small group of Kulturans protested against the spoiling of the planet. The most vocal of the protesters, Maya had been elected to the high council to represent the opposition. She was especially opposed to the use of geological strata for toxic dumping. By-products of Kulturans civilization were being vitrified, turned into glass-like state, then enclosed into cylinders and deposited deep underground. The vitrification was to avoid leakage, the strata were to provide a stable environment for a long long time. How long? To some extent, this was at the heart of the debate. This is how it went.

“The five villages must come to terms,” declared Maya, her hands and eyes a passionate

pair, “our only ocean spoiled, now we turn to our soil for waste disposal, what’s next?”

The assembly stirred.

An older member stood, “We cannot be held hostage to our future. We have a right to do what’s best for us now!”

Behind them, a thousand bitter roses spread over a neighboring field, covering it so much, the soil seemed to have turned black. The bitter rose is a dampened translation for the name of a black flower whose beauty was matched only by the irony of its cycle. Its dark burgeons would bloom a few rises before a conjunction swept the planet. The blossoming was timid, as the flower and its petals awaited the onset of the storm to leave their sheath, while Kulturans sought protection in theirs. Reaching their apogee at the height of the tempest, the roses were quickly obliterated by the windstorm’s irresistible force. Scattered all over, the seeds of the bitter rose would await the next calamity to come to life. The adjective bitter is then to be understood in consideration of the flower’s immense beauty, in contrast to the cataclysmic omen it carried and the population’s inability to

observe it at full bloom. Nevertheless, it was the flower's foretelling quality that saved Kulturans from extinction as, at first, they did not know how to predict the coming of a conjunction except for the rose's kind warning. Had it not been for the flower, they wouldn't have known to protect their provisions, and would surely have perished.

"Our people have a long trip ahead," Maya continued, "why give them luggage they can open only under penalty of death? Why keep depositing lethal cylinder after lethal cylinder into the bowels of our planet?" She surveyed the crowd for a friendly face.

On her far right, the head of the council slowly stood. A stern Kulturans, he exhibited almost no facial expression and this served him well. Unemotional even under intense questioning from his colleagues, secretive especially on matters that affected everyone. He was as pragmatic as he was intelligent. The lighting split his face in half.

"Passion and patience," he declared, "Passion, one cannot help to express, but patience is the art of helping to express. And I ask you for patience." As he spoke, he turned his head from

side to side, switching from light to shade. Facing left he appeared his natural blue, facing right he turned red from the suns' reflections. "Soon, a new power complex will bring energy to all five villages. It will require no mining and produce no waste." Next to him sat an unknown Kulturan. "But you don't have to believe me. I brought with me the scientist leading this project," he motioned him to stand.

The scientist was Kee's father. A reasonable Kulturan, he strongly supported the resolution of problems through technology. Ironically, his son would later follow in his father's footsteps not to emulate him, but to undo his deeds.

"Hydra," said Kee's father, "is a new way to provide energy. It is so powerful, the villages will use only a fraction of it and still satisfy their needs. And its energy will be sufficient to ionize and filter all the water of the central sea and bring to our children the purity our ancestors enjoyed. Hydra requires no mining and produces no waste."

A round of applause drowned the room. Members shook hands, congratulated each other, hailed the speaker. In the middle of the carnival,

Maya stood motionless, as if frozen. Surely this thing, hydra, was better than mining, and apparently it produced no waste! She was flabbergasted, dumbfounded with happiness and suspicion. Had someone inadvertently bumped into her, she would have shattered like a glass figurine.

Everyone thought hydra would change everything. It would provide energy from thin air, clean up the central sea, open a new era of prosperity, everything would change with hydra. And everything did. At the head of the project, Kee's father reigned like a newly crowned prince. Seemingly harmless, hydra gathered power from something as elusive as ether and redistributed it to the villages. A complex network of vines and roots crisscrossed the planet beneath its surface, transporting energy instead of sap. At its core, a unicellular organism believed to be the oldest on the planet converted nothingness into something useful. The princely bio-physicist and his crew had discovered the organism during a magnetic survey of the planet. And though they had no idea how it

generated energy, they had an inkling what to do with it: a power plant.

Within one rise of its inception, however, vapors started sifting up through the soil surrounding hydra. Thin at first, they seemed utterly harmless. But by the time the second sun reached its climax, the emanations had become more pervasive and the fog more dense. And so, shortly after the third dawn, it was decided that the project would be shut down temporarily. But the whole complex was already enrobed in fog, and of the scientists that entered the underground chamber where hydra lay, none returned, including its prominent creator. The rest makes up the sad history of Kultura. As the permafog spread, life died, gangrene on a planetary scale. Of the five villages that dotted the planet, four were completely eradicated almost instantly. The fifth, sitting high on the hills of Kultura was granted a stay of execution, its desperate inhabitants watching the diaphanous fluid roll up to greet them with its lethal smile.

During the respite, however, seven Kulturans in the surviving village were picked among the brightest and most talented to be the

architects of the future. They had a preposterous idea. A notion so deceptively simple even the most imaginative mind would have found it ridiculous and unreal. They wanted to crank their village high into the air hundreds of feet above the fog and shelter it with a glass honeycomb from the armies of invisible toxins percolating up. The architects, as they came to be called, were entrusted with this specific mandate and no choice but to succeed.

## CHAPTER 14

The psychiatrist was out of the box. He had been spying from behind curtains watching from his office window his patient chatting with this beautiful mermaid who had somehow parachuted into his lonely existence and he could bare it no longer. He crossed the English garden in great hurried steps and came to rest beside the literary agent. He was all smiles, a dog clasping a bone.

“Greetings!” he barked, oblivious to Meni who was in the middle of a sentence. “Why, you two are talking up a storm!”

Madonna felt a lukewarm sensation make its way up her thigh as Floor was now gawking at her legs. She pulled her dress over her knees.

Meni twisted in his seat, “So Holland, how’s the view from your window?”

A red tint flooded the psychiatrist’s cheeks, “Splendid day, isn’t it?”

The woman stared straight into the horizon, “Splendid.”



Holland Floor looked like one broad grin on legs. He was cogitating rather hard about potential topics of conversation.

“TUT! TUT!” Meni’s singing shook the psychiatrist out of his trance.

Floor cleared his throat, “Uh-Hum. Well, I thought I could show you to the guest house,” he proposed to the mermaid, “so you can make yourself comfortable, of course.” He threw her a wink.

The woman frowned. What did he think? Madonna turned to the voyeur psychiatrist, her eyes brighter than the fires that destroyed Chicago, London, or Moscow. The lemonade pushing against her bladder, however, spared him incineration. The image of a toilet flashed in her mind.

“Sounds good,” she said, and leapt to her feet.

The psychiatrist pivoted on his tiptoes and clicked his heels together. As if by incantation his arm immediately rose and pointed toward a small bungalow in the distance. The odd couple started for the small house. Floor led the way, treading the soil like an English mare at an equestrian competition, his body rigid as a broom, his feet a pair of zealous guides. He was thinking, in parallel to commanding his posture, of something to say.

“Interesting fellow, isn’t he?” he finally thought up in a fit of creativity.

“Uh-Huh.” Madonna couldn’t agree more about Meni. “How long is he here for?”

“However long he desires,” Floor answered.

“Oh, I thought you’d know,” the agent glanced at her prey from the corner of her eyes, “you are his treating psychiatrist, aren’t you?”

“I certainly am,” declared the doctor, “every week we go through a joint assessment but the decision is left to the patient. Like Confucius would say, I am merely a lantern for his path.”

“How Zen of you,” she remarked.

The broom came to a stop and turned to the woman, “Why, all our patients are here on a volunteer basis. They can leave whenever they please. I hope Dr. Mendel didn’t give you the impression—”

“No, no,” interjected Madonna. She motioned him to walk on, “it’s just that his Tourette’s... I mean, it won’t go away, will it?”

The psychiatrist stopped once again, a stack of frowns squashing his bird-like face.

“Ms. Petri,” he said, “Meni Mendel isn’t here because of he suffers from Tourette syndrome. Dr.

Manukian and I mentioned it to you because we didn't want it to throw you off. He's here because he's got a history of nervous breakdowns. That's why."

The woman's head snapped forward, "You're kidding?"

"Well, I can't say much more," Floor declared pedantically. He angled his chin up, "patient-doctor confidentiality, you understand."

Madonna pressed the man to walk on. Another stop and even the closest toilet would be a mute point.

She smiled coyly, "Please, humor me."

Floor took a quick glance from the corner of his eyes to make sure his audience was attentive.

"I'll say this much," he conceded, "there's more to it than just a simple argument," his tone of voice was unequivocal.

"What argument?" she asked.

"Isn't that what you two were chatting about," he asked reproachfully, "Dr. Mendel's argument with that Finkelstein character?"

"Now Holland—" she paused to interrupt herself, "you don't mind if I call you Holland, do you?"

Excitement burst through the analyst's aorta. One thousand synapses fired at once. Surely, he was gaining ground.

"Oh, please do," Floor insisted, "in fact, I was just going to ask."

"Good. Call me Madonna," she touched his arm lightly right above the elbow, triggering another round of synaptic fireworks. "You're an accomplished psychiatrist," she stated, gently pushing him forward, "what do you make of that argument?"

The broomstick leaned sideways toward her, "Well, I'm not sure this is appropriate..."

"Course it is!" she exclaimed, one must know when to bulldoze through the swamps of indecision. "Listen," said Madonna, "I had a hunch from the beginning that this might be an odd situation. What with a devoted psychiatrist and a bestseller in the works... I mean, science fiction has been stalling for over a decade now. This guy, he could be something new and fresh. But I understand, you're a shrink—his shrink. You're not interested in Meni Mendel's literary future. It probably hasn't even crossed your mind. You called me because, in some way, I can be of use to you. Right? And I came because I sensed

something pulling me here, like a planet by a mysterious sun.”

Holland Floor blushed, “Well I’m flatter—”

“Probably,” Madonna continued thoughtfully, “Meni Mendel.”

The man’s ego underwent a supernova explosion.

“This guy’s fascinating,” she went on, oblivious to the astro-psychological drama unfolding, “if I can work with him and also help with his recovery...” The shattered psyche of the psychiatrist was regrouping. The constant forces of the libido now brought the isolated pieces of ego together, like gravity did with matter. She went on, “but Holland, I’m not going to be involved in anyone’s therapy unless I’m told what I’m up against.”

A brand new thermonuclear fantasy buoyed the psychiatrist’s mind. Blackmail, he told himself. Pure and simple. He liked that. And he liked almost as much the fact that he liked it—lots to self-analyze later, he thought with anticipation.

“Well,” he responded, “I guess you are family, part of the team... I’m sure I can trust in your discretion, your utmost sense of ethics and, of course, your fuuuull cooperation,” Floor turned to Madonna, staring directly at

her left ear, waiting for a signal of her acquiescence, the signature on the dotted line.

Madonna twisted a few degrees in his direction, a slight smirk twitching her lips. She brought her right arm up and pointed at a small white house a couple dozen feet in front of them.

“Is this my bungalow?” she asked, in lieu of an answer.

In medical school, Holland Floor was known for two things. One, it was believed that at thirty-two he was still a virgin. Two, he kept the best notes. Immaculate, he used to say. The first made him highly suspicious, the second, highly popular. What his classmates did not know is that he also kept records on every one he met. One three and a half by five inch index card for each person. The bottom drawer of his home file cabinet contained notes on over a thousand people, the compendium spanning fifteen years of social mis-interaction. In the drawer above, he had grouped the subjects based on their phobias and, above that one, based on their reaction to their phobias. Each level up in the file cabinet corresponded to a deeper layer in the human subconscious.

To make any of this scientifically relevant, that is beyond the point of anecdote, he estimated that each layer should contain no less than five hundred subjects. Yet not every card in the bottom drawer made it to the next level in the file cabinet. Floor was a careful man, highly selective both regarding a subject's grasp of reality and the quality of his own notes, which reduced the number of qualifying entries drastically. According to his estimates, collecting the necessary data would take between twenty two to thirty one and a half years (that is, seven to sixteen and a half more years). This was assuming a constant rate of mis-interaction. Needless to say, his lifetime career ambition was to publish the first psychoanalysis of America's collective subconscious. In that sense Meni Mendel was a godsend, for he embodied the latest mass hysteria. And Floor was going to use the seductive woman to extract from the astrophysicist's mind a bounty of subconscious pulp. The only problem was how.

He gallantly opened the door to the guest house. The bungalow consisted of one small room and a contiguous bathroom, which Madonna raided immediately. There was no television, nor radio, the only members of the electric appliance family consisting of a pair of lamps. The

furniture was equally scant and composed of a wardrobe, a chair, a bed and a bedside table, all in pine wood. Thick round logs piled up horizontally made the walls of the small house. To add to the rustic touch, red-checked curtains adorned the only window in the cabin. Daniel Boone could have lived there. Madonna sat on the bed and retrieved a cigarette from her purse. She didn't bother pulling her skirt over her thighs and knees, letting the psychoanalyst's eyes freak out on their own.

“So,” she said, lighting the tobacco stick, “what's the scoop?”

Dr. Holland Floor stood in front of the bed, hands tucked in his beige slacks. He was a happy man.

“Well, all modesty aside, I prefer referring to the scoop as an analysis.” He watched the woman suppress a smile through a cloud of smoke and collected his thoughts. Fifteen years of contemplation was about to be summarized like condensed milk. “Meni Mendel is an interesting case,” Floor said, “as a patient, he epitomizes the latest expression of our collective phobia.”

“Which is what?” asked the literary agent, exhaling some smoke.



Floor moved to avoid the stratocumulus of nicotine making its way toward him. “Which is what of which,” he retorted, “the phobia or the expression?”

Madonna smiled behind her cigarette. “Both,” she answered.

“Ah.” The tall man rocked his rigid body back and forth a few times, like a vacillating tower of Pisa. “Humans,” he began, “are walking contradictions—at least psychologically. On the one hand, we can’t survive without belonging to a group. We need people to get food, fire, clothes, protection from animals, procreate... and on top of all that, we need people to talk to, or we go insane! In brief, we’re social animals. Yet, on the other hand, we’re all alone inside. No one can climb aboard and experience life like we do, or understand what we really mean. Isn’t that peculiar?”

Madonna made an effort not to roll her eyes, hadn’t the guy ever read Sartre? “Truly exceptional,” she said.

Holland Floor felt encouraged. “Thank you. But what’s truly exceptional is precisely that it isn’t. In fact, it’s common to all of us. After all, don’t you feel utterly alone deep inside, at least once in a while?” He pointed at his bald cranium and tapped it gently, “Don’t you wish you had some company up there?” His eyes stared straight into

hers, like a pair of laparoscopic optical fibers exploring her mind.

“Not only once in a while,” she answered candidly, “there’s an empty chair waiting to be filled right in my head, and it’s labeled alter ego.”

“Exactly!” exclaimed Floor, processing simultaneously an additional note for her card, “and because our brain cannot face this angst at the conscious level, it has shifted the burden into phobias, a simple way for our ego to cope with itself. I have identified and classified a plethora of such manifestations. Fear of snakes, for example, or ophidiophobia, expresses unresolved sexual issues—snakes clearly symbolizing the penis. And the repulsion for rats and maggots relates to filth and lack of sanitation, here we’re confronted with scatological issues. When it comes to spiders and scorpions the fear lies in their appearance, that they do not look human, which taps into our sense of identity, of who we are. At least with other animals we can identify human-like attributes: a trunk with four limbs attached to it, a head with two eyes separated by a nose and above a buccal cavity.”

Madonna grimaced, “Are you telling me that if a tarantula or a scorpion looked more like a person, people wouldn’t be so scared of them?”

The psychiatrist waved his index finger into the air, “Scared but not phobic! Certainly, you’ll agree lions are dangerous yet lion phobia is rather uncommon whereas arachnophobia isn’t. Phobias are unreasonable fears, but with a reason.”

“My brother’s phobic of bees,” said Madonna.

“Aphobia,” declared Floor, “probably relates to an underlying issue with control.”

“Actually, he got stung once and his earlobe doubled in size.” The woman puffed at her cigarette, “I remember as a little kid, I used to play with bugs—they’re pretty ugly too, you know. I was totally oblivious to their appearance though, in fact that’s what made me curious. Then my mom saw me and freaked, I think she made me wash my hands three or four times. Since then, I’ve had a growing bug phobia. What I mean, Holland, is that perhaps phobias are learnt behaviors rather than expressions of underlying angst or dysfunction.”

The man bent his knees keeping his legs tightly together, his torso straight as a chimney. His body went down then came back up in one smooth movement, like the piston to a locomotive.

“Conditioning!” the man said on his way up, “Your brother’s reaction to bees is merely a Pavlovian reflex

against pain. Yes, and your mother's reaction to bugs is very common indeed, a prime example of social conditioning."

"So?" intoned Madonna, "that doesn't change the fact that if my mom hadn't taught me to, I wouldn't be scared of bugs today."

Holland Floor tilted his trunk forward and cocked his eyebrows, "But who is telling the moms and dads to make their children scared of bugs?" The woman exhaled in his face. He straightened himself back up, avoiding the plume of tar and nicotine emanating from the agent's lips. "The collective subconscious!" he exclaimed once upright, "it bottles the fears and anxieties that we share into a common set of symbols. Spiders are very popular. Bugs too, in fact."

"I think my mother's over-reaction is a simpler explanation for my phobia of bugs."

The man shrugged his shoulders, "But why did your mom have an aversion for bugs?"

"Okay," said the woman, "we can climb up my genealogical tree if you want. Maybe my great-grandmother dona Infortunata found a bug in her minestrone—who knows? You'll concede that could've

triggered a pan-generational phobia in an Italian family, won't you?"

Holland Floor paced over a short distance, "You're arguing like a negotiator," he said, with his head bowed toward the floor. "Conditioned behavior occurs, yes, but it's sporadic. People are exposed to bugs and bees, and so occasionally a traumatic event will occur. But while most people have never seen or will see a tarantula or a black widow, many are scared of house spiders which they know aren't poisonous. And that's precisely what a phobia is, an unreasonable fear."

Madonna shifted her legs, "You said an unreasonable fear with a reason."

Floor stopped pacing, "The reason is its function. You see, a phobia is the result of a displacement in our psyche of a fear which we cannot face consciously into another which is more bearable. For example, a young boy may be aquaphobic (afraid of water) because as a toddler his parents forced him into a pool, but in fact he is manifesting separation anxiety. There is an unending list of fascinating phobias: harmatophobia, the fear of error, or taphophobia, the fear of being buried alive, or even meteorophobia, the fear of shooting stars. They each have their unique meaning and subconscious counterpart. But

what I'm most interested in, are those phobias which are common to most of us."

"Like spiders," said Madonna.

"Exactly," said Floor, "and plane rides too." The woman started a dissenting gesture but he interrupted her, "You know the statistics, it's safer to fly than to cross the street. Yet you don't get as scared at an intersection as during a landing. That's because plane rides are so unnatural, so not human. Be it arachnid or plane ride, these objects of phobia touch our sense of self, our identity. It's as if a flashlight goes off in our mind illuminating our innermost chamber, exposing our most primitive angst, the paintings on the cave walls. Only then can we see, as individuals, where we start and where we end. And that's scary."

Madonna stood and walked into the adjacent bathroom. She ran some water from the faucet and extinguished her cigarette on the side of the sink. "Doesn't anyone smoke anymore?" she muttered, and closed the bathroom door. "Now Holland," the woman hollered through the wooden door, "I still haven't heard the scoop on Meni Mendel."

"Analysis!" he shouted back, "I'm getting there."

The bathroom door opened and Madonna walked out. The nicotine clouds had disintegrated into a thin cirrus of smoke midway between the carpet and the ceiling. Only three things poked through the translucent layer: the closet, a lampshade, and Holland Floor's smiling head. "Why, hello Dr. Freud," she told the psychiatrist. The agent returned to the bed and sat on it crossed-legged like a kid waiting for a story.

"So," she said, "how is Meni's depression related to your theory on phobias?"

Holland Floor landed on a nearby chair.

"It resonates in the collective subconscious." The psychiatrist leaned forward well past his knees, "Ever heard of gigantic octopuses swallowing entire ships?"

"Not really," she responded.

Floor went on, "Up until the nineteenth century, sailors reported spotting all kinds of monsters at sea. One common theme was a giant octopus with gigantic tentacles attacking ships. In one of his books, Jules Verne, who may have been the world's first full-blown science fiction author (he was writing about submarines and trips to the Moon before cars were even invented), describes a crew fighting against one of these fantastic creatures."

“Are you telling me your whole theory is based on a nineteenth century science fiction novel?”

“Not the novel,” said Floor, “the myth in the novel. How about Godzilla, ever heard of Godzilla?” The woman nodded. “Count Dracula, the Bermuda triangle, what do all these myths have in common?” he asked, then answered himself, “I’ll tell you what. Our angst made them all up. There is feedback between what makes us fear, and what our fear makes. Meni Mendel,” the psychiatrist continued, “personifies the latest projection, the most recent painting, if you will: Intelligent life outside our own planet. UFO’s. Aliens.” The man paused for a brief instant. “The fear of being alone in our minds has been displaced into the fear of being alone in the universe. That is why the aliens have got to be smart, after all, having an amoeba for company would just not be satisfactory.”

Madonna searched for another cigarette inside her purse. “What kind of company were giant octopuses then?”

The psychiatrist molded a sphere with his hands, “They brought to life an entire universe where Man evolved like an actor in a Homeric play. In that world, Man lived in communion with God and His monsters, and in that sense Man was not alone. The same goes for our obsession



with aliens, except science has replaced God and extraterrestrials replaced sea monsters.”

“But Holland,” said the agent, “science is based on evidence and God on faith. The search for extraterrestrials is a scientific question which stands on its own two feet.”

The psychiatrist arched his eyebrows a couple of times, “Science is a human construct. It searches what intrigues us, not what’s necessarily out there. But you have to know the code that let’s you see this and that’s my job. There is a connection between being alone as individuals in our innermost psyche on the one hand, and being alone as a civilization in the immensity of outer space on the other hand.” Floor paused to stare at the woman. “Do you believe there’s someone else but yourself inside your brain?”

“Course not,” she said.

“Well,” said Floor, “In the language of the mind the universe is your brain, the human species symbolizes your persona, and alien civilizations are other people. ‘Is there an alien civilization but the human species in the universe?’ translates to ‘Is there someone else but myself inside my brain?’ And you just answered that.”

The literary agent grimaced, “So no little green man anywhere but in our heads? We make them up to keep us company?”

“Are there giant octopuses in the ocean?” Floor asked back, “Do ghosts really exist? Maybe. Maybe not. Just a fad. A hundred years from now, the search for extraterrestrials will be as popular as the search for the Loch Ness monster—barely a handful of aficionados left in a Scottish bed and breakfast with a deluded question.”

“You make it seem as if the whole world is nuts,” commented the literary agent.

Holland Floor crossed his legs in a spurt of spontaneous elegance, “On the contrary, it’s normal to displace our angst of being alone into something less painful to cope with. Be it by toying with the thought of extra-Terrestrial intelligence, believing in ghosts or finding company in God. Perfectly healthy. One way or another, we all do it. But Meni’s Tourette’s isolates him from the ordinary person, he feels different from his fellow human. His angst is sharper. And his psyche is under a magnifying glass. He tried to prove to his stupid friend that beings from another world had contacted him. And that fool probably crushed Meni’s theory into pieces, slamming with a sledge hammer smack onto Meni’s pressure point.”

The woman rubbed a hand up her calf and leg, “Looks like you’ve done your homework like a good boy,

Holland. Lots of research on myths and how they relate to people.”

Floor leaned back on his chair, “I’m a very good boy,” he said emphatically, “I know everything there’s to know to make a comprehensive analysis of my subjects. Meni Mendel has a delusion that beings from another world contacted him. It’s my job to understand what he’s talking about.”

“Okay,” she said as if to an accomplice, “what’s mine then?”

Floor was surprised by the woman’s directness, straight as an arrow.

“Your job,” he declared triumphantly, “is to feed that delusion so I can study it.”

“Excuse me?” said the agent.

“His so-called manuscript,” stated Floor, “it’s better in his marvelous mind than in a ridiculous bookstore.”

## CHAPTER 15

Survival in the bio-dome rested entirely upon five bio-filter interfaces. That a fungus was infecting one of the filter's bio-lining, threatened the livelihood of the whole population. It was, so to speak, a gardening problem. A very serious gardening problem.

The greenhouse occupied a small convex cupola at the top of the honeycomb. Aside from a few obstructing plants, it offered a three hundred and sixty degree uninterrupted view of the horizon. The only obstacle between a Kulturan standing there and thin air was a sheet of crystal clear glass, and so vertigo would occasionally take possession of a visitor's sense of balance. Most, however, were struck with the feeling that they had reached the rooftop of the world.

It was this feeling that greeted Kee every morning when he arrived to tend the artificial garden. It harbored over a hundred and thirty five different plant species, seven of them only in the true sense native to Kultura. Here a flower changed

color with the frequency stimulating its roots, there a weed modulated its conductivity inside a magnetic field, and there a bush converted light into electric current using photo-electric leaves. The greenery was home for entire crops of mutants, freaks of the plant kingdom, biologically engineered diodes, capacitors, switches, and circuit board wafers.

The bio-engineer ran a cross check on the automated ozone system. Since one of the bio-filters was infected by a fungus, he was trying to grow a strain resistant bio-lining. He stopped at the newcomers he'd plucked from the fifth interface. Each leaf grew in quarantine enclosed in a private fiberglass chamber. In each cell, Kee had put together an infected and an uninfected leaf. In one chamber, the two leaves had been plucked from the same fungus ridden plant. In the other, however, the undamaged leaf had been collected from a different stem, healthy even though located contiguous to the damaged area. One of the two uninfected leaves may well be resistant to the fungus, in which case it could be used to grow a fungus resistant bio-lining *in vitro*.

The hypothesis seemed to work. Although the specimen from the infected stem was now entirely covered in white fungal spores, the other appeared healthy and unaffected. No time to perform the usual battery of tests. The bio-engineer decided to grow a batch of strain resistant lining for grafting onto the infected interface. As he transplanted the healthy plant into a basin of fast growing soil, Kee felt a pair of eyes watching him and instinctively raised his head. Outside, the permafog seemed to dance and jump to catch a glimpse of the greenery.

“I thought we should talk,” said the presence.

Kee felt paralyzed. A voice whispered inside him, does she know? His unease took Maya by surprise. She expected him to be arrogant and even aggressive toward her, but instead she sensed that her presence intimidated him.

“So, what are you growing for us now?” she asked.

The gardener tried to reign in his racing heart. He relaxed his body and shoulders, and resumed his work. He introduced a couple of

electrodes into the soil where the healthy plant lay and connected them to the overhanging photovoltaic glass panel. Instantly, the roots in the bushel responded to the stimulus.

“Growing the course of action you asked for,” he responded dryly, checking that the plants were secure in the dirt.

Silence fell between the two.

“Really?” she finally exclaimed, seeking for a crack in the Kulturan’s thick emotional armor.

“Really,” he echoed, patting the dark gold clay.

She stared at him for an instant then decided to change strategy.

“You don’t like me, do you?” she asked point blank.

The Kulturan snapped his head up but found no words to respond. He pushed the bushel aside and approached her. She’d made him react but she had it all wrong, he intimidated her, not vice versa. Kee stopped a breath away from Maya. He felt as though her presence zapped him into someone he didn’t know, someone overly excited and vulnerable, someone he should fight.

His eyes narrowed, “Why do you always rely on authority to impose yourself?”

“I don’t,” she said, “I’m—”

“A self elected leader,” he interjected.

She squinted back, “Do you want to be the leader, Kee?”

“No! What I’m saying is, why must there be one at all?”

Maya tried to regain control of herself.

“Listen,” she said, “as a group, the architects lead the community. Whether you like it or not, that’s what we do. But as individuals, each architect is nothing but a piece to a puzzle. Every moment, every instant, the puzzle has to be put back together because the picture on it changes constantly. My role is simply to let each piece know where the other ones are so they can come together. That’s all.”

Right there and then, he had the urge to grab her and hug her in a cataclysmic embrace. He could have let the seven stars crash into each other, the permafog engulf him whole, the sky fall to the surface of Kultura and bounce back into space. He agreed with her, yes, he agreed!



She pressed him, “Will you help me?”

“Come,” he said, and somehow his hand took hold of hers.

They marched, hand in hand, as he lead the way toward the quarantined fiberglass chambers. He explained to her the experiment, the premature success and the doubts. Then he told her about his walks to the outdoor zone, of watching the sunsets and the sunrises. He wanted to show her a secret, a beautiful secret he hadn’t shown anyone. Kee felt a moist sensation and realized it was the palm of her hand still clutched in his. He didn’t look down for fear he’d start shaking. In her eyes he saw the seventh sun rise counter-clockwise.

“How can such beauty come from such discordance?” he asked her.

A light smile rippled her lips like a gentle wind at the edge of the central sea.

“Which do you mean,” she asked back, “that between the suns, or the two of us?”

He flushed and freed his hand. She revealed a suppressed smile while her fingers searched his for a gentle squeeze. Maya turned to the door. “We’re running out of time,” she said, and left.

He would not show her his secret, after all.

## CHAPTER 16

Finkelstein was floating in nothingness having a pleasant dream. He had just won the Nobel prize in Physics. Again. And he was about to address King Gustaf of Sweden, his beautiful wife Queen Sylvia, the Nobel laureate committee, and a multitude of dignitaries. The average age of the audience was seventy-two, Queen Sylvia being the youngest. She was winking at Finkelstein. Decked in a sparkling burgundy tuxedo, the astronomer was about to walk to the pulpit when someone started tugging at his arm, impeding him from stepping into fame. He turned his head.

“What, what?” he heard himself utter.

“Are you Dr. Finkelstein?” asked the stewardess.

“Uh, yes. Yes, I am. Why?”

“There is a passenger who’s sick. Could you take a look at him?”

“I’m not a doctor,” he said to the lovely woman.

“But it says so on the passenger list.” She didn’t believe him. Physicians tend to shy away from onboard consultations. “Don’t worry,” she tried to reassure him,

“the airline’s insurance will cover your liability inside the airplane.”

Finkelstein stared at her with blank dreamy eyes.

“That’s not it. I am a doctor in astrophysics. If you have a problem with an equation, I’ll gladly solve it. But that’s about all I can do for you.”

She looked back in puzzlement, “A doctor of the stars, eh?”

Ten seconds later, speakers on Air Canada flight 601 cracked an announcement. They were looking for a real doctor, physicians only.

The astro-physician settled into his coach seat. The lady next to him eyed him reproachfully. Her neck had swallowed her chin and Finkelstein wondered if he’d be next. He closed his eyes. The melatonin was wearing off, little chance he’d get to fall asleep again. The only thing left for him to do was daydream. Think of the future, think of the past... But that’s exactly what he was trying to avoid, thinking of Meni, somewhere thirty thousand feet below him, and probably another thirty thousand feet further in the depths of depression. Jonathan Finkelstein felt as culpable as a thief wearing a stolen watch. But what could he have done? He tried focusing on the positive memories, and one especially came to mind.

It was June of... After passing their qualifying examinations and beginning work on their doctorates, both he and Meni received summer fellowships at HST, short for the Hubble Space Telescope Science Institute. HST is the central nervous system of a telescope orbiting a few hundred miles above the Earth. The first discovery the orbiting observatory made was that it was suffering from astigmatism. Scientists had hoped to discover a planet outside the solar system, but had to satisfy themselves with an optical aberration—a major flaw in the telescope’s primary mirror. As a result, during the early years the astronomy it produced was tantamount to a corn dog, more batter than meat. But the computer science that came out was leading edge. In effect, the mirror had been polished precisely wrong, and so scientists knew the exact specifications of the optical distortion which afflicted it.

Why was there an optical distortion to start with? Something to do with the right optical test being interpreted wrong, or the wrong test being interpreted right, or there not being a good test performed at all. Anyway, faced with the problem, HST management decided to focus on developing sophisticated computer programs that would model the mirror’s astigmatism and subtract it from the

images obtained by the telescope. And although this improved the astronomy, it wasn't sufficient to propel HST into eternal stardom, side by side with other technological superstars like its nemesis the microscope, magnetic resonance machines or the Pill. On the other hand, just like the Concorde had been a commercial failure but brought Europeans the know-how to manufacture the Airbus jetliner, HST hadn't produced the astronomy it had promised, but had become a gold mine of computer programs and programmers. Every month, an HST programmer would broadcast an email challenging others to find a bug in his or her cybercreation.

Meanwhile, images kept pouring in from the bus size astronomical satellite, and an archive was created. A two year delay was imposed before making the images available (to the public) to allow the principal observers to squeeze as many articles as they could from each picture. As soon as the archive was set up, however, the computer administrators realized they needed a system to protect it against ill intentioned marauders. In computer lingo, such a system is called a firewall. Within weeks, they had engineered a secret firewall which they called Brick, a metaphor for hackers banging their heads against the

virtual wall. The HST computer engineers were adamant about it being impenetrable. This, of course, is reminiscent of the French Maginot line (overrun by the Germans in 1940), or the Israeli's Bar-Lev line (overrun by the Egyptians in 1973) or the Great Wall of China for that matter (overrun by Genghis Khan circa 1200 AD). The programmers were so confident about their fortress, they tested it as thoroughly as Hubble's primary mirror had been (the one with astigmatism). In any event, the day after completion the head computer administrator, Dick Roberts, took it upon himself to challenge all scientists from penetrating HST's brand new cyber-fortification.

In those days, Meni and Finkelstein's lives, aside from facing their respective computer screens, consisted in a few games of ultimate frisbee and ten cent chicken wings. So when they received the message from dick@stsci.edu, they thought that finally they were going to have some fun. It was written in its usual unbearably bothersome style.

From: Dick@stsci.edu (Dick  
Roberts)

To: staff@stsci.edu

Ladies and gentlemen of HST. This  
month's competition is open only to

the pros. There will be a bottle of  
sherry for the successful challenger  
who can outdo Brick, our un-friendly  
firewall.

Gooooood luck (right!)

Dick Roberts

To win, one had to somehow break into the system and then prove it. For example, steal a brand new picture from the archives and email it back to Dick or, really the best, break into his account and have a message prompt him when he'd log on, something like 'Kleptobyte says Hello', Kleptobyte being the code name of the hacker. But what were the chances of that happening?

The two future astronomers peeped at one another over their computer monitors, a glimmer of excitement in their eyes.

"Did you get it?" asked Finkelstein.

"Oh yes, I got it."

"What d'you think?" he asked.

Meni was ecstatic, "Could be a joke, right? But why? No it's not, I bet you—"

"Hold on," interrupted Jonathan, "just got an email from a bunch of technical assistants... they're forming a



group, Sledgehammer, and the guys at Hopkins are doing it too—code name, Drill. They wanna know if I wanna join them.”

“No way baby!” Meni screamed, “We’re on together—jerk heads—right Fink?”

Finkelstein stood up from behind his desk, “Man, are we on! Like they all say, Dick Roberts before he dicks you.”

Meni was cracking up.

Finkelstein went on, “Code name: DICK DICK!”

Meni hooted joyfully and spun in his chair, “TUT! TUT!”

“Wait, wait. How about... Moby Dick!”

It wasn’t until after a game of ultimate and a basket of wings that it dawned upon them... Of course, they’d be Laurel & Hardy. First, they’d focus exclusively on breaking into the dick@stsci.edu account. Teach him a little lesson. Second, they’d do it the simplest way possible, with a *dictionary*. The idea was to log on under his username, then when prompted for Dick Roberts’ password try a word from the dictionary. Try ten thousand times, each time using a different entry. Their source would be a modified version of the dictionary of common names that would include birth dates written in five different ways up

until nineteen fifty one. The software would systematically attach to the names and birth dates a string of characters such as the dollar sign, the pound key, the ampersand, etc. This followed Dick Roberts' own recommendation a week earlier as part of his mandatory security seminar. In effect, people often use their partner's name or their kid's birth date for a password. Adding an extra funky character decreases the chances of someone guessing it. All in all, Laurel & Hardy would have to process thousands of requests to log on under the assumed dick username before stumbling onto the correct password. This, in effect, was their Achilles heel, for they didn't have an infinite amount of time. Furthermore, it assumed Dick Roberts was stupid enough to have a wimpy password, which was as probable as elks speaking French.

“Señor? Señor?”

Finkelstein focused on the man in front of him. He wore a khaki uniform and a thin brown leather belt drew a diagonal over his chest amidst a galaxy of shiny brass buttons. The designer had gone all out with the buttons, possibly inspired by the sight of the Southern Cross or the Milky Way. But because of budgetary constraints, the uniforms were manufactured in one size only, and a slight

confusion on the part of one clerk resulted in that size being XXL. Consequently, unless well endowed by mother nature, customs officials looked like a bunch of kids in oversized pajamas playing with people's passports.

Finkelstein's Spanish was rather rusty. "What?" he asked.

"Qué?" retorted the officer.

"Oh," said Finkelstein.

It's a wonder how the word 'qué' resonates in the American subconscious. Jonathan Finkelstein scrambled for his travel documents. The customs man finally got the passport and browsed through a few pages of the thin book then returned it.

"Gracias," said Finkelstein with a polite smile.

Beyond the customs booth an old acquaintance awaited.

"Welcome to Chili," said the man, "ready for diarrhea?"

"Thank you," Finkelstein responded, "I'm always ready for diarrhea. How's the weather been?"

"Fabulous. Sub-arcsecond seeing on the mountain, electronics great, telescope's perfect, the cooking... Did you say you liked diarrhea?"

The man's name was Harry Hanaga. Descendant of a long line of Samurais from his ancestral island of Hokkaido, Japan. Hanaga was a second generation American. He and his parents had been born far from the Nipponese cherry blossoms, the Kabuki performances and Mount Fuji, in Janesville, Wisconsin, United States of America. His newly wed grand-parents had been living peacefully in San Francisco until they were deported right after Pearl Harbor, courtesy of the State Department. As it turned out, the Finkelstein's and the Hanaga's were neighbors in Janesville, and so the two astronomers were used to teasing each other since they were kids. Jonathan and Harry were more than acquaintances but less than friends. Their bond since childhood was made of the kind of fiber that never eroded (competition) and the certainty that the other guy would ultimately get on your nerves.

“Is this part of your pulsar survey?” asked the Samurai descendant.

Finkelstein nodded, “Uh-Huh. Visual identification.”

Through the windshield, the outline of the Chilean capital was zooming by.

“How dangerous is it?” asked the newly arrived astronomer, gawking at the city line.

“Oh, you’d have no problem,” Harry exclaimed, “you got that local look, straight from the slums.” He smirked.

Harry Hanaga thought it was funny. Jonathan didn’t. That’s where their conversation ended and the trip began. Ten hours by mini-van. There’s always daydreaming.

## CHAPTER 17

The great African-American jazz musician Charles Mingus once said that creativity isn't about making things complicated but making them simple.

Laurel & Hardy had tried different combinations of everything. Found out the name of Dick Roberts' wife, his kids, his parents. Their birthdays, their birthplaces. Even the dog's. To no avail. His computer account was impenetrable. To the consolation of all, no one had produced even a crack against Brick, the anti-hacking system.

"Bedtime. Bedtime. Bedtime," repeated Meni with Tourettic insistence. The spurts had been coming randomly for the last hour. Few at first, now they dominated the conversation.

"Meni," Jonathan finally said, "do you think it's bedtime yet?"

Meni smiled.

Finkelstein stood, "Let's get outta here."

His friend agreed, "We're astrophysicists, not hackers—TUT! TUT!"

They left their small cubical office, knapsacks filled with frisbee, notepads, Jackson's Electromagnetic Theory or some other monster book. Maybe they'd learn it by osmosis. On their way out, they thought they'd pay a visit to the other wanna-be hackers in the main computer room. This was where the powerful Sun Sparc workstations were located. Because their number was limited, the rule was to use the terminal in one's office unless lots of CPU processing power was needed, in which case one would head over to the main computer room and use a Sparc workstation. Only one person disobeyed the rule: Dick Roberts.

When they entered the room at about one in the morning, the silence struck them immediately. No one was around. The lights had been dimmed. The air conditioning filtered in stealthily. Like an old gospel choir at a wake, the dozen or so computers hummed in the background, rocking the silent room in rhythm. The two students looked at each other. Rarely did they get to enjoy the whole computer room to themselves. A security guard strolled by.

"Well, if that ain't my two favorite night owls," he said.

"Hi Darcy," responded the pair in unison.

Darcy examined their identical tee-shirts, black with a starry backdrop and with a phrase written in oversized white block letters, astronomers do it all night.

“You two are really somethin’,” he said, shaking his head as he twisted a key into a red panel next to the door.

“Where is every one?” inquired Finkelstein.

“Jus lef,” said Darcy removing the key, “all wen to drown their sorrows. Something I should also consider.” He removed the key and let it dangle from a chain around his belt, “Well, gotta get to the next red box before the boss thinks I gots kidnapped by an A-lien!” he winked at Jonathan and pointed his index finger right above the student’s shoulder.

Finkelstein turned around. Meni was zooming around the computer room, touching the mice at each of the workstations, stirring them out of sleep. One by one, the monitors were zapping back to life, radiating a soft gray light, their screens blank if not for a single line waiting to be filled:

USERNAME:\_\_\_\_\_

Meni was half way across the room when Finkelstein noticed him.

“What are you doing?”



The other student continued with his madness,  
“Checking if anyone left without logging out.”

Jonathan let out a moan of understanding, “Ah...”  
he exhaled.

That was an old joke. A poor soul would forget to log off before leaving the room and someone else would get into that account and modify its configuration. Upon the user’s return, any command would cause the same message to be displayed on the screen, ‘sorry but I don’t like you’, or something along those lines. This would go on until the joker would feel inclined to tell the victim how to edit his or her configuration file.

“All logged out,” said Meni, “bedtime.”

Jonathan shook his head, “I can’t believe Dick Roberts dicked us.”

“Again,” Meni added. He pushed his glasses up his nose, then made sure they laid exactly one little finger thickness away from his glabella. Perfect, he thought. “If I had the guts,” he continued, “I’d log on to all the workstations and lock them with a password so Dick couldn’t check his email here in the morning—Hee-heeee!—Let him check it from a regular terminal in his office, like everyone does.”

Finkelstein squinted his eyes, “Not a bad idea,” he commented.

“Dick. Dick. Dick.”

“Meni, leave the room.”

“What?—TUT—”

“Do you trust me?”

Meni Mendel approached Jonathan and repeatedly tapped his best friend’s shoulders with the tip of his Tourettic fingers.

“Is that ever a question,” he asked.

The other drew a smile, “Give me ten minutes.”

Finkelstein sat at one of the computers and started typing feverishly. Fourteen minutes and thirty seconds later, Meni returned. The room was empty except for their two knapsacks at the door. Where’s Fink, Meni asked himself. Bathroom. Instinctively, he logged onto the closest workstation. Maybe he could figure out what Jonathan had been up to. The student typed in his username and his password at lightning speed, but couldn’t log on.

PASSWORD DOES NOT MATCH USERNAME, claimed the computer. Must have mistyped it, he thought to himself. He checked that his glasses were aligned with the room’s horizontal, then repeated the operation, careful to spell everything correctly. He waited for his configuration to

appear, two windows occupying ninety percent of the screen and a small horizontal bar at the top, itself divided into five squares. The right hand most square an analog clock, the next a drawing showing the current phase of the Moon, the following one a graph of the processor's CPU power versus time, then an icon of a mailbox for his email, and the last one the icon of a command shell window, in case all the others crashed. At least that's what he expected to see. Instead, a large single unfamiliar window popped up in front of him. What now? He frowned and brought his face close to the monitor. His mouth opened. A message blinked right smack in the middle of the screen: I AM BEHIND THE DOOR, SHMUCK. Meni Mendel got up and rushed to the room entrance.

“How d’you do it? How d’you do it?”

Finkelstein came out from behind the door.

“Simplicity is the mother of all creation,” he declared, then strolled into the room, his friend jumping up and down by his side.

“Can’t believe it, I can’t believe it!—TUT—How d’you do it, Fink?”

“I cheated.”

“Of course you cheated, you always cheat. Now tell me already.”

“Ahhhh... How did the wolf fool the sheep dog?”

Meni re-aligned his glasses with respect to sea level, “Do I look like a shepherd?—TUT! TUT!—Come on, tell me already!”

Finkelstein answered his own question, “He donned a sheep’s disguise, and everyone thought he was what they saw, a sheep. Beh-ehhhhhhhh!”

“Funny. Very funny—dick—Speak up already!”

“You know what, Meni-o?” said Jonathan, “right now, I’m logged on to every single workstation here, and you didn’t even notice.”

“What?” Meni surveyed the room. The blank screens looked normal, waiting for users to fill in their username and password. “How did you...” Revelation seemed to rise up Meni’s face, lifting his lips into a grin of disbelief.

“Yep-a-roo Sir,” confirmed Jonathan Finkelstein, “I’ve written a program that displays a blank screen and asks for a username and password, like you’d expect on a free workstation. Whatever you enter, the program logs you out as if you had mistyped it and displays the message **PASSWORD DOES NOT MATCH USERNAME**. But it read it all right, and before logging you out, the program stored both your username and your password (which you

kindly provided thank you very much) to a file in my account. Then it entered your account and changed your configuration as if you were doing it. Once I'm in, I can do anything."

Meni was ecstatic, "Fink..."

"Yeeees?"

"You're a genius!"

"No, you're the genius. I'm just a very smart wolf.

Grrrr!"

The following morning transpired like this. Eight thirty-five a.m., Dick Roberts walks into the main computer room to check his email. Eight thirty-six, he thinks he's mistyped his password. Eight thirty-seven, he tries again. Eight thirty-eight, he can't believe his eyes. Eight thirty-nine, a group of curious has formed around Dick. Eight forty, Dick Roberts has been dicked. Time thereafter has lost its meaning. He rushes out into the corridor, vapors are seen steaming out his ears and nostrils. One large window hogs his computer screen with three short lines greeting him.

>BRICK SECURITY VIOLATION

>DELETE \*.\*

## &gt;ALL FILES DELETED

No keystroke could stop, revert or erase the events of the last few minutes. His workstation seems frozen. Dick is rabid. Even the sight of a Spanish bull in heat confined to his pen couldn't measure up to his fury. He's on the phone with the boys at computing, those who brazenly assured him their firewall was one hundred and ten percent secure. The best of the boys is named Laura Burger. She weighs three hundred and five pounds, her login name is hamburger@stsci.edu. Computer administration is her life, pizza's her hobby. But right now, they're her death because she cannot give Dick a plausible explanation for what's happened and furthermore, she's shitting bricks. Yesterday's Pizza-Hut extravaganza and today's leftovers are still young in her stomach, and Dick's cacophony works like a laxative. But there comes Mister Finkelstein, with Mister Mendel in tandem whistling like a runaway locomotive, "Hee-heeeee! Hee-heeeee!". Don't they see Dick's busy. Oh? You know what's happened, you can correct it? The crowd parts for Finkelstein and Meni like the red sea for Moses and his brother. Somehow, they are in touch with the powers that be. Jonathan Finkelstein, then

Meni Mendel, press a few keys. A fourth message appears. Faces approach the screen, eyes squint, jaws drop.

>THANK YOU FOR YOUR ATTENTION  
>LAUREL & HARDY

Dr. J. Finkelstein clicked his tongue against his pallet a few times. He hated sherry, but that one had been especially sweet. He looked out the window of the mini-van, a desolate landscape dominated the vista. What if they got stranded here? He turned to his colleague. Harry Hanaga was driving. Two years in Chili hadn't affected him one bit. He longed for malls, Kentucky Fried Chicken and the Odd Couple.

“Look,” he said, pointing above the wheel.

A couple of bumps broke the horizon in a most unnatural way. Humanity had been there and built large instruments to peer into the depths of its deepest ocean: the sky.

## CHAPTER 18

Transportation by magnetic induction was first developed on Kultura. It consists of a highly magnetized shaft which takes advantage of the high iron content in the blood of Kulturans to transport them from one end of the shaft to the other. In a nutshell, a Kulturan is introduced inside a tube where a large magnetic field is rapidly increased. Basic electromagnetic theory predicts that an electric current is naturally induced to compensate for the variation in the magnetic field. The induced current generates a second magnetic field which cancels the change. The passenger inside the shaft provides that current by speeding from one end of the tube to the other, like an electron in a wire.

Two induction tubes linked the stilted village to the surface of Kultura, one to go down, the other to return. A couple of humanoid silhouettes, one red, one brown, stood at the bottom of the transport shaft. In the distance, the atmosphere had turned a canary tint. The second sun had positioned itself at high noon while the first



sun ingratiated itself in the pleasures of refraction, embellishing the horizon with a scarlet trim, as if it were an interior decorator.

“Boy are you ugly,” said the red silhouette.

“Funny,” responded the brown silhouette, “I find you prettier now than in your natural blue.”

“Must be the lenses,” said the red one.

“No,” insisted the brown silhouette, “I thought so even before I mine were put.”

“In any event,” interrupted the red one, “pretty soon it’ll be history.”

Alya, the fertility supervisor, secretly enjoyed her red contour and didn’t mind at all her assistant’s gorgeous brown tint. Truth be said, the lenses colored both of them in shades of red. Alya stuck her crimson hand on the outer wall of the induction tube and the soft surface of the shaft sank under the tactile pressure. Instantly, roots sprang up and coiled themselves tightly around her fingers, like hungry tentacles, and a horizontal bar emerged from under her hand. The Kulturan swung the bar down, the motion breaking the straps restraining her fingers. The roots exploded into pieces and an opening appeared at the base of the shaft.

“After you,” she said.

Her companion entered the tube and pushed a similar lever inside. The door closed and the outer lever sank into the outside wall. There was no sound. The Kulturan at the base of the shaft looked around her. The contact lenses laminating Alya’s pupils filtered the light into an infrared landscape. Without them, the fog would be too thick to see through. She focused on a single point far on the horizon and held back a sweat as the voluptuous outline of her beloved planet appeared before her eyes. The hills of Kultura bulged like breasts. Hundreds of breasts. And the stilted village jutted out like a nipple... Yet, what made the surface of Kultura special was not its sensual figure, but its elasticity. A thin layer of organic tissue barely a few feet thick covered the entire globe, except over the central sea. The thin crust reacted to slight changes in temperature and pressure but was most sensitive to light. As the seven suns danced around the planetoid, they teased its epidermis and made it vibrate. To notice it, the Kulturan held her gaze steady for a while. And before she knew it, her eyes

were bobbing up and down, slowly, rhythmically. Kultura's skin seemed to breathe, slowly, languidly.

Kulturans don't cry through their eyes but through their pores, in a sweat. The red silhouette contained her million tears and pressed her hand against the transporter shaft. Within an instant, she was standing next to the other Kulturalan.

"What took you so long?" asked the brown silhouette.

"Nothing," responded Alya, "Nothing at all."

The two emerged from the up shaft and stepped onto a platform in the outdoor zone. They proceeded toward the geodesic dome and entered through the largest interface. Before they'd left on their mission, they had been dipped in a liquefied solution of bio-filter lining, giving them temporary protection from the toxic fumes. It had been observed, however, that after each dipping, before the lining solidified into a thin tissue, it reacted with the blue epidermis of Kulturans in such a way as to produce a wide array of colors. White, yellow, pink, red, brown, black, and intermediary shades as well. As a result, all the intrusions into the permafog

were preceded with a public dipping ritual which many Kulturans attended, this being perhaps their only form of entertainment. The blue humanoids entered the pool from one end, dipped and splashed for a short while, then came out the other end sporting a totally different tint. Curiously, however, the return dipping into the cleansing solution was not as widely attended. Not that it wasn't as entertaining as the first—it was—but perhaps it spooked the population to see anyone return from the land of the dead, their skin a strange color, their eyes a deep red, like ghosts.

“It’s always better to prevent than to cure,” declared Kalyan.

He was categorical. The architect didn't like the idea of opening and closing an air gate. Keep the dome hermetic, he insisted. Air tight means health tight. He was anxious. Had it been up to him, no one would enter or leave the compound. Yet in a few moments, he and his associate would walk down to the main interface for the arrival of the members of the sixth expedition. The expedition would re-enter the sheathed village precisely by

opening and closing the largest air gate. Their mission had been to arrest the source of the permafog, which meant to disable hydra, the runaway power complex.

When the two k's, Kee and Kalyan, arrived at the debriefing, their two colleagues had just come from the cleansing pool. Alya, the fertility supervisor, was telling the other architects about the gate guarding hydra. Her blue epidermis glistened with subtle reflections of red.

“...like a wall, but it wasn't solid—”

“We tried cutting it open,” interrupted her partner, still sprinkled with brown specks, “but though our knives penetrated the substance, they didn't cut it whatsoever...”

“Like stabbing a wall of mud,” continued Alya.

The group turned when the two k's came in.

“We've been waiting for you two to start,” said Maya, “shall we?”

Kee's eyes greeted the head speaker. She smiled faintly and turned back to the fertility supervisor. Alya had just taken a deep breath, as if she were about to dive into the depths of an abyss.

Now she exhaled, “hydra lies deep underground,” she said, “we reached it no problem—there’s a pair of induction tubes still in functioning order...” the Kulturan paused and inhaled deeply once more, “but although it was easy to get down, we couldn’t access the complex itself. There’s only one entrance,” she explained, “and it’s sealed off by some kind of a giant membrane. It’s thick, stretchable, but you can’t poke it. I was just telling the others how we were unable to carve an incision in it to reach the power plant.”

“It’s a bio-gate,” said Kalyan, “should have looked for a switch instead of poking it in vain.”

“Tried,” interjected Alya’s partner, “couldn’t find it.”

Kalyan grimaced, “Did you try touching the walls around it?”

“Tried it,” said Alya.

“How about the floor?” he asked again.

“Of course,” she answered.

“And the ceiling?” he insisted.

“Tried that too,” responded the other.

“Look,” interrupted Maya, “it seems to me that a sophisticated complex like hydra wouldn’t

rely on one trick to baffle intruders. The switch must be obvious, it's the trigger that's not."

Kee turned to his associate, "I think she's right," he said to Kalyan, "we shouldn't approach this as a riddle but as a keyhole."

"And we must find the perfect pick," continued Maya.

Her eyes locked with Kee's, each trying to probe the other's mind.

"There's no point sitting around," he declared, "we must go back and figure out this puzzle. Bio-technology is my expertise."

"And mine too," added Kalyan.

"But," said Maya, her pores moistening, "who said either of you could go?"

Outside, the red trim had expanded into an uneven band, thin on the side where three suns had assembled, thick on the other where only one star had made an appearance. The horizon had been tipped. Soon, another conjunction would come and the burgeons of the bitter rose would slowly come to life.

## CHAPTER 19

The first astronomical observatory reposes on top of Man's shoulders. The ever so useful head. Forgotten, in favor of a large cylinder curiously empty if not for two mirrors at either end. The modern apparatus, known as an optical telescope, is generally housed inside a small tower hooded by a white semi-spherical cupola with a slit in the middle for viewing. As a result, optical observatories end up looking like bald headed cyclops.

The best locations on Earth for bald headed cyclops are Hawaii and Chili. There, atmospheric turbulence, known as seeing, is lowest so that pictures come out very clearly. The Hubble Telescope is also an optical observatory, but it looks more like a Cuban cigar. It's orbiting the planet approximately three hundred and fifty miles above the Earth and above atmospheric turbulence. The seeing of the Hubble is one tenth that of a good Earth-bound telescope. That's what makes it so attractive. On the other hand, it's relatively smaller in size, and so larger ground-based telescopes are able to observe fainter objects, especially when equipped with sophisticated optical



systems that model the atmospheric turbulence and compensate for it such as adaptive optics and active optics.

As he reached the mountain top, Dr. Jonathan Finkelstein scanned the horizon. Small white domes pimped the landscape, each harboring a telescope. Mosques of knowledge. The young scientist felt elated to have so many resources to search for his minute piece of the huge puzzle. What was the universe? How long had it been around for? How did it come to be? Questions that persisted through time in the four corners of the planet.

Drs. Jonathan Finkelstein and Harry Hanaga stopped briefly at La Serena, a village sixty miles West of the Cerro Tololo Inter-American Observatory. They splashed water on their cheeks, dealt rapidly with the bureaucratic rituals, and continued on their way. Astronomers are allotted limited time on telescopes, and so every minute counts. By the time they arrived at the observing site, it was already four o'clock. Half a dozen optical telescopes and one radio-telescope dotted the Andean ridge. Would future generations wonder whether these were built to praise extra-Terrestrial gods? Surely, these cyclops could only have been meant to be seen from the sky.

Dr. J. Finkelstein entered the small building housing the telescope he had been assigned. The instrument towered fifteen feet high over a middle-aged Chilean technician who was replacing an empty keg of liquid nitrogen. As he put the new barrel down, the man turned his head toward the visitor. The Chilean man's face was expressionless but for a tinkle of surprise in his eyes. Finkelstein couldn't tell if it was because he had startled the man, or because he looked different from most astronomers. More intelligent, he joked with himself but made no comment. All care must be taken not to offend personnel with authoritative behavior or hierarchical undertones. Techies are sensitive people. They can easily be antagonized with doctoral remarks. Furthermore, they tend to adopt the instruments like children, as if the electronics had soul and personality. The technician stared at the newcomer like a mother at an untested baby-sitter.

“Hi,” said the scientist, “I'm Jonathan.” He extended his arm.

Finkelstein knew these guys like the palm of his hand. Better not pop the Dr. bullshit with them. First they're not impressed, second they hate it.

The man's stare remained blank, “Hello,” he responded with a slight Spanish accent, “jow are you?”

The two men shook hands.

“Good. How’s the baby?”

The technician’s face lit up. He quickly finished connecting a hose from a tap on the barrel to a small cylinder attached to the lower extremity of the telescope, where Galileo’s eye would’ve been. “The baby’s fine,” he said, and spun the faucet’s handle half a turn. The needle of a gauge came to life, like a robot opening its eyes. “But watch this chico,” he said tapping the gauge in a fatherly fashion, “the Dewar has a tendency to leak.”

The human eye has been replaced by glass plate silver emulsions, also known as photographs, which in turn have been replaced by electronic detectors. These detectors are called CCD’s, short for charge-coupled device, and must be maintained at low temperature to work properly. CCD’s are the size of a thumbnail and rest on top of a Dewar cylinder filled with liquid nitrogen at approximately minus one hundred degrees Celsius—minus one hundred and fifty degrees Fahrenheit. Their functioning is magical.

A photograph is easy to understand: grains of silver are randomly distributed over a surface; as light strikes an area, it darkens those silver grains exposed to the light. The result is a black and white picture negative. Instead of

grains of silver, a CCD has little squares all lined up and covering the surface of the detector, much like a chessboard. When light strikes a square, it frees an electron inside that box. The more intense the illumination, the more electrons will be released. A computer then counts the number of electrons in each box and draws a picture by darkening spots as a function of the number of electrons present. Since heat allows electrons to move around on their own, the detector must be kept cool. The advantage of a CCD is that it is very sensitive so it can detect faint stars and galaxies. Furthermore, astronomers can compare the brightness of two stars very precisely by counting the number of electrons in each picture.

This wasn't always so, however. During most of the twentieth century, astronomers measured the position and luminosity of stars by comparing their pictures to those of well-known stars. The luminosity of two objects could be compared by knowing that one of them was brighter, and the other dimmer, than, say, Sirius, or Arcturus, or Vega. Ironically, the photographs were obtained with telescopes and the analysis conducted with microscopes. This method was only slightly better than James Ferguson's around 1757. A simple shepherd in the Scottish highlands, Ferguson used to revel sitting by a tree and admiring the

starry sky while his dog barked. Far from idle, he was measuring stellar brightness and positions by tying knots in ropes and inter-comparing them. It's been told he got pretty accurate measurements too.

“Let's open up the dome,” said Finkelstein, squinting and sniffing the air like a black Labrador.

The technician stopped in his tracks.

“Why,” he said, more than asked.

His voice bore no sign of arrogance, nor of curiosity. It was bland. The only sign of defiance resided in his posture, with his hands riding his hips. Jonathan remained unfazed. He kept sniffing the air, like a blind dog, not knowing exactly where to go. Then, as if waking from a dream, he suddenly turned to the techie.

“Seeing,” declared Finkelstein rather matter-of-fact. “It's humid in here, let's open up the gates of Heaven and give this baby some o-two,” he winked, “by nightfall, the temperature inside the dome will have equalized with that outside and won't produce too much local turbulence.”

Finkelstein was passing every test.

“Jokay,” said the man, “I'll take care of it. Why don't you go and jave dinner. Tonight is Chimichanga night, the cook's only specialty. Aside from rice.”

The scientist smiled and entered the control room. A Sun Sparc-20 workstation awaited his orders. Finkelstein typed a few commands in the computer and started a Dark, an exposure with the camera shutter closed. This produces a darkened picture but not a wasted one. Though a Dark image does not measure anything outside the camera, it does measure the amount of random motion of electrons inside the CCD, or noise. In effect, even though it is cooled, the detector still suffers from electrons misbehaving like pupils in a classroom. So the Dark acts like a snapshot of the electronics, and the background noise it measures can later be subtracted from the astronomical pictures.

While he waited, the scientist checked his email. He was happily surprised to find one from his partner in crime.

From: Meni@peterpan.jhu.edu (Meni Mendel)

To: j.fink@utoronto.ca

Fink,

Don't forget PSR2100+09 and let me know, ok?

Tic to ya later!

Meni

PS: think I met the perfect woman

Finkelstein shook his head and left for the cafeteria. Lucky you, he thought.

At five fifteen, he was back. The sky proudly shone its clarity, as if in complicity with the astronomer. He checked a thermometer before entering the dome then another inside the dome, and was pleased the two indicated almost the same value. Thermal differences create turbulence and would have increased the seeing. He sat himself in the control room and started another Dark frame while simultaneously querying Netscape for a satellite image of South America. The phone rang.

“Hello Jonathan. It’s me, Jector.”

Dr. Finkelstein recognized the techie’s voice. “Hi,” he said, “are all the filters in the wheel?”

Hector responded with a question, “Did you like the Chimichanga?”

“Yes,” said Jonathan Finkelstein, “I liked them.”

Hector spoke again, “All the filters are in. If you need anything, you can page me by dialing nine-juan-juan.”

“Won’t that put me through to the police?” the scientist asked.

“What police?” Hector’s question seemed rhetorical. Then he added, to avoid any possible source of predicament, “You jave to dial cero to get an outside line.”

“Got it,” said Finkelstein.

The voice resonated once again in the receiver, “So you like the Chimichanga?”

The scientist couldn’t help an upward reaction of his right eyebrow.

“Yes, yes,” he reassured the man.

A couple of beeps warned the observer that the Dark exposure had been completed and read by the computer. On the screen two pictures appeared at once but in separate windows, like scenes inside a multi-unit home. In the web browser the map of the southern tip of South America unfolded while in another frame the Dark exposure inched its way up.

“I turned the spotlight on for the Flats,” said Hector, “it’s ready for you.”

“Thanks,” said Finkelstein.

“I’m glad you like the Chimichanga,” continued the voice, reminding the scientist he was still holding the receiver.

“Okay. Bye.” Finkelstein hung up.



He was eager to start the Flats. The Dark frames had shown an insignificant amount of noise in the CCD. The next step would be crucial. Although the chessboard-like CCD detector is no larger than a nail, it can be lined with up to two thousand rows on one side and two thousand columns on the other. A regular chessboard is eight columns long by eight rows wide. In a CCD each little square acts like the digital version of a photographic grain of silver, and so it is called a picture element, or pixel. On a CCD wafer less than a half of an inch on a side, there can be up to four million pixels lined up at attention (compared to sixty four checkers on a chessboard). Generally, however, this number gravitates around two hundred and fifty thousand. Which isn't bad, for humans. Still, the manufacturing process is not perfect and the sensitivity to light varies from pixel to pixel. In brief, not all pixels are made equal. This is potentially disastrous for the scientist. For example, when comparing two stars, one may be sitting in an area of the CCD more sensitive than where the other star is located. So two identical stars may appear to have different brightness, when in fact the difference lays in the sensitivity of the pixels where the stars are located. This is called an artifact. Finkelstein had a love-hate relationship with artifacts. He loved finding them in other people's

research, and hated finding them in his. So he was always very careful with the Flats.

To obtain a Flat, the telescope has to be turned to face a blank screen fixed to the inside of the dome, and which is uniformly lit with powerful projectors. A short exposure is then taken. Since the lighting on the blank screen is uniform, the resulting picture should be uniform as well, the brightness looking 'flat'. But because some pixels are more sensitive than others, the image does not appear quite uniform, spotted with bright and dark areas. The Flat image is then saved and used to correct the target images. One of the most attractive features of CCD's is that each pixel is actually a number—the number of electrons liberated by one or more photons. So if one pixel is known to be less sensitive by a certain amount (say 2.5), then the number of electrons it registers can be corrected by multiplying it by that quantity, 2.5. This yields the true number of electrons that the pixel should have detected. The correction is possible only thanks to the Flat images which provide the pixel-to-pixel sensitivity information.

Jonathan Finkelstein acquired a Flat for each filter he wanted to use. Pixel sensitivity may vary with wavelength as well, and he wanted to cover all his bases. The astronomer laid all his star charts on a desk, cleared his

screen, created in his computer three directories labeled NITE1, NITE2, and NITE3, then turned the coffee maker on. He stepped onto the catwalk and lit a cigarette. He hadn't smoked since his graduate student days. Staring up at the Milky Way he wondered whether intelligent beings did exist, out there, but quickly dismissed the entire discussion as frivolous. Finkelstein paced a few steps, wondering whether he, too, would meet the perfect woman. But that idea seemed an even more remote possibility than an extra-Terrestrial leaning over on the catwalk and asking him for a light.

A look around him convinced the astronomer that the darkening sky was free of clouds. Photometric, he whispered to Meni, who was not there.

## CHAPTER 20

Time flies by when you're having fun. Madonna Petri looked at her watch, she wanted to avoid the Labor Day week-end rush back to the big Apple.

"I have to go," she declared, then took a sip of her coffee as if to wash away the taste of her words.

She liked it here at Tupper Lake. Facing New York, Erik, the agency, Augusta Augustina and her crystals didn't seem all that attractive. Sitting next to her at one of the small round tables in the institution's cafeteria, Meni couldn't hide his disappointment.

"Okay," he said looking away. Then his mouth took it upon itself to color his speech with a touch of Tourette, "okay," he repeated, "Bitch."

The woman smiled, "It's no use," she told him.

He flushed and returned her smile, "Not against good ole coprolalia—TUT!—"

Copro means fecal, lalia means talk. So coprolalia means fecal talk, sort of. Page 757 in the second volume of the *Illustrated Encyclopedia Scientifica* defines it more appropriately as, 'Coprolalia [also coprophrasia]—involuntary interjection of vulgar or obscene language (see

also echolalia).’ Phrasia probably comes from ‘phrase’ (or vice versa) and understandably implies an articulated utterance, or communication. It is unclear, however, how lalia would suggest the same, though lalia sounds like labia, meaning lips, which we use for talking... The ways of linguistics are windy roads.

Which makes it all the more fascinating.

“Lick,” said the agent, “I have to go. As soon as I get to New York, I’ll take a good look at—” she interrupted herself. Meni was staring at her with an expression of utter surprise, “what is it?” she asked.

“You said lick instead of look.”

“No, I didn’t.”

She playfully fought a grin.

“Yes, you did,” he insisted, “you know what Floor would say about this...”

Madonna was already standing up to leave, “I know what he’d like to say.”

“TUT! TUT!” exclaimed Meni, “Then you’d better watch your language!”

“And you,” she said casting her purse over her shoulder, “you’d better get out of your depression. You’re too interesting for that.”

They didn't say goodbye, it's bad luck on a first meeting.

As she approached her car, the woman noticed a thin silhouette leaning against the driver's door. When it saw her, the silhouette stood up straighter than the Seattle needle.

"Well, hello Holland," said Madonna, placing her duffel bag in the Saturn's trunk, "how nice of you to come say goodbye."

The psychiatrist remained mute in sign of mourning. With his feet anchored to the ground, his long legs rigorously parallel, and his arms glued to his sides, he bowed his entire upper body sloping it at an angle of precisely forty five degrees from the vertical. This salutation Holland Floor had seen in a Japanese ceremony on television, and it impressed him greatly. He showed his bald spot to Madonna for a few seconds, then solemnly brought his body upright.

"An old Nipponese custom," he said. Then extending his hand, "It's been a pleasure."

In response, she tilted her head forward with a small but perceptible twist, her closed lips arching down in respect, "Arigato," she said, having also seen the PBS

documentary on an American-Japanese farming community in Wisconsin, “ditto.”

She reached for the door handle but was beat by the psychiatrist’s hand. He held the car door open until he was certain she was comfortably seated, then he bent down into the gaping driver’s side.

“There’s something I haven’t told you,” he declared.

“What?”

He peered into her eyes, “Dr. Mendel is schizophrenic.”

She drew a smile, “Because he believes in aliens?”

Holland Floor was indignant that anyone would question his diagnosis. The only person who had (consistently) done so since the State of New York had licensed him to probe minds and alter brain paths with neuroleptics was Jonathan ‘the pest’ Finkelstein. Holland Floor was more than indignant, he was horrified. Why, in the privacy of his home the psychiatrist was already putting the final touches on an article based on Meni Mendel and entitled, ‘A Case Of Scientific Hallucination’ by Dr. H. H. Floor, MD, PhD, AAP, GST, FDP.

“Dementia!” Floor finally exclaimed.

Madonna grabbed the car door by the elbow rest, threatening to pull the door shut and end the conversation, “Holland, what do you make of a slip of the tongue?”

“Nothing,” he said, still vexed.

The woman disregarded his mood, “Nothing? Nothing Freudian?”

“Not a thing.”

“Then what is it?” she asked.

“Bad diction,” he said.

Madonna nodded imperceptibly. She howled “Bye,” then slammed her car door.

The Saturn had barely maneuvered onto the road connecting the estate to the outside world, when Meni appeared in the rearview mirror, running after the car. He waved a piece of paper in his hand. At a distance, Dr. Floor eyed the scene with arms crossed. The woman stopped the Saturn and lowered her window. The whole thing was starting to exacerbate her now. As soon as an author gave her a manuscript, even the shyest of them all started pestering her.

The astronomer caught his breath and repositioned his glasses on his nose. “I just thought of something,” he said.



“What?” she asked, a bit curtly.

“I was thinking,” said the writer, “you only got one perspective from me.”

“Perspective on what?” she asked flustered.

“Well—TUT—you know...”

She grimaced, “Aliens.”

With the tip of his fingers, Meni tapped the groove where the car window had recently disappeared.

“Intelligent extra-Terrestrial communication,” he stated shyly.

She decided not to divulge that Floor, too, had a perspective on the matter. “So?”

The man felt heartened by her openness. He asked, “You’re a science fiction agent, right?”

“Right,” she said, as a catastrophic image of the George Washington Bridge booming with traffic flashed in her mind. I’m never gonna make it, she thought to herself.

“Maybe it’s time you learnt about science nonfiction,” Meni said, and offered her a page torn from a message pad.

“What is it?” she asked.

“My best friend’s address,” he responded, fully extending his arm with the scrap of paper at one end.

The woman grimaced and kept her hands on the wheel of the car, purposely in plain view. “Let me guess,” she said, “he’s the alien who wrote the book. What’s this? His phone number on the pulsar, or is he staying at a local Holiday Inn?”

Meni’s other hand tapped the groove of the window nervously, his fingers a rebellious bunch.

“My friend doesn’t believe in aliens. He’s an astronomer, like me.” Meni extended the scrap once more.

The agent squinted her eyes, as though that would help her assess the man’s statement. She grabbed the paper from his fidgeting hand and unfolded it out of curiosity. A few lines were scribbled on it in terrible handwriting:

Jonathan Finkelstein

CANADIAN INSTITUTE for THEORETICAL  
ASTROPHYSICS

Tel. 416-978-6996 X.235 / [j.fink@cita.utoronto.ca](mailto:j.fink@cita.utoronto.ca)

Ask him about PSR2100+09

## CHAPTER 21

Imodium sounds like the name of a planet, or of one of Jupiter's satellites. It is, however, the trade name of a tablet people take when they have diarrhea.

The telescope swerved east, as Jonathan Finkelstein hurried back from the bathroom.

“Did you get a picture for each filter?”

Sitting by the computer, Hector finished typing a couple of words in then turned to Jonathan, “So, feeling better?”

“Yeah, yeah. How about the exposures?”

“All done,” said Hector.

“Good,” exhaled the astronomer and he let himself fall onto his seat. “Pretty soon, we'll be able to do some science.”

The first observation of a night is the calibration. Calibrating means re-measuring something which has been measured many times before by various other researchers. The scientist fine tunes the instruments to yield the same value that other scientists got. All subsequent measurements will be based upon this tuning. Clearly, if

it's done wrong, or the previous measurements are erroneous, then everybody's in trouble. But if it's done right, then differences obtained in measuring other objects are due to differences in their physical properties and not in the settings of the instruments.

In astronomy, calibration entails the measurement of isolated standard stars, such as Vega. Recently, however, astronomers have begun using globular clusters for calibration. Globular clusters are groups of one hundred thousand to one million stars gravitating about a common center. So by observing a small area of the cluster, an astronomer can use several stars at once for calibration instead of just one. Generally, about a dozen or so stars are picked in the globular cluster as the calibration standards. This makes the whole process more efficient and more accurate. A good astronomer will start observing them at twilight, to spare the night for the targets.

Jonathan Finkelstein popped another Imodium pill, two milligrams.

“Okay—GULP—I think I got it,” he said.

The difficulty in utilizing globular clusters resides in finding the dozen or so standard stars among the thousands that fill the screen. This is exacerbated by the perfectly symmetrical design of the cluster, a sphere packed

with little dots. But with time, the keen human eye recognizes irregularities in the seemingly perfect symmetry, and the astronomer finds his or her way better around a globular cluster than around the indistinguishable aisles of the local grocery store. Dr. Finkelstein glanced at the finding chart in his left hand, then at the image on the screen.

“Twenty seconds of arc to the east,” he commanded.

The technician pressed a button on his console a couple of times, “Acquiring,” he hollered.

On a small TV monitor mounted out of the way, a bright dot appeared inside a bull’s eye painted on the screen in cherry red lipstick. The star seemed to dance in and out of the small circle, and with a couple of skillful maneuvers, Hector succeeded in centering it. Since the Earth spins and ground-based telescopes are set in concrete foundations, stars continuously drift out of the telescope’s field of view, making the pictures fuzzy. To avoid this problem, guide stars are selected and the telescope slowly rotates to track their drift. That they seem to dance or move a bit is due to the seeing. Atmospheric turbulence bends the rays of light and thus constantly moves the apparent position of a star. This effect is minute, yet significant

enough to downgrade image quality for research purposes. Jonathan let out a plaintive “Aaaaaaah,” as he held the lower part of his belly. He was facing Hector.

“At least you enjoyed the Chimichanga,” said the technician, “right?”

Finkelstein gave the man a cold stare. In the background, two beeps emanating from the computer signaled another picture had been read and saved to disk. The filter wheel automatically switched position, and the next exposure begun.

Midnight should be the middle of the night, but it isn't. First because nights aren't exactly twelve hours long, and second because it rarely feels like it at midnight. The passing of time as experienced by humans is non-linear. That is, one gets more and more tired as the evening proceeds, and so time seems to bear more weight during the second half of the night than during the first. As a result, the night's center of mass usually lies somewhere between one thirty and two o'clock in the morning, and that's when things start happening.

Two more beeps poked through Hector's numb brain. He glanced absent-mindedly toward the screen, where the picture unfolded.

“Jesus!” he screamed, then rushed to the catwalk.

Jonathan Finkelstein was reveling in melancholy, accompanied by a cigarette and a seemingly starry sky.

“You gotta see this,” yelled Hector.

A moment later, Dr. J. Finkelstein was sitting in the control room, frowning at the image in front of him. In the space of a few minutes, the brightness of the pulsar had increased dramatically. Now, as the beeping sound signaled, another picture was coming through.

The star seemed to be exploding, surrounded by bright streaks that reached to the edges of the CCD.

“Supernova!” exclaimed Hector.

Finkelstein remained silent. A pulsar undergoing a supernova explosion was as plausible as turtles lecturing on metaphysics at Harvard (or Oklahoma State University). Pulsars have already survived one supernova explosion. Gravity has already squeezed the ball of gas into a neutron star, which is a stable phase in the life of a star. A second explosion would challenge all theories of stellar evolution. Then again, didn't a horde of orangutans and red-assed baboons topple Creationism?

“I'm calling the others,” declared the technician, in part from excitement, in part testing the other man's muted opinion. He waited two seconds, then grabbed the receiver.

“Put the phone down,” ordered the astronomer, still fixing on the images flashing on the screen. His frown bore the mixed signs of puzzlement and irritation. “Let’s check if a cloud hasn’t been obstructing the field of view.”

In the dark, clouds can only be detected indirectly, by the absence of stars. An isolated cloud passing low overhead can stealthily obstruct a telescope’s line of vision for a few minutes. If this happens just as the telescope comes into position on a target, it makes it appear dimmer. And as soon as the cloud leaves, the target suddenly increases in brightness. But on the catwalk, a coat of pure sky lined the heavenly ceiling. The two men rushed back in. Hector decided to check the images one more time, he was anxious to start calling. He’d been waiting for something like this all his life.

Finkelstein left the control room and entered the dome. He was certain that what the pictures were showing was an artifact of sorts. There was no supernova, he knew that for a fact. He was sure of it because he had noticed that the whole picture, not only the pulsar, seemed to brighten. In particular, a couple of faint stars in the same frame were getting brighter too. Hector hadn’t noticed them because they were small, out of the way, and pale compared to the pulsar. But they hadn’t escaped the astronomer’s critical



eye. Now he circled around the telescope, strolling like Sherlock Holmes at the scene of a crime, looking for clues pointing to the key to the riddle. He drew an interior smile at the thought of Meni, who had he been there, would be hooting right and left, driving Hector crazy.

He stopped by the bottom end of the telescope. An umbilical cord of neatly braided electrical wires jutted out from the cylinder attached to the telescope, and cooling the CCD detector. Staring at the contraption, the astronomer mechanically rubbed his hand over his mouth and chin, then crossed his arms over his chest. After a few seconds, he unconsciously started tapping his foot against the floor, like a music teacher would, but out of nervousness rather than rhythm. Finkelstein felt a wet sensation at his feet. He looked down, a small puddle of water lay directly beneath the cylinder. His eyes shuttled a few times between puddle and cylinder as a frown began to form. His head took the liberty to start nodding.

The scientist stormed back into the control room, “I hope you haven’t called USA Today yet,” he threw at the technician.

Hector was on the phone, “...un minuto—what?”

Jonathan was sitting himself back at the console, “Your chico,” he said, “it’s leaking.”

The techie blanked out for an instant, then he hit his forehead with his free hand while the other one banged the receiver down, “Aie, Señor de Dios!” he exclaimed.

At that precise instant, thermal electrons were zooming around the CCD like teen-agers in a cop-less city, making it appear brighter than it really was. The warmer it got, the brighter it seemed. “Qué passo? Qué passo?” yelled the telephone.

“Okay,” said Dr. J. Finkelstein to Mr. Hector Diaz, “how long for the liquid nitrogen to cool the detector back to a respectable temperature?”

“Juan hour,” responded the technician, “including refill.”

He wasn’t joking about Chimichanga anymore.

“Okay, that gives us two hours of dark time,” the astronomer thought aloud, “I promised this guy I’d take a picture of the interacting galaxies NGC1531 and 1532— plus the calibration standards at twilight...”

Like the captain of a ship, the astronomer steers the telescope through the black expanse of the sky, in search of a golden bay to anchor it in. There, the crew will be ordered to search for a treasure. They will bring back chests filled with sparkling sand through which the captain

will sift for years, hoping to find in the midst of it one golden nugget.

Jonathan Finkelstein gathered his wits about him, “We’ll start by repeating the last observation, then do a couple more pulsars. Wait,” he interrupted himself, “have we done PSR2100+09 already?”

“No,” answered Hector.

“Mr. Diaz,” said Finkelstein, “steer a course for PSR21. Give it all you’ve got.”

Five thirty a.m. The eyes of the astronomer feel a little dry, his stomach is a mess and his head is a buzz. But the technician feels fine, both mentally and gastroenterically. His daily cycle has been on this schedule for the last month, and as far as the cooking is concerned, he’s married to the chef. Outdoors, the sky is spotless and timidly begins to brighten.

“I’ll park it for you,” the technician offers the astronomer.

Hector Diaz feels badly for having forgotten to refill the Dewar and wasting precious telescope time. Ninety four minutes to be precise. Finkelstein is too tired to be resentful, however. He spreads his arms, stretches his back and draws a yawn.

“Right now,” he exhales wearily, “I couldn’t make out a spiral galaxy from an elliptical one—even if my life depended upon it.”

He kindly accepts the man’s offer to put the system to sleep, position the mirror horizontally to avoid flexure, close the dome and fill the detector’s container with liquid nitrogen one more time. Usually, Jonathan Finkelstein would spend another couple of hours processing the data and prepping it for analysis. It’s always good practice to check if anything needs to be redone. But right now, he’s dead. The airplane trip, the ride up, the observing all weigh on him like a sack of potatoes. The astronomer throws a backup tape into his knapsack, then leaves for his bungalow. Another two nights, and his mission will be accomplished. Thank God for Imodium.

## CHAPTER 22

“The fifth bio-interface has crashed!”

Kalyan barges into Kee’s lab. The Kulturan has never been so expressive, he’s yelling.

Kee is holding in his hands a shiny metallic box. “Come here,” he tells his friend, “I want to show you something.”

“No time,” the other spurts through a spittle of saliva, “an emergency meeting has been called. Come.”

There’s a split second of indecision as both commands clash in Kee’s head. Only one will prevail. The authority of urgency dominating, he joins his partner to meet the other architects. But as they leave the greenhouse, the full meaning of Kalyan’s statement now comes crashing into his mind. Understanding sinks in. “The fifth has failed?” Kee repeats incredulously.

“And another’s infected with the fungus.” Kalyan is undergoing a similar but opposite realization: he does not understand. “What was going through your head back there, Kee? I’m

telling you a bio-filter is down and you want to show me a box?"

Kee remains silent.

After a while he declares, "I have to know what happened." He takes off from their path and says, "I'm going to pass by the fifth bio-filter, and then I'll join you at the board room."

Kalyan's eyes blink once, at least he understands this better than being shown a metallic box. What's in it anyway?

The planet is sizzling. Three suns have gathered on one side of the fish bowl overhead, and another three have appeared on the opposite side. The geometry of the situation can be reduced to a thermal balancing act. Alone, the seventh sun has decided not to show yet. But soon enough, one of the stars will defect to one side and start the process of thermal imbalance. Then one by one, the rest will follow. With all seven suns gathered in one spot in the sky, the conjunction will be total. The permafog, usually low and placid, will be stirred into an ocean of furious fluid, tall waves of toxic particles licking at the stilts of the village.

The planet is a sizzle, and the seeds of the bitter rose are summoned to their destiny. Temperature is waking the age-old messenger. The hills of the planetoid are dotted with black burgeons. Kulturans eye them with bittersweet feelings, but to Maya they've always been a friend. She's never seen one at full bloom. Are they black throughout, or is their nectar blue? What color is their sap? The Kulturans are sitting in the board room, and the architects are streaming in. She feigns being concentrated and preoccupied, no one bothers her. But really, all she can think about is the bitter rose. And Kee. She's almost happy the fifth bio-filter interface has broken down, so she can see him again. But when Kalyan arrives without Kee, she feels betrayed. All the architects are here but him. Her disappointment borders on anger.

She turns to Kalyan, "Where is he?"

"He'll be here a little later," he responds, embarrassed.

"Does he realize this is an emergency meeting?" she says to him.

Kalyan flushes, "Yes, yes, of course. He just—"

“Where did he go?” she interrupts. She doesn’t know how to control herself, she’s never been faced with such intense emotions.

Kalyan stutters, “He... He... went to... the fifth interface...”

She’s about to explode, when from across the table, the fertility supervisor intervenes. “Maya, it’s okay,” says Alya, “maybe it’s better he went there first, so he can tell us what’s happening.”

Maya’s never lost her poise in public. But there’s a first time to everything. She bursts out, “Don’t you know what’s going on out there? The conjunction is three rises away. One of the air gates is inoperable, and some unknown retro-fungus has started to infect the other bio-filters!” Her cheeks are turning slightly violet, she’s one finger away from sweating.

Kalyan hides his face in the palm of his hands. When he looks up, he thinks he sees a mirage. At the entrance door stands Kee.

“Pretty good assessment of the situation,” he says as he comes in. He sits down and turns immediately to Maya. “I’m sorry,” he says, “but I



had to go. The bio-filters are my responsibility—” he interrupts himself and sighs.

“Yes?” she asks Kee.

Kalyan is sitting next to him and has spun ninety degrees to face him. There is silence around the table but no one understands why. Except for Kee, and he’s about to explain it.

“Look,” he starts saying, “it’s not working. You can’t keep a whole population under a ventilator.”

“What are you talking about?” exclaims Alya.

“Bio-gates are not sustainable,” he declares flatly, “the new bio-filter lining, I thought it would work...”

“Doesn’t it?” asks another architect.

“It does.” His voice is unsure, his intonation awkward. An expression of puzzlement surges on everyone’s face. “That’s not it.”

Maya’s heart is racing. His words are partly lost in the maze of her brain, she can’t help it. She’s staring at the young Kulturan’s bulging lips. She feels the urge to blend them with hers. Rescue him.

But somehow, she finds herself talking, “Then what is it?” she hears herself ask.

He looks up at her, he feels ashamed, embarrassed. He’s failed. He can see his father swaying his head in disapproval from one shoulder to the other. A fungal resistant lining was grown, he explains. It resisted the strain, metabolized the toxins, filtered the air. But there was one problem he didn’t foresee: after it was grafted onto the interface, the base lining rejected it. There’s only one solution.

“You mean we have to remake new bio-filters from scratch?” asks Kalyan in disbelief.

“But the conjunction’s in three rises,” Maya cries out.

Kee stares back at her. He doesn’t care that the village may be eradicated. He just wishes he’d had a little more time to get to know her.

“I know,” he responds.

Everyone is stunned. permafog in the corridors of the village is like pollution guerrilla. They’ll give it a fight, but someone has got to give them hope.

“Well,” declares Maya, “this is it, architects.” She’s on automatic pilot. She’s prepared herself so many times for this nightmare, it’s as if she knew, deep inside, that it was going to come down to this. “We have to beat it. We can beat it. We’ve done it before. If we can manage through this once,” she claims, “then we can manage forever.”

“Yes,” says Kee, “and it would buy us time to go down and disengage hydra.”

Maya turns her head to him. She didn’t mean that. But she cannot deny it either, it’s their last chance. The same brain that made her ask the right question a moment earlier, when she felt overwhelmed with emotion, is now keeping her silent. She wants to scream “NO!” but only her eyes do. Going down to the surface at this time, so close to a conjunction, is equivalent to suicide. But do they have a choice?

The pool wasn’t that cold after all. The two k’s kept their heads under the liquefied bio-filter lining for a long time. Their epidermis, reacting with the chemicals in the tank, quickly lost its blue

hue. The public had come to lend them their support as much as from the curiosity of seeing two Kulturans painted from head to toe in a color other than their usual blue. Like a sunrise over the central sea, Kalyan finally stood above the pool, his skin the same golden tint as the fifth sun. Behind him, Kee emerged splitting the surface of the fluid like the stem of a bitter rose breaking the ground. At the sight of the two clashing colors, the assembly stirred. They had never seen two architects emerge so beautiful, and so contrasted. Kalyan the color of a sunrise, Kee a perfect black, like the flower messenger. The two Kulturans stepped out of the pool eyeing one another, as if they had to get to know each other all over again.

Kee winked, “I mixed in a bit of the anti-fungus solution,” he confided to his partner.

Kalyan smiled and felt the gentle pull of his new skin. A few feet away from the pool, two cots raised to waist level and placed head to head awaited them. Four attendants helped the pair lie down and warm compresses were applied over their eyelids. The two Kulturans tried to relax. The heat permeating in and around the sockets of their eyes

made their cornea feel soft and tender. Gently, a pair of hands began caressing each of the Kulturan's head. The fingers traveled smoothly from their forehead down their nose and then spread to either side of their face massaging temple, cheekbones, and jaw. The massage slowed to a rocking rhythm, and the two bio-engineers barely noticed a mask brought down over their nose and mouth. Connected to canisters lying underneath the cots, the masks fed them with a gaseous form of the bio-filter lining. Slowly they breathed in, slowly they exhaled. Their whole system was now coated with the substance, outside and inside, and the masks were removed. The warm compresses seemed to take off on their own, and the two members of the surface expedition felt a new pair of hands applying pressure right below their eyebrows and above their cheeks.

Because Kulturans' optical nerves fire in permanence, they live under the constant illusion of light. And so Kee and Kalyan did not realize their eyelids were slightly raised until they felt the viscous sensation of a drop fall upon their irises. And even then, the realization was not complete

until the second drop fell into the other eye. The liquid did not sting, it was as if it were going to spill over but wouldn't. The two Kulturans felt a sense of panic as the attendants' hands kept control over their eyelids, and the liquid over their eyesight. They fought with all their might, but had to resign themselves to the commands a soft voice whispered above. Something about relaxing. As the inundating liquid molded the curvature of their cornea, it solidified. From a blur, their vision took an exotic form, not an unfamiliar shape but an unfamiliar tint. When the infrared lenses finished crystallizing upon the eyeballs, they endowed the two Kulturans with a new perspective of the world around them. A world where bigger did not mean stronger any longer. Since infrared wavelengths are dominated by thermal radiation, temperature, not size, was now king of the visual arena.

It took them a while to get used to their new perception. Most affected was their sense of depth, though identifying things wasn't easy either. Maya accompanied them to the pair of induction transport tubes linking the geodesic dome to the surface of Kultura.

“architects,” she said, “my friends, we are running out of time.”

Kalyan approached the red glow which he had identified as Maya. He wished her luck too. A second of silence preceded Kee. He brought his hands to Maya’s shoulders but found he could say nothing. So he let his hands speak, and they followed the contour of her neck, her chin, then her lips. The red aura in front of him suddenly dimmed, revealing the curvaceous figure of Maya’s body. She must be crying, he thought, and the sweat is cooling her skin’s surface temperature. He turned around and went through the interface. On the other side, Kalyan was already opening the door to the transporter shaft.

“After you,” he said, pointing to the tube.

## CHAPTER 23

Returning is always faster than going. Madonna first noticed this as a child, during school trips. The bus ride back was always shorter than the ride out. “You’re just less anxious,” she was told. Then there was her trip to Europe. The return flight went much faster than the outgoing flight. “It’s the wind,” the captain piped in, “and you’re less anxious,” confided the stewardess. Now she was pulling up to her parking spot beneath her building on Lexington Avenue.

“Already?”

It took her almost an hour to realize Erik was gone. First she had to change into sweat pants and shirt. Then she freed her breasts from the contraption that held them unnaturally horizontal. Then she poured herself two fingers of Glenfiddich scotch, single malted, and installed herself cross-legged on the large bedspread, telephone on her left, notepad on her right. After a sip or two, she checked her voice mail, grimacing every so often from the taste of her drink. By the time she got to Erik’s message, she was tipsy. At hearing the news of his departure, she uttered a WOW of disbelief, then rushed to his garment rack. After



confirming the man's (perhaps fortunate) departure, the woman decided to take her mind off him by perusing through Meni's manuscript.

She grabbed the Old El Paso bean and cheese box from her duffel bag and walked over to the area of the living room which served as office. This consisted of an array of tables pushed against a large bay window overlooking her busy street and which were cluttered with high-rises of paper, telephone, fax machine and a personal computer from the Ice Age. The literary agent slammed the box on her desk. She wondered whether publishing the alien planet's story would hurt Meni instead of helping him. She looked at the piles of queries and manuscripts awaiting her attention.

The task of a literary agent combines the talents of an editor with that of a negotiator. The first must have literary intuition, the second monetary ambition. Still, hadn't Proust been rejected by one of France's finest authors, André Gide? Yet one would think great writers would have the finest literary opinions. Contrary to Proust, Augusta Augustina, spiritual writer at large, was being published without much heartache at all. Madonna gazed at the mountains of paper landscaping her desk. She didn't know whether she loved her job or hated it. The thick and

sweet taste of scotch whisky tingled on her lips and made them slightly numb. She liked that feeling. She liked the fact that it made her lips bulge with blood. And she liked treading upon male territory.

She opened the Old El Paso box and read the first chapter. She looked up. It was as if a bolt of literary lightning had shocked her back to her senses. He's nuts, she thought to herself. Of course this wasn't written by an alien. But then again, what did it matter whether it was written by a Human, a Venusian, or a clam? What we need here, she told herself, is a kick-ass introduction, a hook. The claim was what counted. The readership was all there. Many people were infatuated, if not obsessed, with the idea of other worlds and extra-Terrestrial life. Even she was getting into it now. Perhaps Floor's theory was right then. Maybe the whole issue was merely an existential burp of our subconscious, a reflection of widespread anxiety. 'I think therefore I am,' had said Descartes, and indeed, people were thinking. To feel alive, to assert itself, the psyche commanded thought. And what better metaphor of our existence and place in the universe than to wonder whether other beings are real. For, if they exist then certainly, so do we.

Madonna peered at the titles on her bookshelf. The Lottery by Jackson, The Sirens of Titan by Vonnegut, Bradbury's Fahrenheit 451. They had nothing to do with Floor's theories. Nothing to do with angst. These books went beyond the existential issue. The whole point of science fiction was to create a reality so far removed from our own that it enabled us to focus on specific issues and isolate their irony. Sci-fi was the vehicle for many great metaphors. If you wanted to focus on racism's arbitrariness, you created a planet where everybody looked alike and then, all of a sudden, you decreed that those with large ears had to be put to death. If instead you wanted to tackle human hypocrisy, then you'd have a meteorite hit the Earth and the inhabitants of a village near the impact wake up the next day incapable of lying whatsoever. Wasn't that why people of every age, creed, and social background loved science fiction? All one needed to do was show up at a Star Trek convention to see a tower of Babel.

Maybe the search for life outside our own planet expressed our ego's loneliness, but didn't it raise fundamental issues as well? Didn't it challenge the maxim that Man was created after the image of God? What if intelligent aliens had no resemblance to humans, either

anatomically or spiritually. Would they be further from God, less of a creation? And wasn't that what Europeans debated about in the eighteenth century: Do Black Africans have a soul and therefore a right to freedom, even though they looked funny and didn't wear flannel underwear? What if this time around the extraterrestrials were the more powerful ones, and that they, too, believed they were made according to God's image... A drop of whisky trickled down the literary agent's throat and made her shiver. Jihad! No, she thought to herself, pouring one more finger of Glen into her glass, Floor's wrong. The angst thing, she reasoned, that was just one of the many issues science fiction raised, but there were many more, and just as powerful. An interior smile propagated to her lips. That was why she'd gone into publishing.

The phone rang just as the agent started the third chapter of Meni's novel. She put her drink down.

"Why, hello Dr. Freud," she said, recognizing the voice.

"Yes," confirmed the voice, "this is Holland. How do you do?"

"How do you do?" replied Madonna with hidden pleasure.

She started to toy with the portable phone's little rubber antenna. She felt subversive. Victorianly subversive.

"I understand," started the man, "that Dr. Mendel gave you a scrap with a telephone number on it."

Her index finger pushed back and forth on the short black cylinder exuding from the receiver. It was made of the kind of rubber one wants to pinch and squeeze. The phone's buttons too were made of the same tantalizing material. "Yeeeees," she answered, "that is correct, doctor."

Floor went on, "And I understand the name associated with that telephone number begins with an 'F'. Also correct?"

Madonna scrambled for her bag. She unfolded the piece of paper Meni had given her, the name was difficult to decipher. "Jonathan—I think—Fink-and-steln," she read out loud.

"Finkelstein," said Holland Floor. He paused for a second. "That's totally unacceptable."

The woman's fingers left the antenna, "Excuse me?"

"That simian simply can not be involved in our therapy," declared the psychiatrist.

Madonna took a sip of her drink, “Simian? Isn’t he Meni’s best friend\*?”

“A buffoon,” said Floor, “a Neanderthal with delusions of intelligence who constantly questions my work.”

“Since you brought it up,” she retorted, “I’ve also got a question for you.”

“Oh?”

“Yes, I’ve been thinking—”

“Always a step in the right direction,” interjected H. Floor.

“All right, hear me out.” She wetted her lips in the golden Scottish fluid, “Now, your theory about angst—”

“Hypothesis,” he corrected.

“Holland!”

“Apologies,” declared the psychiatrist, “I won’t interrupt again—unless, of course, it is a case of force majeure.”

The woman started again, “Your theory that there are no more extraterrestrials than there are giant octopuses, Godzillas or Loch Ness monsters is only partially right—just keep listening,” she said, preempting another

---

\* simian—An ape-like being. Possibly from the Greek *simos*, meaning snub-nosed. (*The Illustrated Encyclopedia Scientifica*, vol. 7, p. 800).

interruption from the receiver, “true, we feel lonely in our heads. We live and die alone, a token of company on the outside (if we’re lucky). I’ve heard this before. Sartre, the existentialists. Fine. I agree. But, extraterrestrials and science-fiction in general raise more than just this issue. Ever read 1984 by Orwell, or The Sirens of Titan by Kurt Vonnegut, or,” and there she felt a little awkward, “ever watched a Star Trek episode?” She caught her breath, “They talk about death, and time, and racism, freedom of expression, and sex!”

Her last example surprised even herself. She went back to playing with the antenna, waiting like a cat by a mouse hole, for Holland Floor to emerge and answer her.

“Well,” he began a little disconcerted, “I don’t recall there were any extraterrestrials in Orwell’s book. 1984 was political fiction not science fiction. And to answer your question, yes, I have watched many episodes of Star Trek. What with the isolation at Tupper Lake, television can provide a sense of entertainment and even uncover a window into society’s psychological make-up.”

The woman jammed the telephone between her neck and shoulder and walked to her refrigerator. She took out a can of decaffeinated diet Cola.

“I’m listening,” she said, amidst a fizz of carbonated bubbles.

“You’re right,” continued Floor, “Vonnegut and Star Trek do a good job at raising important issues. Still, I’m an astro-agnostic. I don’t know if extraterrestrials exist: maybe, maybe not. Frankly my dear, I don’t give a damn!” The psychiatrist paused for effect, but got no reaction from the woman.

He went on, “I do question, however, why so many people wonder so much about it. They must share a common drive, there must be a stimulating factor present in all the psyches. In my educated opinion, they are driven by the—as you like to call it—existential anxiety of being alone, what I call angst. The guise taken by the question is merely a reflection of the technological and historical context. When sea frigates were the frontier products of technology, the issue revolved around sea monsters. Today the frigates are rockets, and so the frame has shifted from ocean to outer space. As far as issues such as racism, freedom, the nature of time, the essence of death... indeed, they are real and important, but all they need is a catalyst to precipitate them. Science-fiction is today’s catalyst.”

There was a long pause. “So why don’t you want me to talk to Finkelsomething?”



“That man has a bad influence,” Floor stated gloomily, “on Meni definitely, surely on others as well.”

Madonna was intrigued, “Like what, he passes out cigarettes?”

Dr. H. H. Floor was distraught at such interest for such an uninteresting character.

He pressed the receiver with his hand, “Mr. Finkelstein is an insecure product of mis-education. He can’t speak two sentences without falling into a joke, usually a bad one. Why, he accuses me—of all people the only one accredited to form a deeply intelligent statement on the matter—to have no understanding of Dr. Mendel. He contends—with no psychoanalytic background other than his own dysfunction—that the man is perfectly fine, and that all needs is a... is a...”

“A good fuck,” said the woman.

“Yes!” exclaimed Holland Floor zestfully, “I believe those were his exact words.”

The woman nodded at herself, it didn’t seem that bad a diagnosis. Then again, half of Manhattan needed one too. “So?” she asked him.

Floor jumped, “What do you mean, so? I’ve told you before, Meni Mendel is a schizophrenic. He’s suffering from dementia scientifica.”

“Give me a break,” interrupted the agent, “please, at least give it a more complicated name.”

“It is complicated,” asserted Floor offended, “I’ll be presenting a paper on it next week, in New York, at the annual meeting of the American Association of Psychiatrists. Come and see for yourself.”

The agent rolled her eyes. “Like I have time for this,” she remarked upset, “no, I don’t believe I’ll be able to attend, Holland.” Furthermore, she cared about Meni. He may have been depressed and odd, but he wasn’t insane.

“If you change your mind,” insisted the savant, “it will be next Thursday, at five p.m. sharp—cookies and tea fifteen minutes prior—in the Psych auditorium. NYU. Five p.m. Monday. Cookies.”

## CHAPTER 24

Astronomy is like sex. Lots of courtship, lots of foreplay, then the action begins. Or, put scientifically, lots of calibration, lots of calculations, then the analysis begins. In both cases, the steps that lead to orgasm are key.

There is something sensual about observing. The need for an obscure chamber, the starry sky, the unzipping of the dome, the waking of the long instrument within. Then there's our planet's location in the universe. We live in a spiral galaxy, named so because seen from above it looks like a circle upon which are painted several thick white stripes spiraling inward. The circle itself is lightly sprinkled with white dots. The whiteness of the dots and of the spirals comes from light shone by thousands of stars. All together approximately one hundred billion of them in our galaxy.

Seen in profile, it looks like a sunny side up egg with two bright yolks protruding from either side. The yolks form a shiny sphere called the bulge, which is also filled with stars. The spiral stripes look like arms emerging from the bulge and lie in the egg white, which is called the disk of the galaxy. The Solar System is located inside that

disk, two thirds of the way out, a fertilized ovule aware of its existence. From Baltimore, Buenos Aires, Bangkok, or anywhere else on Earth the disk appears as a strip of stars in the night sky. That strip is what we call the Milky Way, but it's really the arms of our galaxy seen sideways.

Jonathan Finkelstein loved fried eggs. He'd come up with the egg metaphor during breakfast at Debbie's. Debbie's is a diner in Baltimore's old harbor, Fells Point, where he used to go as a graduate student. Typical customers at the diner included cops, paramedics and late night dancers; some famished from a long night's work, others storing fat for a hard day ahead. Jonathan was having Debbie's special, two eggs any style with bacon, home fries, toast and coffee, all for one ninety-nine. Then it hit him.

He brought his head down near the tablecloth, at eye level with his plate, and stared at the one remaining egg, fried sunny side up, just like his mom used to make. Then he let it dangle from his fork and slanted his head, eyes parallel to the plane of the egg white. It looked just like the galaxy he lived in, seen sideways. The egg-galaxy.

Debbie approached from behind the counter with both hands on her size forty waist, "Never seen an egg before?"

“This,” responded Finkelstein, “is the most beautiful egg I’ve ever seen in my life.”

The woman squinted, “Just a regular egg,” she said suspiciously.

“I know,” he continued, “but it reminds me of my childhood.”

“What,” said the woman, “you a chicken or somethin’?”

Thereafter, and throughout his doctoral career, Jonathan was known as the egg man at Debbie’s Diner. In Toronto, where he was a junior scientist, people knew him simply as Jonathan. His parents, who always saw him as a little boy, never ceased to call him Johnny. And Meni called him Fink. So he was rather surprised, not to say intrigued, when he got a phone call from someone asking to speak with a Dr. Fink-and-steln, who, he assumed, was himself.

“I don’t think he’s here,” he answered not knowing what to say, “may I ask who’s calling?”

“Is this Dr. Flink-and-steln?” the female voice asked suspiciously.

“Finkelstein,” he couldn’t help responding, “yes, it’s me.”

“You said he wasn’t there,” quizzed the woman.

“I was lying,” replied Jonathan.

“Do you lie often?” she asked.

“Look,” he said, “it’s your turn to lie. What’s your name?”

“Madonna,” returned the voice.

“Bad liar,” reproached the man, “try again.”

“Okay, my name is... Georgette. How do you do, Mr. Fink-stein?”

“Finkelstein. Fine thank you. What are you calling about, Georgette?”

“Well, Meni Mendel gave me your number—”

“Ooooooh! So you’re the one!” interjected Finkelstein.

“The one what?” asked Madonna.

“Nothing,” he answered rapidly, “Meni mentioned you in an email, though he didn’t mention you had such a lovely name.”

“Isn’t it?” said the agent in her best Avon imitation. “Now, Meni gave me a manuscript to review. I’m a literary agent and—”

“Kind of like a car dealer but for books, right?” interrupted the astronomer.

“You astrologers are so smart,” she answered.

Her sarcasm was inviting.

“Thank you,” said Finkelstein, “let me guess,” he exclaimed, “you’re a Gemini.”

“Virgo,” she corrected him with satisfaction.

“Ah, yes. Well actually, I’m the Gemini. But anyway, I’m sure you didn’t call to get your fortune.”

“No I didn’t,” she said in an incriminating tone, “as I mentioned earlier, I’m reviewing a manuscript by your friend Meni Mendel, and he strongly suggested I call you.”

“Well, I have no idea what it’s about,” confessed Jonathan gingerly, “but if Meni said so, then let’s talk. I respect Meni very much. Shoot.”

“Actually,” said the literary agent, “I’d rather if we met. I’m in Toronto for a book fair. You choose the place.”

The Granfalloon is a pub located in the heart of Toronto. Three blocks west lies the campus of the University of Toronto and Jonathan’s office, while a couple of street corners east lies the Holiday Inn, where the book fair was taking place. So the literary agent had only two blocks to walk to reach their meeting place. A wrong turn, however, steered her well off her path. So after hiking for twenty minutes, instead of the five she had been promised, the woman hailed a cab. She arrived half an hour late.

Inside the pub, there were exactly two customers. The first, a nineteen year old, was stripping her with his eyes as he chewed a handful of peanuts. The other, a black man in his mid-thirties dressed in khakis and a white shirt, sipped quietly from a small glass. Neither seemed good Finkelstein candidates. Madonna approached the second.

“Dr. Finkelstein?” she asked half-heartedly.

The man responded by imitating her overly astonished tone, “Ms. Georgette????”

She sat down, “I’m sorry, I expected—”

“Don’t worry about it,” he interrupted the woman, “I’m used to it.”

“It doesn’t seem like you are.”

She laid a notepad on the table.

Finkelstein glimpsed at the paper then brought his face close to hers, as if in confession, “You know,” he whispered slowly, “black men are hard to draw.”

“Look,” she said, “I’m sorry, okay? But it’s not like there are many Italian McPherson’s. So a black man named Giovanni or Jonathan Finkelstein... You’ll excuse the surprise.”

“You remind me of this guy on a train from Berlin to Paris,” he said, and nodded at her, “what’re you having?”



She nodded back to his glass, “Scotch? I’ll have the same, straight up though—real men don’t need ice. What about that guy?”

He flashed her a fake smile, then resumed his story, “Guy comes in the compartment—we’re talkin’ late nineteen thirties here—and sits down next to the window. He’s wearing a black suit, white shirt. He’s got a long fuzzy beard, couple locks of hair spiraling over his ears like new year’s confetti, and his hat’s too small for his head. In front of him is a black man reading a paper. The guy with the beard leans over to the black man. ‘Hey,’ he says, ‘you seem like the type of man who can keep a secret’. ‘Oh yeah?’ says the black man, ‘what’s your secret?’ The bearded guy leans even further toward the other, ‘I’m Jewish,’ he whispers loudly. ‘No shit?’ says the black man, ‘I’m black’.” Finkelstein paused, “So there it is, you remind me of the Jewish man on the train.”

“You know what?” said Madonna grabbing her newly arrived drink, “you remind me of the other guy.”

“Must be the color,” commented Finkelstein, “you noticed?”

“No, not the color,” she said, slowly waving her head, “it’s the arrogance.”

The astronomer's eyebrows jumped up in surprise, "Touché!"

They both gulped a sip of their Glenlivet scotch whisky.

"My mother's African, my dad's Jewish," said Jonathan Finkelstein, "they met when he was in the Peace Corps." The astronomer was trying to make up for the past few minutes.

"Good try," responded the woman.

Finkelstein took another sip. "Thanks," he said.

She smiled. "Do you believe in aliens, Jonathan?"

Finkelstein choked on his drink, "You too?" he gargled. The man took another swig of scotch to smooth out a coughing fit. "Is this why you wanted to meet?"

The agent slammed Meni's manuscript on the table, "I wanna know whether this is complete crap, or whether one can make a case for it."

The astronomer thumbed through a handful of pages, "So he wrote it, Huh?"

"Clearly," she commented.

"Not a good idea."

"Why not?" asked Madonna.

"Why don't you all just leave him alone?" asked Finkelstein.

“Because he asked me not to,” she responded. The woman wetted her lips, “So, any chance it’s real?”

## CHAPTER 25

Holland Floor's office was singular for one very special reason. The psychiatrist had arranged the furniture so the interior decoration of the room mimicked the interior organization of the mind. In effect, every object, piece of furniture, and article of decoration had their meaningful place and psychological counterpart. There were three main areas corresponding to the ego, the superego, and the id.

Upon entering the room, across from the doorway, a large bay window adorned with French lace curtains provided the brain office with a vision of the outside world. Two reclining armchairs faced the frilled window at an angle, a small wooden table supporting a telephone acting as a buffer between the two chairs. Against the wall to the right of the window, was parked a small mobile hospital table which Holland Floor had appropriated for himself during his residency program at UCLA. The pair of reclining chairs provided the necessary comfort for protracted sessions of therapy and note taking. This area constituted the superego of the brain office.

Near the left wall of the room, Floor had set up a simple wooden chair and a large sofa with cracking saddle

brown leather where patients could lay if they wished. The sofa was a favorite place for those who felt like rambling about their phantasms. By no means was it a coincidence that a Georgia O'Keeffe painting hung over the sofa, or that the sofa itself was brown. The gorgeous print showed two white lily leaves with velvet textured creases spiraling into a soft funnel from which an erect pistil emerged. Upon lying on the brown sofa, patients were instantly compelled to embark upon some of their more provoking sexual and scatological reveries. On occasion, the psychiatrist himself assumed the location and recharged his libido with fresh fantasies. This was the domain of the id.

On the other side of the room, pressed against the right wall of the office, Holland Floor had placed a rather monumental double-paneled pine wood armoire. Upon acquiring the imposing wooden wardrobe from his grandmother's inheritance, the psychiatrist immediately had it gutted for file storage. The antiquated style had been preserved with drawers built in aged pine wood; in all, eight rows and three columns, separated at the fourth row by retractable wooden cutting boards used for perusing documents while searching the archive. Contrary to his home filing cabinet, which contained exclusively his private research project, this armoire and its files related

only to patients at Tupper Estates. This constituted the memory banks, so to speak, of the brain office.

Finally, Floor's office distinguished itself by the total absence of a desk. Not that there wasn't enough room for one, there was ample space for even two, but according to Floor, desks were detrimental to psychotherapy. For one thing, they created a physical obstacle between therapist and subject whereas, paradoxically, he was trying to become intimate with his patients (or at the least be a frequent guest of their subconscious). Furthermore, desks were an icon of authority. And being a doctor, Floor thought he was already enough of a father figure and didn't want any more artifacts distorting his rapports. In addition to these few points, he found desks rather useless anyway, certainly far inferior to filing cabinets (which could hold hundreds of documents and promoted method) and definitely not as practical as small hospital eating tables (which could be reeled to one's favorite seat and adjusted to an optimum height). All things considered, and to Holland Floor's credit, most patients at Tupper Lake felt comfortable and even enjoyed his office. One exception, however, was Meni Mendel. The astronomer felt at a loss in an office void of computers, and the empty area in the middle of the room beckoned him to pace. In effect, the

area had been intentionally left empty. It was meant to be paced, trampled, stamped down by frustrated feet. It constituted the paddock where the ego tamed the id.

“How is gravity today?” asked Holland Floor.

Meni fidgeted in the reclining chair. “Let me tell you about yesterday’s first—TUT—Yesterday, I felt like a man on the Moon. I bounced up effortlessly, I walked on air cushions, I felt elated.”

“Were you wearing a space suit?”

“No—weirdo!”

“What about today?”

“Today I woke up feeling like an astronaut at take-off. Five g’s pushing against my chest and onto my bed—Judy—Thinking of many things with no motivation for any—TUT—Everything a deception, and me... a fake—Judy—”

Holland Floor drew an arrow on his notepad, “What do you mean, everything is a deception?”

Meni compulsively toggled a lever on the right of his armchair, successively tilting its back almost level, then upright. With every swing, a mechanical footstool was summoned up and the man’s feet leapt into the air. Floor looked on. In the reclining position his patient indeed

looked like an astronaut during take-off. Finally, Meni got up. He adjusted the curtains to fit his Tourettic standards of symmetry, and hopped over to the small hospital table next to the window. The therapist didn't use it in his sessions with him because of Meni's tendency to pace, which gave him a vantage point from which to peer at the medical notes lying flat on the table. Floor had a phobia of people looking at his notes, especially over his shoulders.

"Astronomy is crap," Meni suddenly declared, "exobiology is bull, my book is deluded, Madonna thinks I'm a nut, and I couldn't finish my Eiffel tower puzzle—Judy, Judy—"

Holland Floor watched Meni play with the mobile writing table, then decided to leave his seat and walked over to the colossal armoire. The psychiatrist pulled a drawer against his chest, then dogpaddled through a thick file and plucked a folder out. He read it for an instant then laid it on one of the wooden slabs he'd extracted from the armoire's belly.

"Another entry for our little list," Floor commented. He turned over a dozen or so pages blackened with interjections and names of things and people. "Your coprolalia has summoned a Judy from your memories, Dr. Mendel. The last time you referred to her was during your



Romeo phase, when you thought you were romantically attached to Director Manukian.”

“I remember that—TUT—though I have no idea who Judy is.”

Holland Floor returned to his seat and settled into the chair’s specially designed cushions, guaranteed for long lasting comfort. “You said you felt like a fake.”

“I got it!—TUT! TUT!—I did have a girlfriend named Judy in high-school!”

Floor thumbed through the folder, “I shall inscribe this piece of the Mendel puzzle immediately.” The psychiatrist scribbled a note. “Now, did you also feel like a fake with Judy?”

The astronomer regained the astronaut chair but sat sideways. “Everything around me is built on make belief. Astronomy, for example. Who really knows what a pulsar is, has anyone flown to one recently? Extraterrestrials, talked to one lately? My discovery—TUT—turned into a novel. And—Judy!—”

Holland Floor looked up from his pad of notes, “There’s Judy again.” He cocked an eyebrow, “Are you in love with Ms. Petri, Dr. Mendel?”

The syllables ass and hole crashed into the psychiatrist’s ears. “I’ll take that for a yes,” said Floor as if

to himself. He pressed on, “Whom do you think is faking the character of Meni Mendel, Dr. Mendel?”

Meni rubbed his palms against his face, shifted in his seat, then repositioned his glasses along his nasal ridge. “There are two me’s—TUT—one is buried deep inside. He’s passionate, emotional, honest. Then there’s another one who lives on the surface, building sand castles and inviting people over for a party, self-conceited and convinced he’s right. My Tourette is a bridge between us two.”

“Sand castles are okay as long as you know they’re made of sand.”

Meni shifted position, “They’re pretty.”

Floor nodded, “Yes,” he grinned coyly, “especially those with turrets!”

Meni was oblivious to Floor, “But they’re useless.”

“Well, they are made of sand,” said Floor.

“Astronomy is pretty,” Meni went on.

Holland Floor nodded again, “Yes.”

“But it’s useless,” said Meni.

“Well,” retorted the psychiatrist, “it’s not engineering but it’s got its hidden beauty.”

“Hidden.” The astronomer let out a pair of sad honks, “TUT! TUT!—I feel like such a fake.”

Holland Floor remained silent.

“All I need,” Meni continued, “is one little sign that I’m not utterly crazy, all pretense.”

“And what would that take?” asked Floor.

Meni snapped out of his trance and turned to his therapist, “Einstein said that the best recognition, the only recognition, is that which you get from the forum of your peers—balls!”

## CHAPTER 26

Finkelstein slanted his head, “Even if there is life out there, it wouldn’t be on a pulsar.”

“Why not?” asked Madonna.

“Too hot,” said Jonathan, “large compounds couldn’t stand the heat, God couldn’t build acids.”

“How about on a planet?”

“Look,” said the astronomer, “what are the chances of conceiving a baby after having sex only once?”

“Thin,” replied Madonna, “but not zero.”

“Exactly,” he said, “and I think that making a planet is like making a baby. Sometimes it takes years, sometimes it doesn’t happen, sometimes you get it on the first try. If you checked a billion couples after they had sex only once, you could find millions of pregnancies, but it’s entirely possible that none occurred.”

She pointed a finger at him, “One certainly did.”

He grinned for an instant, “So, take several billion clouds of gas and collapse them into stellar systems. Well, several of them may produce a planetary system, but it’s entirely possible that only one does. Ours.”

“But chances are, there are a whole bunch out there, right?”

Finkelstein took another sip of whisky, “You want an honest answer: I don’t know. Any astronomer that gives you a number should tell you it’s subject to huge uncertainties. Otherwise, he or she is conning you.”

“How about extraterrestrials, life outside the Solar System?”

Jonathan Finkelstein waved his glass at the waiter, “You know about the Drake equation?”

Madonna squinted her eyes and bit her lips, “Something about the number of stars multiplied by the probability one has life...”

“Almost,” said the astronomer, “you’ve got the right idea, except there are more factors involved. The goal is to calculate the number of extra-Terrestrial civilizations that could communicate with us. So you multiply the number of stars by the fraction of those with planets, fraction of planets that can develop life, fraction of life that becomes intelligent, fraction of those that develop technology and of those that decide to communicate, and so on. Problem is, how’re you gonna peg a number on, say, the fraction of intelligent life that develops technology? I mean, there are millions of species on Earth and only one

developed technology, that's already one chance in a million!"

Madonna laid her pen down, "But aren't there billions of stars?"

"Yes," he responded excitedly, "but take one chance in a million to develop technology, times one planet out of ten that may support life, then when you multiply by the number of stars that may have a planetary system, at the very most one billion, you get maybe a hundred or so intelligent species in the whole galaxy. Now here's the real problem: the Milky Way is twelve to fifteen billion years old but civilizations only last for a few thousand years, so imagine the chances any of these will overlap in time!"

"I'd rather not."

Finkelstein leaned over the table, "Less than one in ten."

Madonna brought her scotch glass to her lips, "Better than the lottery," she said.

The astronomer felt betrayed by his oversimplification, "Yeah, yeah," he said flustered, "but I can make it worse than the worst lottery. For example, the number of stars with a planetary system is much debated and could be a thousand times less than one billion. Not to mention the fraction of planets that may support life is a big

unknown, and life is clearly a difficult thing to reproduce. And not all of the lifeforms will develop intelligence, and of those that do and that also go on to develop technology, not all will decide to communicate,” the scientist’s grocery list was getting a little out of hand, “and the period when that technology is available is a narrow window of time which may not coincide with yours, let alone that it might be shortened by self-destruction.”

“Okay, okay,” interjected Madonna, holding her palms up to make him stop, “I get the gist.”

Finkelstein raised his drink and winked at her in a victorious swig of scotch.

“Still,” she said, “people do win the lottery.”

He interrupted his sip and laid his glass back onto the table while the woman raised hers and returned him a wink.

“There’s a difference,” he said, fighting a light smile, “between your own chance at winning the lottery, and the chances that there will be any winner at all. When you buy a Lotto ticket, the odds you’ll win are pretty low, like one in ten million or less. But millions of tickets are sold. Depending on the jackpot, thirty million tickets could sell, so the chances that there will be a winner can be pretty

high<sup>\*</sup>,” the astronomer noticed the agent arching her eyebrows a couple of times, “this doesn’t mean that someone will win, it’s still possible that everybody got sucked into buying the wrong combination because of their horoscope. And your own odds still graze obscurity. But the more tickets are sold, the higher the chances someone will have picked the right combination. That’s why it is crucial to determine the number of stars buying tickets in the lottery for extra-Terrestrial intelligent life. The more stars, the higher the chances one or more will have the right environment to spur intelligent growth.”

Seeing the man pause, Madonna leaned over the table, “Well, are there enough stars?”

Finkelstein bit his lower lip and swirled his drink a couple of times, creating an eddy of scotch in the glass.

“A mildly optimistic estimate from a group of ostracized astronomers places the chances of an alien lifeform sprouting to intelligence and deciding to send us a birthday card in the one in a thousand to the one in a hundred range. More hard core scientists tend to think that only a hundred million stars could host a planetary system

---

\* In October 1994 the New York Lotto jackpot was \$72 million, and over seventy-three million tickets were sold. This implied that the chances there would be a winner was one in three. Four people won.



and that strictly speaking, the human species is one in a hundred million on Earth to have developed anything close to an advanced civilization. Given that, the chances we have an alien friend trying to communicate with us is less than one in a million. These aren't the chances of hosting intelligent life for a specific system, by the way. One in a million are the chances that, amongst all the stars in our galaxy, at least one of them hosts intelligent life. As a comparison, the chances there'll be a winner in this month's drawing at your local corner store's Lotto gravitate around one in two million and still sometimes no one wins!"

The woman leaned back and glanced at the man thoughtfully. "Ironic," she said, "that the same hard core scientists who claim they can explain everything without a God, calculate the chances for our existence are so low that it must be something very special, even extraordinary, which isn't far off from divine."

Finkelstein played with the rim of his glass, "So. People who win the lottery must also be divine."

The agent lit a cigarette, "No, you're right, they're not. I guess what I'm saying is that the odds are suggestive of something unique. Look, if the chances that any intelligent lifeform exist in our galaxy are one in a million,

and those of Man one hundred million times less, then you can't help to think that, really, Man beat all the odds. It's as if the impossible has been achieved, and who can do that but God?"

The astronomer grabbed the cigarette from the woman's hand and drew a short drag off it. "When it comes to odds and probabilities, everybody's got an interpretation," he returned to Madonna the nicotine cylinder, "the same logic you applied to show Man's uniqueness could be used to show a sardine's uniqueness too. Yet if the Earth was filled with sardines instead of people, would that be suggestive of a god? I don't think so. You need Man in the picture, or the power of suggestion evaporates. Like Primo Levi said, it is the hardest thing, as humans, to realize that the universe is a cold place and that it is he who must bring into it warmth and meaning."

Madonna grimaced, "That's really depressing."

The man shrugged his shoulders, "Let's say that tomorrow a huge asteroid hits the planet and the Earth's orbit is changed so much that it plunges into the Sun. Totally inconsequential. It would be like a spoonful of honey fed to a bear, okay? Now say we were the galaxy's only shot at intelligent life. Is the Milky Way gonna collapse, or neutron stars speaking Hebrew? Everything is

going to go on as if nothing had happened, because, come to think of it, maybe nothing much did happen. How central is Man to the idea of God now? If you have the intuition of God, I respect that. Though I'm not religious, I truly believe in a higher power. But only because of what's on Earth, not because of what's not in outer space."

Madonna shook her head, "Maybe the optimist crowd is right anyway. You know that number you mentioned, the fraction of species that develop technology?"

"What about it," he said.

"Jonathan, is it possible that even though there are hundreds of millions of species on Earth of which only one developed microwave popcorn, that they all belong to the same evolutionary bed. I mean, who's to say that evolution doesn't always lead to a plethora of half-wits from which only one highly intelligent species comes out? Wouldn't the Earth in fact suggest that the chances life evolves into something very smart is one out of one?" she gave him a coy look, "Not bad, Huh?"

Finkelstein quickly finished his drink, "Before you change your name to Einstein, don't forget that the Earth is made up of continents like Australia and Greenland, and islands like New Zealand which broke off early enough to

be independent test tube experiments within this evolutionary bed. The result is that Man did not spring forth from all the test tubes even though he had ample opportunity and environments to do so. Kangaroos were made in Australia, not Man. And Keas in New Zealand. Still no Man. In America, wild turkeys and cranberry shrubs but no Americans. So. Evolution doesn't always lead to a highly intelligent species. Man was made only once, in Ethiopia. We're all African, really. You want another Glen?"

Madonna shook her head, "Didn't they find life on Mars?" she insisted.

"Naaa," rang Finkelstein, "NASA thought they did—fossils of organic compounds in a meteorite. But they submitted their find to the public and short-circuited the scientific forum, to avoid debate and get money from Congress. The result: people running around screaming there's life on Mars when shortly after the discovery was publicized, it was found that the fossils were more likely to have been produced by ordinary inorganic compounds or worse, contamination from the lab where the meteorite was stored."

The woman's hand nervously tapped Meni's manuscript, "So what you're telling me is, this is crap."

Finkelstein slanted his head the other way, “I didn’t say that either. After all, we’re here, aren’t we?”

Madonna raised her glass for one last sip of scotch, “One chance in a thousand, Cheers!”

## CHAPTER 27

“Now what?” Kalyan turned to Kee.

The two Kulturans were standing in a phosphorescent tunnel sparkling with a million glow worms. A rubbery wall sealed the underground passageway, gently glowing in the infrared. The power complex hydra was but a few inches away, shielded by this barrier. Crawling on his hands and knees, Kalyan had padded the entire perimeter around it. He now felt certain there were no hidden opening mechanisms. The two friends sat facing each other, leaning on either sides of the tunnel.

Since Kulturans had buried their toxic garbage in underground geological strata, Kalyan suspected hydra’s energy, whatever it was, melted the vitrified garbage. The result was the toxic emanations they called permafog. And Kee and Kalyan had to stop it. Because, they would be the last to try.

Kee tried to maintain a cool head. “Okay,” he started, “let’s summarize what we know here.”

“Nothing,” hollered his partner.

“Who had access to hydra?” asked Kee.

Kalyan grimaced, “Bunch of old farts, two kids who thought themselves geniuses, and...” he interrupted himself.

“...and my dad,” Kee continued.

The other looked away.

He went on, “So what kind of kids are we talking about?”

“Genetic engineers,” replied Kalyan.

“Geneticists?” This new piece to the puzzle lifted Kee to his feet, “What would you need them for in a power plant?” he asked loudly. He stood, hands on hips, facing the stubborn membrane-like obstacle. “Are you smart?” he suddenly asked.

The other architect was taken aback, “Excuse me?” he said.

“I’m talking to the membrane.”

“What?” Kalyan was confused. He watched his partner for a long instant staring unfocused at the thing in front of them. Then he inquired impatiently, “Yes?”

Kee seemed to be wavering between utter mystification and sudden revelation. “Look,” he

declared, “we’ve been looking at this problem all wrong.” He pointed at the rubbery barrier, “Just look at this thing. Let’s say you found a switch, then what? Do you think it would disappear? or that a door would appear? This thing is sealed to the walls.”

“I noticed that,” remarked Kalyan.

The other went on, “Remember the previous expedition’s report? ‘It’s like a wall of mud,’ they said, ‘you can stab it all you want but that won’t cut it open.’ That can only mean one thing: to get in we’re going to have to go through it.”

Kalyan frowned, “What are you getting at?”

“Look,” Kee replied, “how does something get through a membrane or a filter?”

Kalyan’s face was clearing but not entirely. “By osmosis,” he responded.

“Exactly,” said Kee, “now the only extra bit of information we have is about those—”

“Geneticists!” yelled the other Kulturan.

The two architects turned to each other in one movement. A two-piece jigsaw puzzle shouldn’t take that long to figure out.



The greenhouse was a fantastic place to think. What with the panoramic view and the company of the mutant plants, one felt detached from reality. Maya's eyes ran over the distant landscape flowering with bitter roses. The sky on one side of the room shone bright white; five suns had bunched there a few degrees above a hill. Overhead, the sixth star made its way toward them, dragging a yellow curtain behind it. On the other side of the room, the glare from a sunken seventh sun created a dim aura of blue light. A black petal came flying by, lifted by the winds. It fluttered for a moment before crashing against the geodesic glass panel in front of Maya. The Kulturan's eyes danced with the leaf until it stopped. Her gaze focused back inside the laboratory. A shiny metallic box seemed out of place. She wondered what was in it, and before she knew it, the box was in her lap.

She welcomed the interruption: two of the five bio-filters were not working any longer and the three others were infected with the retro-fungus. Soon, the stilted village would have only altitude to fight against airborne pollutants. With a conjunction brewing, what chance did they stand? That

depended on Kee and his partner. Were they to succeed and turn hydra off, the permafog would subside, and the level of toxins in the air would plummet. She opened the shiny box. Inside, a beautiful monster awaited.

The open flower seemed in perfect pain, her delicate petals a velvety black, shackled to seven electrodes attached to the sides of the box. The black pollen had been removed and in its place a tube plunged into the pistil like a dagger into her heart. From the midsection of the stem, three wires exuded at right angle. And where the roots used to shoot from, another tube stuck out. Seen from above, the electrodes were dancing around the flower. The scene combined the power of beauty with something unbearably sick, the kind of thing that forces one's head to turn away, albeit mesmerized. There is something perverse about high-tech torture, as if someone had gone out of the way to re-invent pain.

Maya might have been the only Kulturan ever to see a bitter rose in full bloom. But this sense of privilege was tainted with a feeling of guilt. Not because of the pain inflicted on the flower, but

because one had rendered vulnerable to the point of mercy something harmless and mystical. She closed the metal lid. Her skin was covered in iron rich sweat. No, she wasn't the first to see a black rose in full bloom. Someone else had seen it before her, the same someone who'd put it there in the first place. And she had a feeling she knew who that was.

Kalyan squinted at his partner, "I know what you're thinking," he declared. The svelte contour of the other Kulturan appeared in indigo red. "Membrane penetration occurs by osmosis. You're guessing this one works by genetic osmosis... So size of molecules and concentrations are irrelevant, only genetic code matters."

Kee nervously pressed his lips together. An imperceptible nod rocked his head up and down.

"And what's more," added Kalyan, "you're banking on your genes resembling those of your father to get you through the membrane. But what if this thing changes its mind half way through?"

Kee took a couple of steps forward. "All I ask is that if you see my hand outstretched, don't

start wondering about it, just yank me out of there. Otherwise, I'll give you the thumbs up.”

“All right,” Kalyan replied, a little offended.

But he had no time to dwell on his friend's lack of confidence as Kee was already flinging himself onto the membrane. He tried walking into it, running into it, pressing himself flat, elbowing himself in sideways. Nothing. The rubbery substance would not give in. “Come on!” he yelled in frustration, Kalyan pushing at his back. He rammed himself one more time onto the rubber seal. Then again and again. Every time he bounced back just as hard. In his mind, Kee thought of how things conspired against him. Maybe he really wasn't his father's son and hydra was the only child the membrane recognized. “Come on, you bastard,” Kee swore at the rubber, “I'm just like him!”

Kalyan was running out of breath, “Must be... your... bio-filter lining,” he said, punctuating each word with a push, “it's shielding your... genetic make-up... from this damn thing!”

Kee stopped in his tracks and the other let his arms drop. Kee's pores moistened. “Can you

believe this?” he cried out, “we’re two inches away from hydra and this monster...”

He hadn’t wept since he was a child.

Wetting his pores was as close as he could get to it, and that’s exactly what he did. He was standing next to the membrane when Kalyan saw him last. The rubber seemed to suddenly come to life, a thousand fingers pointing at him, awakened by the strands of DNA in a few dead skin cells that had reacted with the bio-lining and been brought up with Kee’s transpiration. In an instant he was gone, as if grabbed from behind.

“Kee! Can you hear me?”

There was no response.

The Kulturan harnessed all his energy and managed not to panic. He waited for a while, but not even an outstretched hand came forth. “Helloooooooooo!” Kalyan howled loudly, hopelessly. A great wave of helplessness was taking possession of his senses when he noticed a hand protruding from the side, its thumb was up. As soon as he touched the hand, it started pointing at the membrane. Kalyan considered it for a moment, then while his partner maintained the osmosis flowing, he stepped into the rubber and entered the hydra energy complex.

## CHAPTER 28

The year of our Lord 1789 saw two events shine with particular brilliance. One came from the sparks of the muskets storming La Bastille, and was the French Revolution. The other came from the glitter of stars and nebulae never seen before by a human eye, and came from William Herschel's newly completed forty foot telescope. The world's longest. Whilst Marie Antoinette awaited decapitation on the guillotine, King George III of England and the Archbishop of Canterbury were visiting Mr. Hershel's contraption, something about peering into the skies. Neither the King nor the Archbishop were interested in looking at binary stars, or Uranus which Herschel had discovered a few years earlier or even the inhabitants of the Moon which he documented in his observations.

Instead, his Highness wanted to know if he could watch the Queen of France's execution from a safe distance, while his Sainthood wondered if he could see Heaven. Both wanted to put to rest a couple of nasty doubts poking at their minds. Both left disappointed.

Because it was so long and heavy, the mirror weighed about a ton, the instrument could not easily be

gyrated or spun, like its modern offspring now can. Instead, one end was left resting down, while scaffoldings held the other end pointing upward. To his credit, the astronomer decided to let the Heavens do the work. He pointed the telescope at a precise angle and let the sky move through his eyepiece. Each night, he observed a different strip of sky. Up to that time, astronomers spent their nights tracking a handful of stars, now all kinds of objects passed through Herschel's field of view and he, and his sister Caroline, drew them and catalogued them. Had his system of scaffoldings and pulleys been more sophisticated, Herschel would have never been the precursor to modern astronomical surveys.

Some of the most intriguing objects they observed were the nebulous type. They looked like fuzzy amorphous balls floating in the Heavens. A few had been observed before but their nature had remained a mystery, so he paid close attention to these fuzzes of light. Sometimes, he was able to resolve them into bunches of stars, called associations, other times the objects remained fuzzy. The question then became whether the fuzzy nebulae were indeed stellar associations—and all one needed was a telescope powerful enough to make them out—or whether some were of an altogether different kind. The answer

came later, as some nebulae were confirmed to be gaseous envelopes around white dwarfs (the long sneeze stage of a low mass star, or planetary nebula), and others were found to be distant galaxies.

With a hand on his mouse, Dr. Jonathan Finkelstein double clicked the IRAF software icon on his SUN Sparc station. He had been looking at the image of the pulsar and the visual identification seemed to yield something odd. While the IRAF package initialized, he brought his head close to the monitor one last time and examined the dot of light. The picture that filled the top right quadrant of his monitor looked just like the sky, except it was on the screen in front of him instead of overhead. A neon red circle started blinking at the bottom of the image. By adroitly moving the mouse over its pad, the man quickly dragged the circle over the target, PSR2100+09. The astronomer felt pleased with his own dexterity, even though a twelve year old could have done it even faster. Finkelstein then pressed the C-key and a small blue window popped up left of the image, showing a detailed map of the area twenty pixel long by twenty pixel wide and centered on the blinking red circle. The map looked like the type a geologist would use, with contour lines showing the topography, except instead



of altitude each line represented luminosity. The astronomer nibbled at the inside of his lip a few times, then pressed the S-key. The contour map was replaced by a 3-D surface map of the same area. It looked like a range of mountains with a peak in the middle, except this time, height represented luminosity, the taller the brighter. He now dragged the blinking circle off the target and onto an ordinary bright star caught on the same picture. Again, he pressed the S-key and another blue window popped up. Astronomers like surface maps because the graphical representation makes it easy to determine which star is more luminous by comparing heights. But Jonathan Finkelstein wasn't comparing luminosity, he was comparing shape. The bright star's surface map looked like Mount Everest, a sharp well defined peak towering over the surrounding pixels. In contrast, that of PSR21 looked more like a pregnant hill in the Appalachians.

With a series of key strokes, the astronomer constructed a graphical model of the bright star and adjusted the clone to have the same total luminosity as PSR21. A pulsar looks like any other star when observed in the visible part of the spectrum. It's in the radio frequencies that it distinguishes itself, as it pulsates periodically like a beacon in space. A surface map of the clone showed it had

the shape of the bright star and the luminosity of the pulsar. Pressing the F2-key, Finkelstein subtracted the image of the artificial star from that of PSR21.

The power of a CCD image is that each picture element, or pixel, has a number associated to it representing its brightness. And so two pictures can easily be added or subtracted by adding their corresponding pixel values. Since the clone was of the same magnitude as the pulsar, and both were supposed to be stars, theory predicted the subtraction to be near perfect. The scientist wouldn't even have bothered, had the surface map of the target not looked so lame. He dragged the blinking red circle over the area where the pulsar had just been artificially excised, and pressed 'S'. A blue window popped up. The surface map of the residue showed a deep crater. This could mean only one thing: PSR21 wasn't shaped like a star. Non-stellar, said Finkelstein to himself, and rested his chin into the 'L' formed by his thumb and index finger.

When Meni got the email, he jumped for joy.

"I knew it," he said out loud, "non-stellar!"

He telephoned immediately back to Jonathan from the Tupper Estates.

“What do you mean—TUT—don’t get excited?” he hollered in the receiver, “non-stellar!” he shouted at Tourettic speed.

“You haven’t even answered a simple ‘how are you?’” complained Finkelstein.

“Non-stellar,” sang Meni Mendel.

“Say, when are you getting out of that joint anyway?” asked his friend.

“Tomorrow.”

“Good,” declared Jonathan, “Get away from that Floor guy. I don’t like him one bit.”

“I know,” stated Meni, “he doesn’t like you either.”

“Anyway,” declared Finkelstein, “as I wrote to you, I’ve looked at PSR21. You were right, there’s something funny,” this was Jonathan’s way of making up, “it’s as bright as—”

“...an association,” interrupted Meni in a confident tone.

“How would you know?” retorted his friend, “you haven’t even seen the image yet.”

“You said it yourself,” Meni replied cheerfully, “non-stellar! That could only mean one thing.”

“I know.”

“It doesn’t look like a star because it’s in a system.”

“A stellar system,” said Finkelstein.

“Yes, yes. High mass star runs out of fuel and supernovas. Pulsar is born. In the explosion, the pulsar’s kicked to the right, or to the left, or whatever—TUT—in any event, it starts wandering around until one day its path brings it close to a stellar association and—Hee-heeeee!—pulsar gets captured in the association’s gravitational field.”

“Hmmm. A capture would give it a highly elliptical orbit,” commented Finkelstein thoughtfully, “that could explain the two and half year orbit...”

“What are you talking about?” demanded Meni surprised, “Who got a two and half year orbital period for PSR21?”

“These guys in England tracked it for five years. The data showed a two and half year periodic variation, suggestive of an elongated orbit around something,” Finkelstein paused for a brief instant, “the orbit’s decaying too.”

Meni compulsively tapped the receiver a few times, “Didn’t they get pictures and come out with their own little scenario?”

“They didn’t get the telescope time,” Finkelstein replied, “the time allocation committee didn’t believe their

calculations. They're the ones who discovered a planet around some pulsar, then had to retract their discovery when they found a mistake in one of their equations."

"Ouch," exclaimed Meni, "should we trust them, then?"

"Well, the image of the pulsar is non-stellar," reaffirmed Jonathan.

"Non-stellar," echoed Meni, and couldn't help adding, "and inhabited—TUT!"

## CHAPTER 29

On his thirteenth birthday, Jonathan Finkelstein was given by his parents a rectangular box containing a chassis mounted on a spinning mechanism, plus ten pieces of white cardboard, and three bottles of paint: spinach green, salsa red, and chewing gum blue.

Jonathan's father, Maurice 'Globetrotter' Finkelstein, had traveled to each of the four corners of the planet. He had drunk cappuccinos in Rome, eaten lamb stew in Casablanca, and chewed coca leaves on the Inca trail. He'd lived in Africa, in Asia, he'd done a thousand things and met a thousand people. But when he returned to his native Janesville, Wisconsin, he was penniless, married, and had a son. Still, he wanted his only child to be like him, a painter—at least at heart. Though he fancied himself an artist, the world around him considered him a cobbler, and though he ended up with the largest shoe repair chain in the country, Artistic Soul Inc., his beginnings were humble. So for his son's Bar-Mitzvah, he got together an old record player, some cardboard and three empty red plastic ketchup bottles. He encased the turntable in an empty crate of nails,

and since he had just finished his store sign, he filled each ketchup bottle with the remaining paints.

Young Finkelstein would carefully lay one of the cardboard canvases on the frame, spin it, and then joyfully press on the plastic ketchup bottles. Depending on his mood, he would choose a different rotation speed. If he felt introspective he'd set the dial to  $33\frac{1}{3}$ , if he felt lively he'd switch it to 45, and if he sensed the demon of creativity looming over him, he'd jack it up to 78. Independent of the rotation speed, the result invariably resembled either a Jackson Pollock or a spiral galaxy. He identified the first in one of his dad's art books, and the second, many years later, in an introduction to astronomy class at Beloit College, in Wisconsin.

Now seated in his Toronto office at the Canadian Institute for Theoretical Astrophysics, Jonathan Finkelstein wondered at his confusion. Every time someone had examined PSR21, something weird had come out. First the English team had found the amazingly long orbital period, then Meni declared he'd found an extra-Terrestrial message, and now he himself found it didn't look like a pulsar but rather like an association. Jonathan had thought that by studying the pulsar and showing Meni how ordinary

it was, the matter would be put to rest. Instead, PSR21 was turning out to be the exact opposite from an ordinary pulsar. And the last thing Jonathan wanted to do was exacerbate the situation. The phone rang. Thinking of the feisty literary agent, the astronomer's heart almost supernovaed.

Instead, he responded disappointed, "Yes, I remember you Mr. Floor."

He made a point of not calling the psychiatrist doctor. At the other end of the line, delicately holding an index card labeled Finkelstein, J. between his index finger and his thumb, Dr. H. H. Floor went straight to the heart of the matter.

"You've been interfering with my work," he said flatly, "again. Why did you tell Dr. Mendel he could leave tomorrow?" Then reading down the card, he noticed the comment, reverse psychology. "I'd like to rephrase that," he rapidly corrected himself, "why didn't you tell Dr. Mendel to stay?"

Finkelstein grimaced and looked at the receiver, "How is Meni going to get better if the psychiatrist himself is... as peculiar as yourself, Mr. Floor?"

"Would you like to talk about me, Mr. Finkelstein?"



“I’d like to talk about the person who deserves to be talked about,” Finkelstein responded upset.

“Then you agree Dr. Mendel needs attention?”

Floor continued.

“Attention? yes. Pseudo-analysis, no.”

“I see,” Floor said, “maybe he’d get better with you then?”

“That’s not what I said,” Jonathan responded defensively, “Meni doesn’t need to get better from anything. He just needs to be let alone.”

“Ahhhh!” exclaimed the psychiatrist, “But I have the feeling he doesn’t leave you alone. Isn’t that so?”

The astronomer flushed, “What are you talking about?”

“Mr. Finkelstein,” said Holland Floor, “I didn’t graduate top of my class for nothing. We both know Meni Mendel is obsessed with, say... aliens?”

Finkelstein was caught off guard, the other man wasn’t that far off. “Obsessed is a little strong,” he commented.

“We understand each other,” continued the psychoanalyst, “he is on sick leave for a reason, no?”

“Yes,” admitted Jonathan angrily, “but he’s not sick. And I didn’t tell him to leave tomorrow. He chose to on his own.”

As he talked, Holland Floor annotated some additional comments on the index card, “I see. But you did tell him about a pulsar in a solar system of sorts, no?”

The psychiatrist made an effort to end all his sentence with a ‘no?’ to force the other into admitting whatever preceded the negation. Reverse psychology, exclaimed Holland Floor to himself, so juvenile!

“Well yes,” conceded Jonathan, “but not really. I mean, not a solar system, a stellar system.”

He didn’t want to get into a protracted discussion on the semantics of planetary astrophysics with Floor.

“But in your friend’s mind,” the mind doctor argued, “there is no difference, you see. You are aware of this, no?”

Jonathan Finkelstein was losing his patience. One more ‘no?’ and his hand would come out the receiver at the other end of the line and wring the psychiatrist’s neck.

“Yes, no, what does it matter? Listen,” said Jonathan, trying to regain control, “what matters is how to help Meni out of his depression. And the best way to do

this—and I’ve known him for a very long time, Mr. Floor—is to refocus his attention someplace else.”

“Someplace that would captivate his attention, no?”

“Someplace very captivating,” Finkelstein capped off.

“But different from astrophysics, no?”

“No,” responded the astronomer to Holland Floor’s great surprise, “precisely astrophysics.”

In graduate school, Jonathan Finkelstein had explained to his father the process of gravitational capture very simply. First he reminded his father of the spinning contraption and the three ketchup bottles filled with paint. Then, he showed his father one of the resulting chef d’oeuvres his mom had saved in an album (along with the nine others).

“Look at the kinetics of the paint,” Jonathan told him, “see how each drop is smeared the same way?”

His father brought his face close to the canvas, popping his glasses up for a moment, “Along a circle,” he stated to his son.

“That’s what I meant,” said Finkelstein junior, “all the drops seem to be going clockwise, right?”

“Right,” responded Finkelstein senior.

“And that’s normal, ‘cause that’s the way the turntable spins, right?”

“Right,” repeated the father.

“Then how do you explain this?” snapped Jonathan, pointing at a couple of droplets stretching in the opposite direction, counter-clockwise to the rest.

Maurice ‘Globetrotter’ Finkelstein brought his head down and examined the two culprits. “I guess this explains why you’re not Jackson Pollock,” he declared flatly.

“That’s exactly it, Dad,” retorted Jonathan. “So, how did I do it? How come two of the paint drops seem to be going in the opposite direction from all the others?”

The son pressed on. Half an hour earlier, his dad had asked him how galaxies formed, and after telling him the regular mumbo jumbo, Jonathan decided to expound on galaxy interaction. The mumbo jumbo, according to the son, had been suggested two hundred years earlier by one of the world’s greatest philosophers. According to that philosopher, a large ball of gas had collapsed into itself due to its own gravitation, and as it contracted it started to spin and flatten out. Kant’s nebula, it was called. Imbedded in it, smaller balls of gas had also collapsed and formed stars. In the end, the whole thing looked like a giant egg, fried,

sunny side up, with a yolk protruding from either sides and sprinkled with stars. But this seemed like nothing compared to the challenge posed by the two maverick spots of paint going counter-clockwise on the canvas.

“I don’t know,” the father finally admitted, “how?”

“Very simple,” Finkelstein, Jr., went on victoriously, “I added them after the spinning. I didn’t pay attention to the angle I held the ketchup bottle when I squirted it, and so the paint ended up splashing the other way... by chance.”

“Mazeltov, and how does this relate to my question?”

“Because,” calmly responded the son, “we observe in our own galaxy a handful of star clusters going the opposite way than all the others. It’s called retrograde motion. And so we think they joined our galaxy after it was formed, not during.”

Mr. Finkelstein, Sr., seemed intrigued, “Where did they come from?”

The prodigal son felt proud he could provide an answer, “They were probably captured. Stolen if you will, from another galaxy or from inter-galactic space, by the Milky Way’s gravitational field.”

“What’s inter-galactic space?” asked the father.

“It’s the space between galaxies,” responded the son.

“That I can imagine,” declared the father, “but you just told me stars are created inside galaxies, so what are they doing between them now?”

Jonathan Finkelstein was pleasantly surprised by the question. You don’t become CEO of the biggest shoe mending company in the world by chance, he thought to himself.

“Well,” he said, pausing for an instant, “it’s possible they were pulled out by a previous encounter between two galaxies. Or that they somehow were ejected during the formation process. Or that they were formed outside of a galaxy but where gas had also accumulated. The important thing to remember is that capture by gravitation can occur, and that these retrograde orbits seem to confirm this caveat. In fact...”

“Yes?” asked the old man. If he wasn’t genuinely interested, he was certainly making a heck of an effort.

Jonathan considered the situation for a moment, then decided to be daring. “In fact, other things can suggest gravitational capture. For example, our Solar System. All the planets orbiting the Sun lie in more or less the same plane, except for one. Pluto’s orbit is inclined some fifteen

degrees off that plane. How come? The probability it's a statistical fluke is near zero. And its orbit is highly elliptical too, whereas most others are almost circular. This difference isn't because Pluto's furthest from the Sun, Neptune is almost as far and yet its orbit is just about a circle. See what I'm getting at?"

"Sure," replied Finkelstein Sr., "I used to be able to tell an imported shoe just by the sound of its sole on the pavement. Italians were the best! Click-click-click instead of clap-clap-clap."

"Exactly, dad," exclaimed the son, "and if Pluto was indeed imported, who's to tell there aren't more of them out there?"

## CHAPTER 30

Extreme conditions require extreme measures. Of the five interfaces providing clean air to the sheathed village, four were so infected with the retro-fungus that they were inoperative. The only functional one was the first interface. The reason was that it was exposed, face on, to the brutal winds of the conjunction which impeded the spores of fungus from depositing. But as soon as the suns redistributed themselves over the sky of the planetoid, the thermal imbalance would subside. As soon as the temperature bathed Kultura more uniformly, the storm would die down. In no time, the particles of fungus would find their way into the lining of the remaining bio-filter and eat away at the last interface.

“This way,” pointed Alya.

Kulturans streamed by her, fleeing to zone one, where the bio-filter still provided clean air. She’d come up with the idea, or more precisely had dared to express it, at the previous board meeting. Moving the inhabitants there was the only way to



keep them safe from pollution. The alternative was unthinkable, that is, un-breathable. Every single Kulturan would resettle into zone one then, at least until the conjunction was over. Afterwards, the permafog would settle back down and the levels of airborne toxins would decrease dramatically. Maybe low enough to cause only minor damage to their lungs. There was only one problem: five bio-filters were necessary to provide enough air for everyone to breathe, how long could they last on one?

The evacuation was almost completed and Maya quickly ran up to the greenhouse. One last look around, she told herself. Leaving it behind was like leaving Kee, and the pain seemed too great without one last goodbye. When she arrived in the glass cupola, the permafog danced up and down the panels, as if it were possessed. Unyielding, the Kulturan's eyes scanned the laboratory, knowing exactly what to look for. Holding herself steady by the railing of the steep stairs, Maya finally focused on the true purpose of her visit, a metallic box resting by a bushel of unripe capacitors.

The metallic box shone seductively while all around it pollution fogged the windows. Like a thousand spectators, the crowd of toxic molecules jumped up and down, each wanting to peer in, they wouldn't miss this for the whole world. Gathering her courage and exorcising the dancing spirits, Maya launched herself forward, then back, shiny box under her arm. The architect's heart raced at the prospect of one last tiny glance, even if awkward or sideways, through a narrow opening of the box's lid at the bitter rose inside.

The two members of the last surface expedition, Kee and Kalyan had never seen anything like it, at least in the infrared. Finally, they had penetrated the guardian membrane and entered a cave at the heart of the power complex. The cavity was dominated by the intermittent glow emanating from a filamentary network covering the entire ceiling. So this was hydra. A mass of filaments intertwined and interconnected, each element rocking slowly, rhythmically, and glowing in unison as if under the influence of a tide. It spread overhead, interrupted only at one spot in the middle

of the cave, a few paces in front of the two Kulturans. There, the filaments converged into a carved knot, as if it were the structure's belly button. An umbilical cord of braided vines cascaded down from that point, like a stalactite. Near the ground, the vines disentangled into five thick roots which then disappeared into the soil. Unlike the rest of the structure, the vines were made of a familiar material clearly the work of Kulturans bio-engineering. Kalyan pointed at the bio-wires and turned to his partner.

“I noticed,” Kee said calmly.

They approached the culprit of the villages' death and circled around the cords protruding downward. Each of the five roots glowed ferociously.

“One for each village,” declared Kee.

“Which one do you think decimated yours?”

That he recognized, in parts of this exotic vision, the handiwork of Kulturans technology, brought on the bitter-most taste of betrayal. In one gesture and with both hands, he abruptly yanked the appendage down. The umbilical cord snapped immediately. There was no sound but that of the

thick coil of fibers landing onto the floor of the cave.

“Done,” declared the Kulturan.

“Yes,” said Kalyan, “but for how long?”

Kee glanced at the glowing ceiling, “You’re right, we must prevent our mistake from repeating itself.”

Maya joined her friend, Alya. They watched over the few hundred Kulturans resettling into zone one near the main entrance of the geodesic dome. The scene brought with it a sense of impending catastrophe.

“I’ve been thinking,” whispered Alya nervously.

“I know,” Maya interrupted, “three hundred lungs and one bio-filter. I know,” she repeated.

Alya flushed a deep blue. After all, this had been her idea. She turned to Maya. The leading architect pressed a shiny metallic box against her stomach. “What’s this?” Alya asked.

“I think,” Maya answered hesitantly, “this is... us.”

The leading architect opened the box ever so slightly, and the radiance of the flower paralyzed the other Kulturan.

“Look,” said Maya, and as she gently stroked the stem of the imprisoned bitter rose, the petals quivered.

“Alive?” exclaimed her friend in disbelief. Maya squinted back, “You call this living?”

## CHAPTER 31

Madonna Petri left New York the same day Dr. H. H. Floor arrived to give his talk newly entitled, ‘Dementia Scientifica Obsessiva: Extraterrestrials as a mass hallucination’.

The auditorium was packed with Holland Floor’s med-school classmates and their friends. The student who had graduated top of his psychiatry program was known more for the oddity of his research than for his research of oddities. In fact, by the time he got to the third paragraph of his speech, and to the third mention of the acronym E.T.I.—for Extra-Terrestrial Intelligence—a smirk of amusement had appeared on most of his listeners’ lips.

When speaking publicly, however, Dr. Floor had taken the habit of annotating in his mind the comportment of his listeners, and thus took full notice of their blatant lack of scientific objectivity. ‘Of course!’ he realized in a flash of genius, if the hallucination afflicted the masses then surely psychiatrists would not be spared. Clearly, his audience was in denial. In his aloofness, Floor thought with sympathy of the master himself, Dr. Sigmund Freud.

Hadn't he been mocked when exposing his brilliant work on the Oedipus complex?

The psychiatrist scanned the crowd looking for the one person he really cared to be understood by. But she was nowhere to be seen. For the first time in a long while, Holland Floor felt a poking sensation inside his guts. 'Fine!', he finally conceded, and banished the woman's memory to the surface of a three and a half by five inch index card.

Maybe it was a good thing Madonna didn't show up at Holland Floor's entertaining talk. As she drove South on I95, she pictured the auditorium rather empty if not for a few ancient professors speed reading through the conference program. "Excuse me," one of them would interrupt poor Holland, "but this isn't on Prozac and Rat Libido, is it?" The woman smiled guiltily. A green rectangular sign zoomed passed her, BALTIMORE 65 Mi. She glanced into her briefcase sitting open on the passenger seat, Meni Mendel's annotated manuscript and book contract glared back at her.

She grabbed a music CD wedged in the stack of papers and popped it into her car stereo. Patsy Cline's voice started to blare languidly. Madonna felt at peace with

herself. Telling the news to Meni on the phone had made her feel like a kid unwrapping a new board game with a friend. Since Erik's departure, she had been riding the roller-coaster of single life. At times the woman felt liberated, then again she felt lonely. She didn't want to give Meni any ideas, she liked him but... Still, she suspected he'd form some ideas on his own anyway and dreaded turning him down.

The literary agent's GM Saturn finally glided into the visitor's parking lot at the Johns Hopkins University department of Physics and Astronomy. She found the astronomer's office on the ground floor, near a sculpture by Henry Moore, Atomic Energy. She knocked twice and was greeted with a couple of TUT's which she interpreted as an invitation to enter. Meni was peering intently at a large screen, like Don Quixote staring at a windmill. Next to him stood the brave Pancho Villa.

"Georgette!" exclaimed Pancho.

The woman tried concealing a smile, "Excuse me?" she said.

"Georgette!" repeated Jonathan Finkelstein, "how is the world of high literature?"

Meni was mystified, "Georgette?"



A couple of chuckles leaked through the agent's nostrils.

“Your name isn't Georgette, is it?” said Jonathan.

The woman approached the desk, “Nope.”

“TUT!—Her name is Madonna, you fool.”

Madonna slanted her head gently, “My turn to lie, remember?”

Finkelstein nodded, “You didn't look like a Georgette.”

“Who's Georgette?” asked Meni, pushing his glasses against his glabella.

Madonna disregarded the question. “You guys watching the Flinstones?”

A CCD image split the screen in half.

Finkelstein leaned back in his chair and observed the woman. There was something very not like a madonna in her demeanor. Something pleurably unholy, and wholly human. The remainder of a little girl who used to get into trouble but in an innocent way, who was naughty but not mischievous. In brief, all the signs of the curiosity and intelligence forbidden to a madonna.

She turned to the image on the Sparc station's monitor, “What's this?” she asked.

There was no immediate response. The agent noticed Jonathan Finkelstein sealing his lips with his index finger, and Meni Mendel fidgeting in his chair.

“It’s a picture,” Meni finally conceded, tapping the screen symmetrically with both hands.

“Your aunt?” the woman asked casually.

Finkelstein smiled, “I think it’s Georgette,” he confided in a low voice.

The literary agent smirked back. “So,” she said, “who’s gonna have the balls to tell me?” She twisted her head a couple of times between the two astronomers. “Let me guess,” she went on, “it’s the pulsar, isn’t it?”

“Smart!” howled Meni Mendel, “It’s the image of a stellar association.”

“Ah,” she let out, “my apologies.”

“Don’t apologize,” interjected Finkelstein, “you’re actually right. The pulsar’s in it.”

“Behind it,” corrected Meni.

His hand compulsively started massaging the mouse into a circle.

“In it,” repeated Finkelstein.

“Then what’s this, Dickstein?”

The mouse’s pointer orbited around a speck of light at the center of the picture.

“What is it?” pressed Madonna.

She didn’t mean the question in an astrophysical sense, but rather like, what is this thing? All she saw was a white blob on a dark background with four white dots around it.

“It’s a gravitational lens,” explained Meni cockeyed, “see that bright clump in the middle, that’s a stellar association. And these four dots around it all come from the pulsar standing behind the clump—TUT—light bends around a massive object,” he explained, “such as an association.”

The woman glanced toward Finkelstein.

“It’s an artifact,” he answered her eyes, “grains of dust on the CCD detector magnified a thousand times and out of focus. But really,” he continued, “what this is, is our friend Meni fucking up, that’s what it is.”

“Oh come on,” regretted the agent, she was sorry to have pressed the issue.

Meni’s Tourettic fingers had made their way to Finkelstein’s shoulder where they gently tapped the astronomer. “The feature’s on every picture, in every filter,” declared Meni Mendel.

Jonathan Finkelstein turned his head and faced the fingers. “As it should,” he told them, “since the effect’s on the CCD and not in outer space.”

The hand flew off.

“Then how come we don’t see it on the Flats, asshole?” Meni snapped at full speed.

The woman blushed with guilt. “I started this mess guys,” she declared, “it’s me you should be upset at, okay?”

Someone asking him to calm down was another reason for Jonathan Finkelstein to escalate the argument.

“There’s no evidence this is a lens except for these measly pictures,” he retorted loudly, “and they were obtained with a leaky instrument. Artifact!”

Meni Mendel turned to Madonna, “Maybe it is, maybe it isn’t—TUT—” his voice reflected a mix of confidence and nervous excitement, “but you can’t close yourself to discovery just because it’s different, can you? If it wasn’t, it wouldn’t need to be discovered.”

The literary agent had been turned into a referee though she felt more like a ping-pong ball. With each verbal volley, the woman’s head was slapped one way, then another. But there was something fascinating about being a

witness to this exchange, like peering through the partly opened door of your parents' bedroom during a fight.

Jonathan's palms went up, "I know what he's getting at," he said to Madonna, "and I'll have nothing to do with it."

His friend twisted his body, "What am I getting at, Fink?"

"I'm not gonna say it," declared Finkelstein.

Madonna couldn't help her lips. "Aliens?" she asked in a whisper.

The two astronomers stood dumbfounded.

"Smart!" roared Meni, "That's exactly it!"

"Okay," Finkelstein gave in, "would you care to explain to me how and why extraterrestrials would send us the manuscript of a book, and choose to do so using a pulsar's signal?"

Meni looked somehow happy that someone had finally asked.

"Why is easy," he started by saying, "how, you can't expect me to fully explain."

Jonathan Finkelstein rolled his eyes, "Aaaaaaaall ears," he howled, "even half an explanation will do."

The other astronomer cleared his throat, "Uh-Hum—TUT!" He rearranged his glasses neatly on the ridge

of his nose before proceeding. “What are the Bible, the Koran, the Mayan codex, or even the Iliad. Stories? Just stories? Uh-Hum, uh-hum—TUT! Haven’t the Muslims, the Hindus, the Hebrews and the Greeks been propagating their civilizations through stories? And what do people do when they come home, but watch stories on the zapper? Why, why, why. Answer this: if you wanted someone in a foreign land in another era to know about Jonathan Finkelstein, what would you do? Wouldn’t you send them your biography? And what’s that—TUT—but your story.”

Meni Mendel waited for an acknowledgment from his friend and colleague, “Go on,” is all he got.

“You want the why? You want it?” he teased Finkelstein, “why a pulsar’s signal and not a telephone call? TUT!”

“Yes,” Jonathan burst out, “I want to know why. I’m expecting nothing short of a person-to-person call through a large radio-telescope. I think that’s perfectly reasonable.”

Meni smiled, “TUT! TUT! I’ve been wondering about this one since I found the signal. Why, why, why. But how many wavelengths are there? An infinite number, right? So tell me, what are the chances a species will ever

stumble onto that precise wavelength and receive that reasonable call of yours?”

“Well,” Finkelstein dragged his words, “it’s not that bad. There are some preferred ranges.”

“But it’s still pretty bad—TUT—right? Right?” The astronomer aligned the fingertips from either hands against one another, like a spider’s legs on a mirror. “But,” he interrupted loudly, “if you’re an intelligent species, you study your environment, right? You know about the sky. You’ve noticed the different characters out there—TUT—the white dwarf, the black hole, the neutron star...” After a few push-ups, Meni’s hands shuttled to his nostrils and started pulling repeatedly on the dividing wall.

He went on, “As an intelligent species, you know that if there are other intelligent beings out there they, too, will study these objects. I mean, don’t we? So tell me, what is your best bet: to send a message at an arbitrary wavelength or to use that of a pulsar which will probably be studied by another intelligent species?”

Finkelstein, making his way towards the door, now paced a few steps away from it. His comment was succinct but to the point. “This is nuts,” he said, then looked down and shook his head.

Madonna's lips went back to work, "How about the how?" she asked, flushing at her own impertinence.

Finkelstein stopped pacing for an instant and looked up at her.

"Chutzpah!" exclaimed Meni, "In fact, our great Dr. Finkelstein himself gave me the answer—TUT—He told me the Brits have found that the orbit of PSR21 was decaying. That's normal, the orbit is losing energy because the star is radiating gravitational waves. Maybe the extraterrestrials have learned to manipulate them in a such a way as to—"

Finkelstein opened the door, "Aliens aren't going to send us a novel through a pulsar mailbox," he interrupted, "neither can anyone manipulate gravitational waves. This is just nuts!"

Meni rose from his seat, "Dickstein," he yelled, "just as nuts as Pluto being captured by our solar system, right?"

"You're comparing apples and oranges," declared Finkelstein and he shut the door behind him.

Madonna sank back into her chair.

She sighed in relief, "Pfew! Is it always this intense between the two of you?"



“Always,” Meni answered flatly.

“Now what?” asked the woman.

“Now,” responded Meni as he tried to find the best location along his nose for his thick glasses, “we try and convince somebody down in Chili to take another picture of PSR21. Confirm the gravitational lens, redo the radio part at a higher signal-to-noise ratio, then get infrared ima—”

“Right,” interrupted Madonna, “and the chances of all this happening are...” she purposely didn’t finish her sentence.

“Slim,” completed Meni, “—TUT—especially if Fink’s out.”

She grimaced, “Not so sure we should go ahead with your book anymore, you know.”

“But why?” exclaimed the astronomer.

Madonna couldn’t separate the friend in her from the literary agent. “Look around you,” she said, “it’s just bringing bad things into your life.”

The man smiled timidly and leaned slightly forward, “I know one good thing that it brought,” and his fingers started to gently strike her hand.

She smiled faintly, then gestured no with her head. “Don’t,” she said softly.

But Meni was busy struggling with timidity, “I...”  
The astronomer was desperately searching for words, “I...”  
He suddenly interrupted himself with coprolalian honesty,  
“Sexy!” hollered Meni Mendel.

“Thank you,” said Madonna, as if complimented on  
her dress.

The woman removed her hand without ceremony  
and ran her fingers through her hair, as if to give them an  
excuse.

“I just don’t know,” she declared, then added,  
“about the book, that is.”

## CHAPTER 32

West Africa, May 29, 1919.

Sir Arthur Stanley Eddington liked to sip tea whenever he was confronted with an intense feeling. The juxtaposition of doing something benign in the midst of a crisis heightened his excitement. He looked up and frowned. The sky was darkening at high noon. He'd come all this way to Principe Island and the clouds were ruining his trip. The Sun, the Moon, and the Earth were about to draw a straight line. Straighter than the stem of his pipe. Another hour and everything would be over. It all depended on one cloud now. It was getting darker but it wasn't nighttime yet, and for a good reason. The same reason he'd come here for. But that damn cloud... not that he was looking for a tan, he was merely looking to verify the general theory of relativity. Or refute it.

Four years earlier, as World War I raged between Britain and Germany, the physicist Albert Einstein had smuggled to him, from Europe, papers relating to the

relativity theory. According to Einstein, the universe was a pillow. Stars and planets were like balls lying on it creating little dips and big troughs in its fabric, called space-time. Light traveled through space-time like a small marble on a pillow. Rolling down the fabric, following every fold, every wrinkle, every groove it encountered. A ray of light passing near a star would therefore bend along the sagging space-time, like the path of a marble curving around a heavy ball sitting on the pillow. Knowing geometry was tantamount to knowing the universe.

Upon reading this, the British scientist became electrified. Eddington decided to organize an expedition to prove, or disprove, that good fellow Einstein. The expedition was to observe a set of stars at a six month interval. First at nighttime, then six months later during daytime. Since the Earth revolved around the Sun, the night sky changed with the seasons. And the stars that were first observed at night, six months later would appear across from the Sun during the day. Each time, the astronomer would take a picture of the same group of stars, with one exception. The daytime photograph would naturally include one more star, the Sun.

If relativity was right, the position of the same stars in the sky, as seen from an observer on Earth, would be

different with and without the Sun. After all, according to Einstein's theory, space-time should be curved around the Sun, so that the rays of starlight passing near it would arrive bent on Earth as if they had come from a different direction. The mass of the Sun would bend the starlight of the stars standing near it, making them appear to be shining from further to the sides. This prediction could be tested by comparing pictures of the same area of the sky with and without the Sun, daytime versus nighttime. All Eddington had to figure out was how to photograph stars in broad daylight when the sky was as bright as lemon pie.

Though amiable and shy, Eddington had an iron will lubricated with logic and Earl Grey tea. An accomplished physicist and astronomer, he attained the highest distinction after publishing a critically acclaimed scientific manuscript followed by a very popular book, *The Nature of the Physical World*. Within two years, he was knighted. His expedition to test Einstein's relativity was divided into two groups. One went to Sorbal in northeastern Brazil, the other to Principe Island in the Gulf of Guinea, West Africa. Between the transportation, the telegrams back and forth, the support team, the photographic material, the scientists and their assistants'

salaries, the cost was exorbitant. Not a problem said her Majesty's government, we'll finance the expedition, but under one condition: Eddington must accompany the expedition and simmer out of the country for a while. This was to save them from a grave embarrassment.

Arthur Eddington was not only an eminent scientist, he was also a Quaker. Between 1914 and 1918, when Britain was losing tens of thousands of its sons in the trenches of Verdun in France, Eddington was pondering stellar structure. In brief, he did not go to war, he was a conscientious objector. A voluntary exile, therefore, was seen by her Majesty's brass as the most efficient way to avoid sending him to an internment camp and avoid them the embarrassing publicity. And so, on this May 29, 1919, Eddington was off the coast of Guinea waiting for a miracle. He wanted to take a picture of the stars in broad daylight. He was waiting for an eclipse.

The first thing Einstein did after receiving the telegram informing him the bending of light experiment had confirmed his predictions, was write his mother a postcard.

“Beloved Mother,

Good news today. Blah-blah-blah, the British expeditions have definitely confirmed the deflection of light by the Sun.”

Light bends, the universe is curved, pictures of stars in mid-day. Such good news! Pauline Einstein rushed into the streets of Lucerne in Switzerland, and accosted several pedestrians passing by. No, she answered, she wasn't interested in the time. After all, what would your mother have done had she been so lucky to get such a card? An old Yiddish saying tells that a mother who receives a letter from her son speaks so, “I read it night and day,” then taking a scrap of paper out of her apron, “wanna hear a little?”

Pictures of the sky show the thwarted nature of space-time. A large body of mass between an observer on Earth and, say, a background star, will bend the light coming from that star and make it appear to be in a different position than it actually is. In some circumstances, the light coming from the background source may have two ways to get around the intervening object, and rays will be deflected into two directions. A picture would then show two very similar light sources on either side of the intervening object. It's called gravitational lensing. Up to

four twins of the same background source may appear around the intervening object. One such event has been observed in the Southern hemisphere and was named the Einstein cross, in honor of the eminent genius.

### Recipe for a Gravitational lens

(serves up to four)

#### Ingredients:

- enough mass to distort space-time significantly
  - a background source of light
  - the right geometry along the line of sight
- scan with telescope until observed

All kinds of permutations may arise. For instance, a pulsar orbiting a stellar association could be lensed when carried behind it. It would make for a particularly interesting case because the radio-pulses it emitted would also be lensed. This means up to four radio signals would make their way around the association and be deflected towards Earth, even though the pulsar would have emitted only one. Some paths around the association being shorter than others, each pulse would reach the detector at a slightly different time. The result would be the combination



of four similar signals, one delayed with respect to the other.

Another interesting aspect of such a system is that the pulsar would be slowly spiraling inward. In other words, its orbit would be decaying. This phenomenon has already been confirmed in binary systems where a pulsar is in orbit around another star. The leap to a pulsar orbiting a group of stars (instead of one) isn't very big, just rarer, as far as we can tell. The decaying orbit would still occur because of a loss of energy as the pulsar radiates gravitational waves. The situation is similar to that of a plane losing altitude as someone utilizes part of its fuel to launch fireworks out the back window. In the case of the orbiting pulsar, the fireworks are gravitational waves.

The emission of gravitational waves by a star is comparable to that of electromagnetic waves by an electron. Electromagnetic waves are two big words for a phenomenon more commonly known as light. When an electron is accelerated, it radiates<sup>\*</sup> light. Likewise, when a pulsar is accelerated, it radiates gravitational waves. A pulsar in orbit is constantly accelerating: here is why.

---

\* The only exception being when the electron is constrained to a particular atomic shell.

Imagine yourself walking merrily down the street when suddenly you realize you're about to step on canine refuse, dog shit. Your foot's falling to the ground but you react and give it enough forward momentum to avoid hitting the spot—but the foot's still falling. Likewise, a body in orbit is always falling towards the center, such as a planet around our sun, but it also has enough forward velocity that it won't hit the center, it'll miss it just like your foot will miss the shit spot. Thankfully, crap doesn't have a strong gravitational pull, but our sun does. So once a planet misses it, our sun will be pull it back thanks to the invisible bungee cord of gravitation and this will keep the planet circling it. So we on Earth are always falling, toward the Sun. An orbiting pulsar is constantly falling too, and to fall means to accelerate toward something. So an orbiting pulsar is constantly accelerating and thus radiating gravitational waves, which causes it to lose energy. Little by little, it spirals in: the orbit decays.

Like an ocean has water waves, space-time has gravitational waves. In the ocean, the more curved the surface of the water, the more wavy it is. In fact, a calm sea is flat: zero curvature. So changing or manipulating waves affects the curvature of the medium. Water waves affect the

surface of the sea, gravitational waves affect the curvature of space-time. Since it is the curvature of space-time which lenses the pulsar's light and radio pulses, one could affect those signals by manipulating the gravitational waves.

Couldn't an intelligent willing force harness this process and modulate the outgoing pulsar signal with a message?

Pulsars are more than just incoherent big mouths, they are telephone polls in outer space. How likely is someone to climb one? Well, how likely are we?

## CHAPTER 33

The seventh sun finally made its appearance on the wavy horizon of Kultura, marking the end of the conjunction. From Kee's location, it penetrated the sky through a cleavage in the landscape. The sun came from afar, its highly eccentric orbit carrying it way past the others before it reappeared. It came up retrograde, as it always did, in its wake a parting sea of gravitational waves.

Maya looked around her. She was alone. The silence that had fallen on the geodesic dome was deafening. Gone was the brouhaha of the Kulturans and, since none of the bio-filters were operative, the shushing sound of the vents had also disappeared. She was lying on one of the narrow cots where expedition members lay after splashing into the pool of bio-filter lining. A few rises ago, Kee had lain exactly where she now was. The lapse of time separating the two events felt like a palpable distance, like ten feet or a hundred feet. Had someone been able to bring that distance to zero, she'd be lying on top of him. Her heart raced.

Inevitably, she'd have to leave the silent dome and take the induction transporter tube down to the surface of the planet. The metallic box containing the last black rose in full bloom rested on her naked belly. The flower reminded her she was still alive. The Kulturan sat on the cot and laid the shiny box carefully beside her. She propped one knee up on the hard mattress, then turned to the box. The pores covering her shapely body dilated to the point that she suddenly felt cool. In one continuous gesture, Maya brought her hands on top of the metallic lid and pivoted it about its axis. She wetted the whole surface of her skin when she saw the bitter rose greet her with the humble gratitude of the enslaved. Light! screamed the flower. Maya's heart filled with empathy. The Kulturan gently removed one tube, then another, then the electrodes one at a time. With each pull, the bitter rose leaned a little further into her fingers. At the last yank, it fainted into the palm of her hand.

“Now me,” Maya announced to the flower, as if it could hear anything, let alone understand.

Clutching the rose against her breast, the Kulturan stepped through the now defunct main

bio-gate. She noticed its lining was completely covered in fungus, but she didn't react. She laid a hand on the shaft of the magnetic transporter and a door opened. Stepping into the tube, she turned for a last glance at the inside of the dome. In an instant, she would reach the surface of Kultura.

Kee and his partner in crime, Kalyan, were waiting. They waited and waited for the conjunction to subside. Of two things they were certain. One, they had put a stop to the source of energy inducing the permafog. Two, during their idle time in the cave, they had noticed the large organism called hydra was a large fungus of the same type which affected the bio-filter interfaces. They were convinced that with hydra unplugged, both the fungal infection and the permafog would die down. But would there be anyone left to tell this to?

The two Kulturans pressed their hands together, then hugged each other. Kalyan spoke first.

“Tell them...” he started saying, but couldn't finish his sentence. Tell them if there's anyone to tell, echoed inside him.

Kee interrupted his friend, “I will,” he assured him. “What will you do here?”

“As you said,” declared Kalyan, “we must prevent this mistake from repeating itself.”

“How will you do it?” Kee asked.

“I’ll figure something out. All this energy,” pondered the architect, “that comes from who knows where. The story must be preserved with it. Go.”

He watched his friend leave the cave but did not envy him. Each one fits into the keyhole of life in a different manner. What would Kalyan have done back at the village anyway? His place was here, with hydra, putting the puzzle back together. The Kulturan knelt next to the electrical vines which had been pulled down. He examined the bio-wires, rubbing his chin, wondering what to do with them. He settled on one goal: record the history of Kultura and make this an integral part of the large fungus named hydra. It was essential that the two go together. Otherwise, the fungus would lack meaning, and the story a function. He started to draw a bio-circuit on the floor of the cave. Somehow, he said to himself, I’ll record our history

into this mass of glowing material, that's the only way others will learn and be warned.

Kee had long penetrated the membrane and left his friend prisoner of the cave. The Kulturan did not look back. With his own goal in mind, he proceeded through the luminescent tunnel. His people needed him, they needed his words to live, his knowledge to survive, his hands to build. And he, he needed the one Kulturan with whom he clashed the most, Maya. His goal was straightforward: take her into his arms and embrace her wholly. Kee rushed onward. He entered hydra's magnetic induction tube and reached the surface of the planet in no time. At his feet, a few bitter roses littered the ground. The conjunction had done its job and the seeds of the black flowers, dispersed over the planetoid's surface, had already sunk into the bulging soil of Kultura. The winds had swept the permafog into a thin veil which was beginning to settle. For the first time, the mist lay below the Kulturan's knees. As he walked, Kee trampled the thin fog with hostile satisfaction. With each step, he pressed into the ground the germs of bitter rose that lay in his path. In the distance, he could barely



make out the five thick pillars of the stilted village which were nearly transparent in the infrared. The geodesic dome seemed to float on the upper fringes of the remaining permafog, like a ghost ship adrift on the central sea. His entire body trembled with the fear of uncertainty, wondering if anyone was left other than himself and Kalyan.

## CHAPTER 34

Three personal letters awaited Madonna Petri upon her arrival at her home, 91 Lexington Avenue.

The first she stumbled upon was Holland Floor's. It consisted of three sheets of paper, scrupulously stapled and tucked into her downstairs mailbox, all typewritten with footnotes and a couple of references. The sheets were so neatly folded that as she went up the elevator, the image of the psychiatrist ironing the pleats off the paper flashed in her mind. The second note was casually stuck between the door and the frame of her apartment. It was wrinkled and carelessly ripped from a small pad of paper. The handwriting was clearly Erik's. Finally, as she opened her apartment door, the literary agent almost stepped on the third letter. It was a bright yellow envelope bearing a special delivery sticker and an illegible signature scribbled underneath, which she instantly recognized as the doorman's.

All these letters reminded the woman of her grade school years, when passing notes in class or during recess was something fun and exciting. The difference now lay in that she felt everything influenced, or at least affected, the

rest of her life. Giving Erik a break would imply one commitment, staying single implied another, and dating again would mean something altogether different. In each case, she felt as if she had to choose between totally different personas. As a young girl, things were so much simpler. Madonna Petri sat on the sofa. Who was she going to be?

Erik's note contained a trifle seven words, 'Be back to pick up the rest'. He hadn't bothered to sign it either. Perhaps the most interesting thing about it was the letterhead. It was one of those notepads which also served as a calendar. For each day of the year, a different Far Side cartoon was drawn. For Monday, November 22<sup>nd</sup>, the cartoon showed a mad scientist going over a blackboard filled with mathematical formulas, while two colleagues looked on. They were pointing at a spot on the blackboard where a complicated equation stopped abruptly. It continued further to the right, and in-between, a cloud had been drawn in which was labeled, 'then something wonderful happened...'. The caption showed one of the two perusing scientists asking, 'Could you go over that point again?'. The woman smiled. That's how she imagined Meni Mendel and Jonathan Finkelstein working together.

In contrast to Erik's note, Holland Floor's letter was tantamount to a treatise on the essence of being. He'd started with Socrates' maxim, 'An unexamined life is not worth living', then expounded on it with his own interpretation of those few but profound words. According to the psychiatrist, the dictum meant that individuals had to psychoanalyze their thoughts and actions to find meaning in life. That without a proper set of compulsions, fantasies, and complexes an individual had no motivation to live. In a sense, to be sane an individual had to be highly inhibited, otherwise he or she would be empty of personal drive. There were three steps between true sanity and true insanity, according to Floor.

“Step 1: The healthy individual. A highly introverted person, his or her healthy mind will be pregnant with engaging thoughts and fantasies. Introversion provides a constant replenishing of the libido from within, and produces a driven and creative individual.

Step 2: The normal individual. The normal mind is well balanced, the subconscious in osmosis with the subliminal environment (television, billboards, fashion, etc.). Archetypal agents free flow back and forth between this person's psyche and society's myths. People that achieve such a fine balance between their inner self and society, lose part of their ego and gain a collective personality. Normality is then to be understood as that collective persona.

Step 3: The sick individual. Extroversion is to the psyche what a soil that cannot retain its minerals is to a farmer. People with overly-developed people skills constantly disgorge their neurosis, like hormone ridden weight lifters who flex their leg muscles to the detriment of their testicles. One can comfortably state

that such a person is, de facto, castrated (from within). To compensate for his or her lack of substance, this individual will focus on his or her delivery by an abundant use of superlatives and a penchant for the grotesque.”

H. H. Floor then went on to illustrate each case; himself being the healthy example, Meni Mendel the normal, and Jonathan Finkelstein the sick. Psychoanalysis was like going on a treasure hunt where the riches were one’s hang-ups. His three and a half by five inch index cards were scraps of a much larger parchment, a map to treasure island, and the island was our subconscious. A page later, the psychiatrist was analyzing his own object of desire: her. In his own words, “...you play a leading role in my fantasies. Not all, mind you, but at a fair level of intensity.”

The psychiatrist’s honesty was baffling but Madonna kept reading, her eyebrows reaching for the middle of her forehead. There was a transition passage whereabouts he digressed about the differences between reality and illusion, and which concluded with him praising

the greater power of the ethereal over the palpable. A man will run to a mirage, but not a mirage to a man. Clearly, he went on, the phantasm of her company was more fulfilling than he could ever expect of herself, even if she slept by his side. As he put it,

“The power of fantasy resides in its infallibility. Your image is more loyal to me than you could ever be, and it lives directly in my cerebrum. I can call upon it at any time of day or night, and it will faithfully be there for me, as creative and willing as ever.”

The literary agent grabbed a pen and a sheet of paper. She had the sudden urge to reply to Holland Floor. The first note she wrote questioned how he ever got accredited to psychoanalyze anyone. She crumpled it up. The second note was a repeat of the first plus she gave him credit for his self-analysis. The woman crumpled it up too. Her third try didn't get past the first word, 'Dear', which she found too emotionally involved, and the note also ended up as a paper snowball. Finally, in a Floorian spurt

of self-examination, Madonna came to two realizations. One was that H. H. Floor was merely expressing what ninety-nine percent of men thought but did not admit, (i.e. fantasizing all day about women that they'd met for a second or two). The second thing she realized was that he was making her compete against her own fantasy. Madonna reminded herself of the prize of that competition. Clearly, she had no desire for Holland Floor, either in person or in thought. The woman felt as though a huge weight had been removed. She wrote:

“Holland,  
 I wish you much fun on your interior  
 play. It seems you've found a set and  
 a few good actors to fill your  
 loneliness. Unlike you, I like real  
 people better than fictitious ones,  
 especially when they blend the  
 different components you call  
 healthy, normal and sick into one  
 persona. You're right about  
 fantasies, they never fail you. But I  
 prefer the occasional failure to the  
 constant predictability of one's own



mind—or do you not know  
yourself?”

She smirked faintly. That was sure to turn him on.

The yellow envelope was clearly from Meni. The woman grabbed it with nervous anticipation happy to receive a note from someone dear to her, but at the same time, she feared the astronomer would overextend himself once again. She wondered how she was going to extricate herself without hurting him. Like a synchronized event at the Olympics, she tore open the colorful envelope just as the doorbell ripped through the apartment’s silence. What a tear, she joked to herself, then threw the envelope on the couch and proceeded to the door. She was expecting Erik to come back and retrieve the rest of his things, though there weren’t any left. They hadn’t seen each other for over two months, and she figured he wanted to talk. He’d probably come up under some pretext like dividing the CD collection, or the books, or anything that would require dialogue and confrontation.

The woman had to stand on her tiptoes to peek into the spyhole of her front door. She smiled in disbelief, and unlocked her apartment door.

“Hey,” she said, genuinely happy and surprised.

Jonathan Finkelstein smiled devilishly. He held both hands behind his back.

“I hope I’m not interrupting anything,” he said politely.

“I like interruptions,” she replied, “come in.”

The apartment was composed of exactly three chambers; a bedroom, a living room, and a bathroom. The bedroom was located directly across from the entrance door, a large room in between serving the functions of living room, dining room, kitchen and office. The bathroom could be found further to the right. Straight in front of Jonathan, a square slab of glass occupied the central area. A pair of sofas bordered the slab on two sides while a long, full body reclining chair in black leather bordered a third. The chair was almost horizontal and its sensual profile and material matched the woman’s sex appeal. It caught Jonathan’s eyes instantly and he imagined the agent’s beautiful figure, naked, lying comfortably upon it. The man brought his arms from behind his back.

“For you,” he said, a bottle of Glenfiddich in one hand, and what seemed like a black rose in the other.

The flower echoed the man’s skin color, enhancing it a little, endowing him with an air of seduction. She

glanced at the rose for an instant, a flattered smile bending the extremities of her lips.

“My favorite,” she said grabbing the bottle and disregarding the flower, “make yourself comfortable while I grab a couple of glasses.”

Finkelstein went over to the end of the couch next to the leather recliner. He wanted to be near the instrument of his fantasy. The woman joined him. She sat on the edge of the leather seat, her legs and knees bent sideways like two arrowheads pointing to one side, her feet entangled like a knot at the bottom. The agent laid two small glasses on the table and poured three fingers of scotch whisky in each. She grabbed hers and raised it. Finkelstein rested the black rose on the table and clinked his scotch glass against the woman’s. They nodded and took a sip. The astronomer made a special effort to follow Madonna’s eyes and steer clear from the flower on the glass slab.

“So, what brings you here?” she asked.

“Don’t you know?” he responded coyly.

The agent flushed.

He said, “I want to write a book of course.”

The man spoke with a smirk and Madonna had to bring her glass back to her lips to hide a grin.

“What about?” she inquired.

“Excuse me?” asked Finkelstein.

“Your book,” said the agent, “what’s it about?”

Jonathan swallowed and enjoyed the lingering taste.

“Well, I haven’t written it yet,” he said.

“I see,” commented Madonna, “fiction or nonfiction?”

“Both,” he responded.

“Does it have a title yet?” she inquired.

“Yes.” He took another sip of the bittersweet liquid, “That is a good question.” He rubbed his hand, still holding the scotch glass, against his temple and forehead. “Hmm,” he let out frowning, as if he was thinking rather hard. He kept humming for a moment, then turned to Madonna, “Maybe you—” Finkelstein interrupted himself as the woman leaned over the table and reached for the rose, slightly exposing the upper bulges of her breasts. She then slid down the full body leather recliner. The man finished his sentence, “—have a suggestion.”

He stared at the literary agent for an instant, admiring her sand colored crown, her sculpted body, the shape of her closed eyes. The flower’s head burst right above the two hills of her cleavage. A little lower, slim feminine fingers held the stem of the tar dipped rose against her stomach. The astronomer moved carefully to

the leather berth and sat lightly on its edge. He slowly bent down over her.

“Of course,” he said softly, “it’ll have to be,” his last words melted on her lips, “the sleeping beauty.”

He kissed her gently while she responded in slow motion. She neither fought, nor helped him unbutton her blouse. He undid the front clasp of her bra and immediately ran his tongue around the bull’s eye on her right breast. The man’s shirt flew off. From the side, Madonna looked like a thin shaving of mozzarella wedged between two slices of black bread, one made of leather, the other of skin.

“Wow,” exclaimed Finkelstein after the rapture was over and the two sipped their Scotch.

Madonna exhaled, “Better than astrophysics, huh?”

The astronomer smiled back. “What’s this?” he asked pointing to a ripped yellow envelope abandoned on the far end of the couch.

## CHAPTER 35

Meni Mendel wasn't good at writing letters, or cards. As far as this one was concerned, it had had so much white out pasted on it, it looked more like a sculpture than a sheet of paper. All he wanted to say was thank you. But he always ended up with hyperbolic phrases, heavy sentences, and never ending statements. At one point, he'd had three parentheses within one another. Finally, he settled upon a straightforward formula with very simple wording. Thank you for believing in me and being my friend, Meni.

He licked the yellowish envelope shut, then called Comet Delivery Service. He was attracted by the company's ad in the yellow pages for two reasons. One was its name which was astronomical in nature. The second thing was its motto, We Deliver Faster Than The Speed Of Light. The astrophysicist thought with amusement of the consequences of this statement. Special relativity, out the window. General relativity, bye-bye. Certainly, he'd lend his full support to such ambitious entrepreneurs. In his hands he held his manuscript annotated in red. On the desk his book contract laughed back, calling him to play.

The astronomer reclined in his office chair. He thought about his book, his commitment to science, the search for truth. He'd found intelligent signals encoded in the pulse of PSR2100+09. He was convinced of that. But deciphering them hadn't exactly been a picnic. Truthfully, all he had were fragments of a larger text, at times incomprehensible. Still, Meni wanted people to understand what he had pieced together. He questioned whether a private club of intellectuals, called scientists, should have exclusivity over it.

Imagination, Einstein had said, is more important than knowledge. The night after he'd detected the message, on the plane to the Baltimore-Washington International airport, Meni Mendel had read in a magazine about a group of scholars who had succeeded in opening their minds. To some extent, they needed to for their project. Divers off the coast of Texas had found a French ship sunk in 1686, the *La Belle*, an exploration vessel. Now they were exploring it. The divers had retrieved the skull of a man, and the archeologists were eager to reconstruct it. They already knew the man's approximate age and that he'd died of thirst. They had been using high-tech computers and sophisticated 3-D software to simulate what he'd looked

like. But in the end, they had to call a physician who was also an artist to sculpt the sailor's face into a clay model.

So Meni would be that artist, but for astronomy instead of archeology. And he'd try to reconstruct the faces of galaxies, and planets, and extraterrestrials, instead of sailors and sunken ships. If art meant the talent to communicate, then he would be an artist astronomer. In the early days of astronomy, there were no photographs. Astronomers had to draw what they observed but, depending on the type of art prevailing in their society, the scientists would see different shapes of the same object. Some saw the Moon smooth and spotted with stains, others saw it rugged and covered with shadows. Where some saw mountains and oceans, others saw forests. As a result, it became common knowledge that the Moon was inhabited. Hadn't telescopes shown forests?

Meni pondered his work. Had he drawn a forest? What artifact had he introduced? In his manuscript, the foreword explained his discovery but then continued on as a novel. He wasn't certain whether he should have embellished the story he'd decoded and made it public for all to read. Should no one in Galileo's time have drawn the Moon so as to avoid introducing an artifact?



It's no coincidence that the first person who documented the Moon's rugged surface came from Italy. Galileo was a member of the *Accademia del Disegno*, an exclusive art academy in Florence. He was an expert in perspective drawing and in the shadowing techniques of *chiaroscuro* (light and shade). It is this expertise that enabled him to see the dark spots on the Moon as shadows cast by mountains, and not forests. In fact, six months earlier his English counterpart, Thomas Harriot, had preceded him in observing and drawing the Moon, except he sketched it as flat as Queen Elizabeth's portrait: a two dimensional rendition of reality, as if someone had sat on the old lady, (and on the Moon). Whereas back in Italy, students of Leonardo da Vinci and Raphael were painting portraits more real and beautiful than life. In fact, it was commonplace to apply a few brushstrokes to correct for nature's unforgiving details; wrinkles, a sagging chin, scars, an uninvited pimple.

For the illustration of the Moon in his book<sup>\*</sup>, Galileo asked the engraver to exaggerate the ruggedness of the satellite's surface, and in particular of *Albategnius*, a deep crater facing the Earth. Was he less truthful to Nature than today's astronomers? Modern scientists claim they are

the messengers of a reality independent of culture and technology. But when an image of the Hubble (or of any other observatory for that matter) is printed in a book, or published on the Web or shown on television, someone has to decide on the contrast on the picture. With photographs it's a matter of dipping the print in the developing solution for a longer or shorter period of time. With digital images the contrast has to be adjusted with a mouse. Suddenly, objective reality is vulnerable to the technology and aesthetic choices of the time. Maybe this explains the enigmatic painting of a pipe by surrealist artist René Magritte. It was a rather simple Belgian pipe, the kind Sir Eddington, or Edwin Hubble, or even Sherlock Holmes, had he existed, would have loved to puff tobacco from. But it came with the caption, *This Is Not A Pipe*. It was a representation of a pipe.

There's good news and bad news for the world of astrophysics. The sunken ships are back. More things to study than Ptolemy, Galileo, Copernicus or even Hubble had ever fathomed. But the scientists of today have to relearn science. They must be taught the history of science, and philosophy of science, and ethics, and art. They must

---

\* *The Sidereal Messenger* (1610)

stop acting like untouched members of society, heroes of truth, and stop pretending their work is free of artifacts. They must learn how their environment affects their work, and how to inject their exclusive knowledge back into that environment.

Galileo was an artist astronomer. He published his ideas on the physics of motion and the Earth's revolution around the Sun as a play between three fictional characters<sup>‡</sup>. Each part represented a different perspective: one expressed his opinions, another one Rome's, while the third elucidated what an objective onlooker was supposed to think. That is, he almost always agreed with Galileo's fictional ambassador. But his play was banned by the Holy Office because it was contrary to the Divine Scriptures. According to the Holy Bible, Man was created in the image of God, the World was created in six days, the Earth stood still at the center of the universe. That four moons were seen orbiting Jupiter, and not our planet, failed to convince the inquisitors that the Earth was not the center of Everything. And the astronomer's arguments on the daily cycle of the Sun, the phases of Venus, or the variations in the apparent size of Mars, as proofs that planets revolved

---

<sup>‡</sup> Dialogue On The Two Chief Systems Of The World (1632)

around the Sun and not the Earth were deemed irrelevant, if not anathema.

In 1633, Galileo appears in front of the Inquisition under threat of torture. He is condemned to ‘abjure, curse, and detest the said errors and heresy’ and required to ‘repeat the seven penitential psalms once a week for three years’. In 1687 Newton publishes his three laws of motion. In 1705 an astronomer named Edmund Halley predicts a comet will return in 1758. He bases his forecast on Newton’s inverse square law: gravitation. 1758 and Halley’s comet is back, as predicted, confirming the Universal Law of Gravitation. A century has passed since Galileo was gagged by the Holy Church and he hasn’t been rehabilitated. In 1864 William Huggins obtains the first spectrum of nebulae in space and starts dissecting celestial bodies into their constituting elements: hydrogen, helium, oxygen... 1924 comes around, and Edwin Hubble shows the existence of island universes... galaxies outside our own! The Holy See still believes Galileo is a heretic. A few years later, in unprecedented experiments in Brazil and off the coast of West Africa, Eddington proves that space-time is curved. In 1965 microwave radiation is detected pervading the cosmos and becomes the backbone of the Big Bang theory. So what? Galileo is still considered un-

churchman like. It's 1969, and people are watching on their TV sets a clown waving a flag on the Moon. But the Vatican isn't budging, Galileo is wrong, the Earth is immobile. For God's sake, the astronauts can see the damn thing moving through space! By 1989, the space probe Voyager 2 passes the planet Neptune and leaves the Solar System. Three years later, on October 31, 1992, almost four centuries after Galileo's condemnation, Pope John Paul II decrees that, after all, the man who drafted the first astronomical observations of the Moon's craters and Venus' phases and who first set forth the law of inertia may have been right. The Earth is going around the Sun, (and not vice versa). Really?

Dr. Meni Mendel brought his hands behind his neck and swirled his seat three hundred and sixty degrees. He spun it a few times more, then abruptly stopped his rotation. He repositioned his dark frame glasses approximately a quarter of an inch from his glabella, then tapped his temples a couple of times. His head felt like it was still spinning. When he shut his eyes he saw stars, seven fireballs flashing bright luminous colors, orange, and red, and yellow. He kept his eyes shut, the landscape metamorphosed. The soil was blue, and a translucent fog

slightly blurred his vision. He relaxed further and his imagination took him a few dozen light years away to a planetoid orbiting the second of seven suns in a stellar association.

Maya clung to the bitter rose as she sped down the magnetic induction tube toward the surface of Kultura where Kee was. When she reached the bottom, she did not leave the shaft for a long time. She was scared.

Outside, the permafog had settled at foot level. Nearing his destination from hydra's induction shaft, Kee felt his heartbeat accelerating. This was the second time only that he had seen the geodesic dome from the planet's surface. The first time had been on his way in. He stared at the underside of the stilted structure unveiled from the toxic fog, and saw not five but thousands of pillars. He rubbed his knuckles against his eyes. The infrared lenses were wearing out and the rays of the seventh sun rising straight ahead were blinding him. Will I ever be able to see my planet clearly? he wondered.

When the pillars started converging towards him, he thought he must be hallucinating. He squinted as much as he could, his facial muscles producing a false smile, and the pillars turned into thin shadows. A moment later, he thought he could make out bodies at the foot of each shadow. They approached him slowly, confidently, as if they had all the time in the world to reach him. He stood there, paralyzed, squinting, a black figure himself at the foot of a long shadow. Within an instant, he could already distinguish facial traits and features on the bodies drawing near him. Surely they were Kulturans like him and not ghosts. Except they looked different, something... Yes, he suddenly realized, that's it. He could hardly believe his eyes. Instead of the usual blue epidermis, they were black, copper, gold, olive, brown. Light, dark, and medium shades. They reached toward him hands extended, pores moistening, muscles stretching their freshly dried coats of bio-filter lining.

The last Kulturans to emerge from the pool now exited the down shaft. She let a black flower fall onto the ground and ran directly to Kee. The seventh sun reflected off Maya's white marble skin

creating a bright aura around her curvaceous body. A thin whirlwind of permafog marked the spot where both fell into each other's arms. Beneath them, Kultura's toxic burden was returning to its stealthy lingering giving the inhabitants yet another reprieve. Above, mutating hydrogen into helium with unabated vigor, the multiple suns painted the inverted bowl a shiny gold, unaware of the magic unleashed by their alchemy.