



# Tales of Innovation and Imagination

Selected Stories from the 2003  
Clarke-Bradbury International  
Science Fiction Competition

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**Foreword**

We live in the midst of a revolutionary social experiment. For centuries, the nations and religions of Europe have persecuted each other, fought each other, invaded each other. Now, after the disastrous struggles of the Second World War, when at one time it seemed as if we would all sink under a new barbarism, we are seeking to unite into one community. War will be no longer possible between us.

Undoubtedly, this new wish to unite is based upon economic factors. But behind such factors stand the invention of nuclear fission and the terrible strength of nuclear weapons. It seems that we need a giant with a cudgel to bring us to order. We are confessedly a bit of a rough lot. A rough lot, yes, yet idealists also. Dreamers.

One of science fiction's perennial speculations concerns whether or not we can improve morally and spiritually. However, in the present - and most of these stories are echoes of the present - we have to get by as best we can, struggling with our own limitations, and overcoming them. But imagination is unlimited. We are always inventing new things, in our heads or in actuality. A certain cussedness about us means that often we invent the very things we fear most, as was the case with nuclear bombs. As Mark Twain once remarked of Adam, Adam was only human. "He didn't want the apple for the apple's sake, he wanted it because it was forbidden."

To return to the European Community, it can exist only because of the new technologies. We can communicate with distant friends almost instantaneously where, only a generation ago, a letter would take days, a trunk call was the forerunner of the text message. We can fly cheaply, drive on Autobahnen, travel by TGV. We belong to the speediest and most talkative generation ever.

As a young man in a distant war, I operated a line instrument called a Fullerphone. It was a loathesome little buzzing instrument, now as extinct as the trunk call. The Fullerphone sent and received Morse code. I was expert at Morse and could send and read messages real fast. But that required training. Nowadays we have cell-phones, computers, emailers which we operate almost instinctively. It's true that the art of Morse code has been lost, but you can't have everything!

What are we going to need when we venture into space, real space? Real space begins even beyond the region our winning story talks about, beyond the Kuiper Belt. We shall require stronger materials and faster propellants for the craft, maybe ion drives. And what of the human occupants of such ships?

Back in the 1950s, even before the last Fullerphone became extinct, James Blish was talking of anti-agathics ("far and away the most complicated molecules ever found in nature") to ward off death. Blish sailed whole cities across the galaxy with 'spindizzy' drives, and they travelled at what he called transphotic speeds...



Something else we will need. The spirit of adventure, embodied in so many SF tales. I would guess that the ships on which those bold adventurers travel to other planets of other stars will be a product of Western technology, for such has been our style over centuries. Little cockleshell galleons set out from Thames and Tiber to circumnavigate the round globe, whereas no Chinese junk, no dahabeah, ever sailed to Western shores.

It is the West which has set the pace for technological development. Science fiction is the strange song it sings as it goes. I imagine that such will always be the case - at least until the Chinese take over...

BRIAN ALDISS

## Introduction

The European Space Agency (ESA) recently carried out a review of science fiction (SF) writings, artwork and films to ascertain whether any of the concepts and technologies mentioned in this SF literature could be used for spacecraft and missions. There was the possibility that older, overlooked ideas might be now feasible with today's huge advances in space and other technologies and materials that were simply not available at the time when many SF works were written in the 1920-50s. The enormous public interest in this study stimulated the idea of a science fiction essay competition.

In November 2002, ESA's Technology Transfer and Promotion Office launched the Clarke-Bradbury International Science Fiction Competition as a way to involve young people in thinking about space and become more interested in science and technology in general and in space activities in particular. The competition, organised on ESA's behalf by the Maison d'Ailleurs, the OURS Foundation and MoonFront, was endorsed by two of the most well-known and best-selling SF authors – Arthur C. Clarke and Ray Bradbury – and was aimed at young people who were asked to write a short story which utilised technology in some way.

The main aims of the competition were to promote innovative ideas for future space technologies; recognise and pursue viable space technologies found in science fiction; provide a link between young writers and the space community; encourage young people to read and write science fiction; and share the ingenuity and creativity of young minds with the general public.

The science fiction stories were supposed to relate to technologies in some way. For example, imaginative use of embedded sensors or wearable computers, advanced methods of propulsion or launching, new types of materials for spacecraft structures or new kinds of designs for future space habitats, terra-forming, or medical applications on long-duration space flight and so on.

The competition was named the Clarke-Bradbury International Science Fiction Competition in honour of two of the greatest science fiction writers of all time – Arthur C. Clarke and Ray Bradbury. Both Clarke and Bradbury have fascinated the minds of millions of young and old people around the planet for years and inspired space scientists and explorers with their extraordinary stories.

Arthur C. Clarke has noted that “any sufficiently advanced technology is indistinguishable from magic” and that the only way of discovering the limits of the possible is to venture a little way past them into the impossible. In his endorsement of the competition, Sir Arthur wrote, “I want to congratulate you on the initiative to launch a science fiction writing competition. I hope it will attract many entries, and inspire more and more young people to take to writing science fiction. Today's youth take for granted the marvels of modern technology many of which were envisioned in the science fiction of my youth (and some in my own stories!). Please keep me informed of your progress. All good wishes.”

Ray Bradbury said, “Back when I was twelve years old I was madly in love with L. Frank Baum and the Oz books, along with the novels of Jules Verne and H.G. Wells, and especially the Tarzan books and the John Carter, Warlord of Mars books by Edgar Rice Burroughs. I began to think about becoming a writer at that time. This is a letter to indicate my complete approval of and admiration

for the concept of a Clarke-Bradbury International Science Fiction Competition. I look forward to further developments and will cooperate in every way possible during the next few months. Good luck and best wishes."

Basically the idea was to write an original story using science fiction technologies that could be used for space travel, exploration and settlement. Technology was to be seen as both the inspiration for the story and the focus of its realisation. A maximum length of not more than 2500 words was requested and the story had to be written in English. The competition was open to space and science fiction enthusiasts from all nations between 15 and 30 years of age.

An international jury, comprising both science fiction writers, space technologists and others was assembled to assess the entries in accordance with the following criteria:

- Technology – convincing use of technology in the story
- Imagination – innovative ideas and the ability to think "outside the box"
- Structure – development of storyline, plot, characters
- Skills – clarity of expression, style, degree of realism

Some 120 stories were submitted from 36 different countries in every corner of the globe – Africa, Asia, Australasia, Europe, South America, North America. Stories were received from both younger and older would-be authors. The largest number came from the United States, with significant numbers also from Poland, Spain and the UK. And one-fifth of the entries came from women.

It was very interesting to see the diversity of ideas these often very young writers demonstrated in their entries. Some great stories were submitted, many of which were really imaginative and thoughtful, with a few written as plays, poems, as e-mail exchanges or interviews – and they embraced all aspects of science fiction. Some dealt with teleportation, some with star wars, others covered interstellar travel and the discovery of new planets, colonisation and terraforming, some looked at propulsion systems, communications or medical aspects, while others dealt with the human dimension and relationships on long duration missions. Several were on their way to Mars. Technologies were well-covered too – materials, nanotechnologies, laser mining, hyperdrives, massive guns to shoot satellites into low Earth orbit, space elevators, biospheres, solar sails. Some were narratives, some were essays, others comprised nothing but dialogue between people. It's amazing how much can actually be said in 2500 words! The level and quality of English and standard of writing from those whose native tongue was not English was truly remarkable.

The entries were read and evaluated by an international jury who eventually selected six stories to be awarded prizes. Without exception, the jury members found it extremely difficult to decide which stories should be in the winning group, although, interestingly enough, several of the same stories did crop up on most jury members' lists – though not necessarily in the same order. Although the selection criteria were a guidance, the final choice was personal and subjective. Some jurors pointed out that they selected the stories based on the way technology was used – stories in which technology was the only subject were discarded, as were stories which tried to introduce a myriad of different technologies. Stories with technical or scientific arguments which were obviously wrong or which were inconsistent with boundary conditions were also discarded. Although many entrants found themselves confined by the focus on technology, too many seemed to write lightly

fictionalised descriptions of impact disasters or space journeys to escape an overcrowded Earth. Thus the jury looked for stories which created a sense of drama or difference.

Based on the jury input, the Winner of the Clarke-Bradbury International Science Fiction Essay Competition for 2003 was ultimately chosen by the organisers to be the story *Temporal Spiders – Spatial Webs* by **Lavie Tidhar** – a 26-year-old Israeli who grew up in South Africa and now lives in London. The story is about spider: a ten metre long/wide, roughly circular rock drifting through space listening to and absorbing everything – especially music – and looking for a place to nest and lay his children. These, when born, eat out through the rock of the planet into which spider has burrowed and take wings to establish a web of communications throughout space. This story was chosen because of the quality of writing, the technology idea behind the story and the poetic feel to the text. It was a convincing future technology and a fluently written story. The use of viewpoint was interesting and the way the scenario established itself rather than being just described was stimulating. The impression was given of a vision of a future which is strange, different, and which, refreshingly, consists of more that is actually given in the story. The story was also short and stood on its own with no need for further explanation.

Runners-up were **Rudi Ball** from South Africa for his story *Collectibles*; **Gareth Barlow** also from South Africa for his story *The Canine Intent*; **Wunji Lau** from the USA for his story *Form and Function*; and **Andrew Mays** for his story *Tonight's Episode: the Molina Research Station*. In addition, a Special Mention was given to **Christa Ackermann** from Switzerland (who was only 16 at the time of submitting her entry) for her story *An Encounter – retnuocnE nA*.

This book comprises a selection of the stories submitted for the competition, including the winning entries. The stories are in no particular order (except the winning story at the beginning) and no attempt has been made to group them into like topics. It was difficult to decide which of the stories to leave out, in the interest of size and space available for the book, since the majority of entries submitted were very good. Those chosen reflect different styles of writing, are representative of similar topics, as well as diverse nationalities, and should appeal to a wide range of reader interests.

We hope you find the book and its contents both readable and enjoyable!

David Raitt  
European Space Agency



## TEMPORAL SPIDERS, SPATIAL WEBS

Lavie Tidhar  
Israel

*Space was full of sound.*

*To say that in space nobody hears your screams, Spider thought, was a somewhat limited statement; something that applied to people, perhaps, but which certainly didn't apply to it. Spider drifted through space, listening. In the breeding grounds, where his initial psyche underwent long and challenging cycles of evolutionary process, an interest in sound was encouraged, the selection routines singling out the complexities of sub-programs, binary trees and neural networks that composed the embryonic it for further cycles.*

*Spiders, after all, were bred for music. Music, with a capital em and a pointed the in front of it. The Music.*

*Now it drifted, in a state it could only define as leisure, through the vastness of Trans-Neptunian space. On the outskirts - such as it were - of the solar system, where the Music was yet faint. Soon it will disappear altogether, only faint echoes of it felt against its skin as light and radio waves bounce randomly.*

*Then the time of leisure will come to an end, and work will begin.*

#NNP247HUB6MIRROR12

A faint quiver, the brush of a signature packet asking for acknowledgement. Spider (SPIDER100,674,284EXPLOR-HUB/1234.5678.9101/5, to give it its full name) responds immediately. So Mars Mirror (or, rather, hub six of mirror twelve of the structure composing Mars Mirror) wants to talk. The handshake takes ten minutes of real-time, with seven hops across the scattered Major Space Hubs, entities much like himself in size and build, but with resources only for the sorting of network traffic. Dull, slow and careful, they have, Spider often thinks, much resemblance to ancient, human civil servants.

The conversation goes something like this:

#Ready to reproduce?# HUB6 sends a sense of amusement with the words, conveyed in a minuet of brief, precise code.

Spider sends the equivalent of a snort. ~I can still hear you, can't I.~

#Found a place to nest yet?#

~Still looking,~ Spider sends, ~still looking.~

While waiting for HUB6's snippy conversation, Spider listens to everything else. Snatches of classical music, broadcasts from the remote asteroid belt; miner's conversations on an open, unscrambled line – a sign they are off shift and heading back home, to whatever rock their kibbutz or longhouse or work unit is settled on. Conversations in Iban, in Hebrew, in Chinese – all the migrant populations that have re-embraced close-quarter socialism for the benefit of space colonization. It watches compressed video feeds being sent from the Moore telescope on the edge of the system, as the packets of data make their long, circuitous route through endless hops across hundreds of Minor Space Hubs, on their way to Earth.

It listens, and talks to HUB6, and looks for a suitable nest as the acceleration carries it further and further away from the Music.

Some time later, HUB6's messages vanish as the time-lag increases, until Spider is out of range of the Music, its body absorbing nothing more than random light- and radio-waves, carrying no more encoded meanings.

Spider is out of the sphere of Music, out of the sphere of human habitation.

A lonely entity, Spider's body is small, a ten-metre length and width roughly-circular rock. Spider's rockface can be deceiving, however. Dotted along its outer shell are hardened instruments, minute antennae, a whole array of concealed communications devices that cover it like a rash.

Underneath, within the secure, skull-like encasing of its body, Spider's brain resides in stately seclusion, at the heart of this converted, tiny asteroid. The inside is packed: Spider, to take one analogy oft-used by the opponents to such rush expenditures, is like a Trojan horse.

As network traffic decreases there is a corresponding increase in system traffic. This area of space is full of orbiting objects, giant (in comparison with Spider) rocks: a thick belt of frozen debris, like something worn by a Nordic ice-giant.

Spider scans the rocks, so many giants, so many with diameters larger than 100km, searching for a place to roost.

It is very particular.

Spider begins broadcasting in all ranges: light waves, short-wave radio, long-wave radio, sending on all channels simple ping codes, the equivalent of shouting ~hello can you hear me?~

None return.

Satisfied that it is now truly out of range of the music, Spider is too busy to worry about the complete silence that surrounds him. It identifies, at long last, a likely roosting place, a minor rock with a comfortable diameter of only 50km, whose outer rim of ice conceals a heavy, metal-packed body.

Escalating, Spider estimates reaching the rock within an Earth day, twenty-four hours of gentle escalation before it will hatch.

Spider is filled with a sense of excitement, moderated by his constant alertness: its young psyche, not so long out of the breeding grounds, is geared only for this monumental process of life, the extension of the sphere of the Music. So unlike, it thinks, HUB6, whose complex, confusing personality requires him to be oh-so-integrated into the semi-autonomous team of the giant Mars Mirror, caching and data-streaming and always talking, to the vast machinations of the Earth or Moon Mirrors, which make sure data is kept up to date, on immediate access, regardless of where you are in the system.

It prepares itself.

A shower of ice creates a breathtaking vista; as Spider comes crashing into the rock the impact disrupts the sheen of ice and sends it spinning into space like a gigantic, delicate rainbow. Spider burrows deep into the rock, the force of the impact creating a comfortable crater like a wound in the rockface.

If it was silent before, Spider thinks, now it is practically tomb-like. Its communication devices, its senses, are now obsolete, useless. It doesn't matter. Spiders may have a short life-span, but that life is eventful, to say the least. Spider's body begins to change as holes open in its hardened skin, and as the grubs inside begin to blindly crawl out into the stone of the new nest. *What is this life*, Spider thinks, quoting an old poet, *if, full of care, we have no time to stop and stare?*

Spider sits at the heart of the rock and waits for his children to find their way out, to eat their way through the rock, and to take wings.

*From some distance away, the disintegrating rock appears like a mirage: as if a corpse is being consumed by small, dark ants. As thousands of objects emerge, in stately, slow-motion movement*

*from the rock and fly away in all directions, the rock suddenly seems like a budding flower, its leaves soaring away in concentric circles, at its dying heart a small, broken shell all that remains. Spider's children spread and expand over this area of the Kuiper Belt: tiny Space Hubs, Routers, Mirrors, talking excitedly to each other, spreading away, establishing a long, transparent web of communication until they hit the farthest reaches of the Music itself, and the spheres explode, in this remote region of space, into a symphony of Music.*





## THE RAVEN

Gabe Posey

USA

It wasn't called the Raven because it looked anything like the stoic black bird. It wasn't called the Raven for any nineteenth century depressed writer. It wasn't called the Raven for any other reason than the rather banal fact that 'R' had been the next letter in the progression and the theme chosen had been birds.

Captain Bobby McGhee hadn't been involved in the naming. He hadn't been involved in the design either. Captain McGhee hadn't been involved in anything but test flights for years. He was sixty-eight and had been piloting trips between the Earth and Moon for eighteen years before he had begun spacecraft testing. Before that he'd been an aircraft pilot. He was too old to compete against the kids that were doing tests on the blindingly quick Shuttles. Making Earth to Moon trips in an hour didn't appeal to him anyway.

He had signed on to the Raven project with the idea that maybe it'd fail. It wouldn't have been the first and likely wouldn't be the last. He wasn't looking for the Raven to fail in a way that would leave it dry-docked and picked over for spare parts, though. Captain McGhee was looking for a *spectacular* failure. He wasn't hoping for it, per se, but he was certainly prepared for it. He had been born in 2046 and though he wasn't old by current standards, he *felt* old. He felt like it was time. He patted the small rook sticker on his armrest and smiled. They'd be preparing for launch today and no one was more expectant than he.

The ship didn't look like a Raven, aside from the various stickers the crew used to mark their territory in and about their stations. Every now and again you'd see one of the more popular stickers, a very bland and stationary rook, on the side of a display or even on a closet door. It gave the crew a break in the monotony of their long dock. The Raven hadn't yet launched but it had been manned for the better part of six months.

The ship was small and rather unaffected by the hype that surrounded it. It looked less like a spaceship and more like a broad-head on an arrow. It was a pyramid, of sorts, with the four solid corners tapering to fins as they approached the base. The ship itself was contained within a cylinder that ran the length of the pyramid. The fins were for the potential energy collectors. The ship was a cumbersome thing, unable to maneuver itself in small spaces or with any great accuracy. It wasn't designed to maneuver in small spaces, though. The Raven was designed for interplanetary travel. The first of its kind, a joint Euro-American venture, the Raven was the first interplanetary vessel that could travel between any number of planets and, potentially, solar systems. The idea of moving between systems was a grand one and a stretch even to the designers of the Raven. The Raven was a gamble, a guess and furthermore, possibly brilliant.

Little could be called brilliant about the Raven, though, and little was truly innovative. The hull was made of a high density low mass aluminum-titanium mixture. It was nearly as light as plastic but rigid and stronger than the same mass of steel. This allowed for the massive body of the Raven without requiring constant materials trips back and forth to the Earth. The body materials could be manufactured in space and assembled in space. That, in its day, was exciting, but no longer. The hard curve of cutting edge excitement in spacecraft technology didn't allow much room for a long project. The Raven had been a very long project.

Bobby McGhee had signed on for it three years ago. It had been scarcely more than a year later when they were talking up the new project, Sand Piper. He had heard great things about the S.P. but he wasn't willing to give up on the Raven. She was either his ticket to greatness or his ticket to the

great beyond. Both destinations held their promise for him and he would be equally glad either way it went.

“Captain?” Billings, his First Officer, said. Captain McGhee turned and looked at the young man. If the Raven went off without a hitch, this young man would have a spectacular career ahead of him.

“Captain, the tugs nearly have us into position.” The ‘tugs’ were smaller retired shuttles that had been given the daunting assignment of hauling the Raven into its peculiar launch position.

“Very good Billings, let me know when they’re about to roll the engines.” The engines in the Raven were still its one shining accomplishment. Unlike conventional thrust engines, the Raven relied on a three stage engine that worked on an inexhaustible power supply: gravity. Captain McGhee wasn’t an expert in such things, but he understood what *any* craft required for motion. A fuel, of some kind or other, drove an engine and the engine provided thrust. The Raven’s engines relied on the same basic theory, but a radically different execution. The fins of the ship were cored to a specific mass of nickel and iron. Once the tugs had pulled and pushed the Raven into place – the ideal location being the precise edge of a massive body’s gravitational pull – the fins would begin collecting and storing gravity. The mass of the ship and everything within would increase by unknown number of G’s. It wasn’t *exactly* unknown, but it was certainly unknown to everyone currently aboard. In tests, the amount hadn’t proven fatal, but as any good test pilot knows, tests on paper or in a computer were rarely even close to the reality of the situation. After the ship had acquired the calculated amount of gravity, it would simply release the gravity in a specific direction. Like an elastic band, the ship would careen across space. The long run algorithms had shown that it would be possible to do a full circuit of a solar system in this way, traveling much as comets did. Today’s launch was to Mars.

Using conventional engines, the Mars trip currently required a month and a half of solid chugging travel. The Raven was hoping to do it the space of anywhere from a day to a day and a half. Captain McGhee felt a hard pang of excitement run through him. He hadn’t felt quite such a pang in years. If the Raven succeeded, he’d likely be exploring not only the rest of the solar system, but possibly even many systems beyond. The Raven was a door for him. It was either a door to his life or to his death.

Billings stepped up beside him and sat down. “The engines are prepared to roll, Captain.” Captain McGhee could see a tremulous giddiness in Billings that he had once had. It was an exciting day, regardless of when you were born. Captain McGhee punched up the ship’s intercom and prepared to address the crew. They weren’t carrying a capacity crew. He was only addressing seventeen people total, when the ship could comfortably carry fifty.

“This is Captain McGhee. All hands report to travel stations. Engage all sensory monitors. We will roll when all stations report green.” The Raven was laden with far more than necessary sensors to observe its maiden voyage. They would know exactly why it failed or didn’t within moments of their launch. As Captain McGhee watched, stations one by one reported green. Green signified that the station had checked its sensors and had every member assigned to it strapped into their jump chairs. The chairs were designed to alleviate the heavy G’s but Captain McGhee knew from experience that no matter how comfortable the chair, the crushing weight of the invisible universe would leave them all bruised and sore. They were prepared for a blackout, but no one really expected one. They’d be traveling with enough gravity to sufficiently block blood from reaching their brains for a second or two, but unlikely it would result in any permanent damage. The actual moment of blackout would pass almost instantly as the gravity was dispersed.

The last station switched over to green. It was now under his command, his control. He could roll the engines and then send the Raven on either its maiden or final voyage. It was a queer feeling, one the Captain had never felt before. Piloting test ships always came with risk, but Captain McGhee

had never gone into a test run with the expectation he had now. Captain McGhee acknowledged his flashing command execution icon. Then, as they say, all hell broke loose.

For a moment the ship was still. Its bizarre arrowhead figure loomed with black space before it, Earth behind. Then, with the eyes of Earth watching, it was gone. Had there been gases surrounding the Raven, a sudden thunderclap would possibly have been registered. Instead, Earth looked on with an awkward, "Oh."

On the Raven, Captain McGhee had a moment to realize that something was horribly wrong. He had that moment to infer that the number of G's calculated and the number of G's actually harvested were two completely different numbers. He had that moment as his body was pressed into the ever responsive and ever cushy chair. Even had he *wanted* to abort, he couldn't lift his eyebrows let alone raise his diaphragm to let the words out. He had felt massive G's, though, without feeling quite like he was. The force he felt was something more akin to concentration than load bearing. Just before he blacked out, the forward view showed the impossible view of the asteroid belt sliding lazily past them on the starboard side.

Swimming up through his unconscious, the command console chimed at him every five seconds, demanding, in a most polite manner, that the Captain respond. When Captain McGhee finally did come to, he realized a few very crucial things. The first, and perhaps the most obvious, was that he was the only one who had awoken. His entire crew was still unconscious. He would have been too had his body's natural instincts not brought him back faster. He was used to blacking out under heavy G's. These youngsters were most certainly not. He still wasn't sure it had been heavy G that had put him and his crew under, though. One of the other things he realized was that his little nap had been more substantial than he'd first thought. His watch showed that something near twelve hours had passed. In theory, he should have been able to see Mars by now. This was disconcerting as the most crucial thing he realized was that the fore view was *not* Mars.

Swirling in zones and belts much like Jupiter's, the planet before them was striking in its coloration. Deep velvety reds were contradicted by bright almost glaring yellows. Captain McGhee unbuckled himself and stood up. His back creaked and ached unlike it had in many years. He stretched and knew that he was likely going to be sore for days to come.

"What is that?" Billings asked from beside him. Captain McGhee shrugged and thought for a moment.

"Give me an aft view," he said. Billings punched in the commands and the screen switched to show a flat space of stars. "Use our tracking computer to locate the Sun." Billings punched up the command and a circle appeared over a brighter than normal star. "Calculate the distance." Billings complied.

"My God," he said. Captain McGhee felt another pang of excitement. At his first look at the strange planet, he'd had a hunch, but at Billings' reaction, his suspicion was confirmed. "Sir we're seven billion kilometers away." Captain McGhee glanced at his watch again. They had moved at nearly half the speed of light. He didn't think that was factually *possible* given the engines they were using, but then again, he had only been briefly given an explanation of the technology. Despite his elation, he was also concerned. The amount of time that had passed for them was obviously twelve hours, but he couldn't imagine how much time had passed on Earth. There were people who would figure that out, but he could well imagine that they were likely wondering where the Raven was or, perhaps, if it still *was* at all. The idea of their travel speed made him feel dizzy. It might take them a month to reach Mars but for a completely different reason than would have been anticipated.

Captain McGhee returned his attention to Billings.

"Interesting. That puts us past Pluto. What about the sensors? What're they saying?" Billings punched up the sensor readout onto the main display.

Most of it was engineering garbage but nestled among the trash were a few points that made Captain McGhee's heart pound. One readout showed 'Relative Energy Collected' as eight units to the fourth power. He had been instructed that they had only needed five units for each leg of the trip, ten total. They had *over*-collected by an enormous degree. "Billings do the math. I want to know where Mars is and how many units we need to use, given this overshoot, to get back." Billings nodded and began both his computations and his radioing down to the engineering room. There was still a serious risk of overshooting their destination, but given one trip, he thought they should be able to calculate the second more precisely.

Captain McGhee smiled. The rest of the ship was coming out of their induced slumber now and they'd all be abuzz with the news of their success. For a moment, clear and shining, Captain McGhee felt much as Billings had just before they departed. With the sheer power and availability of these engines, planets would no longer be an issue whatsoever. The stars would yield their secrets and man would move ever onward, ever upward. The mission hadn't failed and though that other darker door still lay somewhere, sometime off, this new door had given him insight into a whole new world.

## THE GREATEST VISION

Tommy Hensley

USA

*Wherein the Reader is Introduced to the World*

It was Alfonso Parazzi who constructed the first biosphere meant for residential habitation. The reporters and politicians watched, as he cut the ribbon to one of the air-locks that separated the interior from the environment outside. It was Baffin Island, Canada. It was the dawning of a new age of humanity. It was the beginning of a new debate, which weighed the fate of stars and galaxies upon the scales of human wisdom. It begot the question, what is the greatest vision for the future of mankind? But Alfonso Parazzi could not have known that. To Parazzi, the bubble was his greatest vision. And today was the ultimate fulfilment of his life, because today the whole world marveled at, and thanked him for, all the years and tears he had given to it. Today was the first day he knew, for certain, that it had been worth it. Perhaps even the first day he knew for certain that it was good he had lived. Let's not dwell on how the biosphere worked, if you asked Alfonso, he could surely tell you. We're here simply to witness the beginning, the first cause, the giant leap for mankind that finally made the colonization of space not a possibility, but a plausibility.

We can say that the biosphere did work. Canada was the first to buy stock in Alfonso Plastics, when he created and demonstrated a cheap but relatively impervious lattice. First it was used in cars, and Tupperware, and thousands of other little things that wanted flexible but tough material. The toughness was only a nice side effect, though. The most impressive aspect of the material was its inertness. It did not expand or contract under heat or cold, or react to any common element in the air or on the ground. It did not decompose. It did not conduct temperature.. It was an absolute barrier of is-ness that could not be bullied into becoming-ness. The plastic, once made, could not be changed short of being melted down. But Alfonso didn't stop at Tupperware, he dumped all the money back into his research and kept pushing for the material that wouldn't just benefit the living, but life itself. This was the product. Inside the biosphere was a complete self-maintained environment. Water evaporated, condensed, and precipitated inside the bubble. Air was switched from Carbon dioxide to Oxygen by plants, and from Oxygen to Carbon Dioxide by people. Crops were grown inside the bubble, for the purposes of air recycling as well as self-reliance. A couple roads and an airport outside the bubble connected it to the rest of Earth. The airlocks made it a chore entering and leaving, so people mainly stayed inside. That was the idea. A macrocosmic temperature regulator. A little bubble of comfort on the face of a desolate barren frozen wilderness. A blanket that kept in the heat Canada so greedily tore from the rest of their countrymen. Soon after, bubbles sprouted up in Russia, which had previously had the satisfaction of being the largest wasteland in the world. It spread into the Arctic, and the Antarctic, though only the most hardy of pioneers thought it worthwhile to stray so far from the rest of the world. Methods were soon devised to keep it cool inside the bubble, rather than warm, and Australia became a new frontier. Bubbles were made to keep things drier, and specifically to completely purge the environment of unwanted diseases, insects, and unwanted parasites, to the transformation of Africa. Cities that had previously existed without bubbles argued over the cost of erecting one, and the benefits that could be expected. There were no longer tropical, temperate, and arctic zones. The zone was now whatever the bubble wished it to be. The quality of life and cost of living skyrocketed and plummeted. And though there were still wars and rumours of wars, the multiplicity of little Edens that were sprouting up like a new species of vegetation, spoke of a new innocence and beginning for mankind.

Mankind's most mortal adversary, the mosquito, squished itself against the plastic barriers. Ants were told to dig elsewhere. Scorpions and cockroaches and flies were told to wait outside. Weeds almost always managed to sneak in somehow, but weevils at least were stopped. Locusts could no longer plague Egypt even if they'd wanted to. Crop yields rose, the less bugs spoiled them. Reducing pesticides lowered the cost of food, improved the taste, and helped maintain the environment so it could then support a far larger population. The energy versus environment debate quietly dissipated, as the primary need of fossil fuels, heating and cooling, had been banished. Most of Earth still lived 'outdoors' as the new term became. But mini-bubbles even amidst those cities sheathed wooden houses from termites, and Fido from the rain. Though Alfonso Parazzi had died long ago, the progression of his model was made by fresh brilliant minds, hoping for their own epithet in the annals of mankind. The bubble defined the century. No other improvement even approached it. No other invention spawned so many blessings to people in so many ways in so many places. But like all things, the change was slow and quiet and more gradual than the predictions. Many people, if asked whether their lives had changed, or were much different from the lives of their parents, or grandparents, would have answered no. There were still barbarous countries, and poor countries. America still struggled to find a balance between satisfying the basic needs of the people, and supporting the growth and freedom of the economy. There was never enough money to go around. Families still broke apart. Lovers still broke each other's hearts. Children still cried over every little thing. Men still drank too much and smoked too much and cursed too much and gambled too much. Lawsuits were still used as milk cows and weapons of spite in countries with civil courts. Politicians still flouted the system, and changed their promises after the election. It was still scary for a woman to walk alone at night in Detroit. It still wasn't allowed for a woman to walk alone at night in Iran. The bubble, you see, didn't change all those little things about life. The bubble didn't remake life, it was the gift of more life, and better life. There were even hopes of forming bubbles that could withstand the pressure of settlement under the ocean. Humanity still had to live inside it. The bubble was just plastic. Ingeniously constructed plastic. Humanity still provided the stories.

### *Wherein the Reader is Introduced to Mars*

Now, this terraforming of Earth could have continued quite some time, with more land brought into cultivation and comfort, and perhaps even the sea. However, long before the physical territory of the world had been filled with the prophetic planet-sheathing bubbles, the political territory had quite devoured it. There was scarcely a square foot of land some army wouldn't have rushed to protect their claim to. Mineral rights went right down to the mantle. Fishing rights and plankton farms were zealously guarded by watchdog satellites and navy patrols. Airspace, radio space, even Space-space, was cut into the finest pie slices between the gun-totters of the world. Why, there were claims by China and Japan over the next island the volcanoes were expected to raise above the water level. For many people living in the world, the countryside though still empty was far too occupied. And the opportunities though ample were claustrophobic to the rising generation which saw no place left for themselves. And worst of all, peoples and cultures saw the last places in the world where a new flag could have been flown, gobbled up forever. Earth's frontiers were absolutely closed. If a new nation wanted to emerge, it had to carve itself from the old. Which the old countries for some reason only allowed after years of bankruptcy and bloodshed, if ever. So that many who could have wished it, never bothered to try. It was at this time that a research team had been funded at enormous expense to stay a year on the face of Mars, underneath man's best friend, a bubble. It was a temporary shelter, with a reflectivity

designed specifically to shield the scientists from the radiation, as well as customize the temperature on an otherwise freezing planet. It gave them one bar of atmosphere, so they could breathe normally. The air and water had been imported. Trillions of dollars had gone to the project. Congress shook many a fist at pork barrel spending and waste while grandmothers still couldn't afford treatments for cancer. But the project got off, somehow or other. There seemed to be a ground swelling of popular support that no politician wished to balk. They had been to the moon so long ago, they refused to believe that with so much more technology and wealth they still could not go to Mars. It was a point of world-historical pride, they refused to be the generation that did nothing and got nowhere, lost between their parents and children.

The researchers did not quite get used to the gravity. They had to relearn how to walk rather than jump, and toss rather than hurl, but it was noted that the less strain on the body the better. The G could serve as a new relief for the elderly of frail frame, and the morbidly obese of far too unfrail a frame. Food still went down the researcher's throats, blood still reached their toes, there was no reason why humanity could not adjust to a lighter load.

Of their most important tasks, the scientists charted out the amount and locations of water on the planet. Though the bubble could recycle almost all the water that stayed inside it, it was far too expensive to lug Earth's oceans some millions of miles and dump them on Mars. They also charted out the locations of useful minerals, such as iron, nickel, and zinc--trace resources necessary for the survival of humans. There were far fewer heavy metals on Mars than Earth, but in some places there were concentrations enough. The soil, obviously, was not suitable for plants, so air filters were used instead. But the researchers succeeded in manufacturing soil from organic soup and cultivating plants based upon it. Plants manage to grow virtually anywhere, much to the consternation of bubble farmers who hoped to never see a weed again. But this same tenacity was reported with worldwide rejoicing, when displayed in a small lot on a foreign planet. When the mission ended a year later, the plants having received enough light, and the humans not having received too much, the new bubble was declared a success. It was left behind as a monument of Kilroy's having been even here. But also, possibly just maybe, as a staging ground for those who might have wished to follow.

The expense was enormous. Nobody, hoping to make their fortune, had any intention of going to Mars. Good old Earth still unearthed a seemingly endless supply of resources for all that crawled over her. But there were groups of people, pooling resources, a million funding the trip of a thousand. Perhaps, they held out the hope, an improvement in space flight would allow them to follow. With a lifespan averaging one hundred years in the civilized world, it was not uncommon to live through at least a few scientific watersheds. If not, at least they had the consolation, that a thousand did go. How many millions of people will give their lives and fortunes to see just one of their family--a cousin, a daughter, a nephew, a niece, be happy? How many millions have always given everything for some few blessed thousand to make their way in the world? Don't underestimate the goodness of people's hearts, when it's said, that millions of people ceded away their own hopes and dreams of ever reaching the Red Planet, so that thousands could reach theirs. Humanity had not changed from being human, with the invention of the bubble. Sometimes love means giving up your own job so that your spouse can pursue theirs. Sometimes love means bicycling the first leg of the race, and letting the stronger cyclist draft you. Sometimes love means standing in the first rank of the trenches and waiting to be shelled, so that the second line of trenches doesn't have to be. Love can demand terrible things from you. And yet people do it. All of these things. So how is it a wonder, that love enabled millions of people to give up their hopes for the hopes of a few thousand others, when it has given so much more so often before? The challenges of colonization were enormous, but so were the hearts of those first settlers.



Mars could not support nearly as many people as Earth's billions, it was never meant to. Mars was seen as the haven for people, not in search of resources or space, but that oh so precious ineffable word, that so many have left home for before. Mars was colonized by bubbles, bubbles of communities, set forth with last tears and embraces by greater communities, who left in search of freedom. There were as many peoples as there were bubbles. And each people, safely on a land free of any claim by anyone with a gun, for the first time in their lives, took a deep breath, and beheld for themselves-for the first time--that for this moment-for this one tiny space of time before a flag was flown-do as thou wilt was the whole of the law.

## THE CANINE INTENT

Gareth Barlow

South Africa

“Gee,” said Melissa apprehensively, squinting at the dark grey walls of rock surrounding her and her two companions. “I didn’t imagine it would be so dark, Major.” Her flashlight spot flicked back and forth like an excited moth.

“That’s *Colonel*, Miss Gellarson,” muttered Clifford through clenched teeth behind his oxymask. Colonel Clifford Keyes of the United Systems Air and Space Military Alliance, that was – and a title well earned, especially after the immature ridiculing hell he had had to endure as Major Keyes. “We can not afford to electrify the lighting in these caves since they were abandoned. Besides that, we have no real idea how such electrical interference may hinder the many experiments in progress, especially –”

A short series of high-pitch barks rendered the rest of his words meaningless. An oxymasked Jack Russell bounded around their feet and came to rest on Clifford’s right boot.

“Was it absolutely necessary to bring this animal with us?” The Colonel pointed an accusing finger at the floor.

“Oh, there’s nowhere else for him to go, major. Really, Settler is no trouble. Right, Settler?”

Melissa giggled as the dog scratched at Clifford’s leg with razor sharp claws. “See, all he wants is a little fun. I think he likes you, Major.”

Clifford resisted the temptation to remove the dog with his other steel-capped boot, and pointed his flashlight at it instead in the hope that the bright light would prove sufficiently annoying. It didn’t.

“So,” he spat, “how fully are you briefed on this equipment?”

Against one roughly mined wall sat a rock lasercutter, a cube on four wheels sitting about thirty centimetres high. Next to this was piled two handheld remote controllers and a headset.

Melissa shrugged. “I believe I have to test some new machine, something to cut through rocks.” She shrank a little behind her oxymask. “I don’t know why I have to do this. There must be hundreds of other people who know more about *mining* than I do.”

Clifford wished half-heartedly that his superiors would rush in at the last second with one of those other hundreds to replace this person. “Uh-huh, not fully briefed, then,” he said acidly, and heaved a sigh. “We chose you for the very reason that you have not operated anything like this before. Think of it as a usability experiment, if you like. Are you ready to begin? The sooner we start, the sooner we can go.” He glared at his watch.

This was no normal rock lasercutter. The extra technology crammed inside the tin can was so secret, in fact, USASMA had implied in no uncertain terms that they would happily remove all of Colonel Keyes’ limbs if he breathed a word about it to anyone else. This also gave rise to the second reason they had picked out the technologically-deficient Melissa Gellarson from the rest of the settlement: there wasn’t an ice-cube’s chance on Sol that she would be able to relay any important details to the Unknown Enemy that USASMA was always murmuring about. Clifford was developing a strong opinion that Melissa would struggle to use a handheld calculator if pressed to do so.

There was still a usability factor involved, this was no lie. The lasercutter had to be tested by a person who had no preconceived ideas of how it should be operated. The fact that the chosen test subject appeared to have little idea of how to operate just about anything was an irony not lost on Clifford’s diminishing patience. And as for her diabolically annoying canine friend, now, that was just the last straw. Clifford pictured Settler roasting on a spit. The insistence of Melissa pampering

the thing so much, even having an oxymask fitted to its snout – Clifford’s military-trained cool was microns away from snapping like a very dry twig.

He reminded himself that his services here would probably help push his leave application a few thousand places forward in the red-tape queue. A holiday on Earth! What a pleasure! It was worth putting up with one infernal animal and its diminutive owner for one dark day.

“First, I will demonstrate how a standard, unmodified rock lasercutter is operated. Please watch carefully, Miss Gellarson.”

Clifford stood a little distance away from the lasercutter, holding one of the remote controllers in both hands. A flicked controller switch, and a barely audible whine came from the lasercutter as it switched itself on. He began playing his right thumb over a rollerball on the front panel, and the lasercutter rolled into action, wheeling around the floor in accordance with his directions. Settler began chasing it, barking every now and then.

“How funny!” exclaimed Melissa. “Like a little metal dog. Settler, sit down!”

“A dog with some added weaponry – I mean, cutting tools and so on.” Clifford cursed himself silently for that unforgivable slip-up. “Are you with me so far? Take the other controller and try it for yourself.”

Melissa picked up the other remote. “So I just push this, like so –” The lasercutter demonstrated a few full circles on the spot, then careened at full speed towards the rock face. “Um. This thing is quite sensitive, isn’t it?” A tenth of a second before Clifford could think to enable the emergency brake, Melissa cornered the lasercutter on two wheels and aimed it straight towards him.

“Could you please slow it down a little, Miss Gellarson?” yelped the Colonel as the lasercutter stopped millimetres from his legs. He hastily bounded to one side, away from the front panel.

“Whatever you do, Miss Gellarson – please do not aim the lasercutter at another human being.”

“Sorry.” Melissa pouted like a child admonished for smashing a window. “I didn’t know, did I? Anyway, why is this all so important? Surely we’re not down here for driving lessons.”

“We are not nearly finished yet. And please hold your dog – this could be dangerous.” Clifford steered the lasercutter towards the nearest wall. “A lasercutter,” he explained, “has a variable-spread high-powered laser which can be used to cut through solid rock, and is controlled using this set of dials like so.” He enabled the lasercutter beam, and played it back and forth along the wall, leaving a two inch-thick gouge in its trail. Then he widened the beam, quickly vaporising a square meter of solid rock. “What I want you to do is spend a few seconds familiarising yourself with these controls.”

Melissa gave a horrified gasp. “I can’t do that! What if I do something wrong? I’ll chop through something I’m not supposed to, and then what? What if I accidentally aim it at –”

“Miss Gellarson, the lasercutter’s beam will be harmless during your control. Watch.” Clifford reached down and punched a button on the side of the lasercutter, then played the beam over the wall again. “See? It’s just plain white light now. Harmless.”

“I see.” Melissa looked at her controller dubiously, then began spinning a few dials. The beam traced a couple of circles on the wall, a triangle, a square. “Well, this isn’t so difficult. Oh, Settler, behave yourself!”

The dog was leaping back and forth, trying to catch the beam spot on the wall. Melissa laughed, and maintained the spot a few inches from the dog’s nose. “As interesting as this is, I still don’t understand why you need me. This is standard equipment, isn’t it?”

Clifford cleared his throat and tried to sound official. “I must warn you that what I am about to show you is military secret material, and –”

“Uh-huh. Settler wouldn’t tell a soul.” She giggled again and knelt down to stroke the dog’s head.

Clifford counted to eleven silently. “Wear this, please,” he said, offering her the headset.

“What is it?”

“It’s a new controller we have developed. You see, we need to address certain problems involved with manual controls such as the one you have been using. Specifically, we need a faster, more accurate response time. Using handheld controls can only ever be accurate to a certain extent: one must account for the difficulties involved in learning how to use them, the relay time from brain to hand, the possibility of serious coordination errors when under extreme stress, and so on.” Anyone with more brains, thought Clifford wryly, would realise where this technology was headed in the long run. “What we ultimately need to do is bypass the use of our physical limbs completely.” Melissa nodded, and regarded the headset with some trepidation. “So in other words, this thing is going to read my mind? I’m not sure I like that.”

Clifford chuckled. “Well spotted, Miss Gellarson, but I can assure you that you need not worry about others listening to your thoughts. All the headset does is attempt to interpret visual mental imagery. To put it simply: you control the lasercutter by picturing what you want it to do.”

Melissa placed the headset around her head and concentrated. “Nothing’s happening,” she said sadly. Clifford showed her how to switch it on.

For the next twenty minutes Melissa didn’t say a word, just peered silently at nothing, concentrating as hard as she could on picturing what she wanted. The lasercutter responded sluggishly at first, then began picking up speed as Melissa got the hang of picturing her intentions in just the right way. Occasionally she would giggle softly as Settler continued to chase the lasercutter and its laser spot around the floor. After some time, Clifford allowed her to switch the lasercutter’s beam back to cutting power, and now she was experimentally burning well-controlled artistic lines into the rock face.

Clifford didn’t speak either. He was appreciating the proceedings more than Melissa could know. He had expected some teething troubles, but it was turning out to be a perfect success. If someone as inexperienced as Melissa could train herself to use the headset with such apparent ease in under twenty minutes, there was no telling how useful the system would turn out for USASMA. The implications for military weaponry were staggering. It was almost sad that Melissa would never know what kind of system she had helped pioneer.

A low rumbling from above them interrupted Clifford’s reverie. He stood up sharply and looked around, trying to trace to source of the noise. Now it was coming from all around the mine passage, a thunder growing louder with every second, like an approaching storm. Settler began to yap at the roof.

Melissa suddenly seemed to realise something was wrong. “What is it, major?” She removed the headset, dropped it next to the lasercutter and looked at him questioningly. “A storm outside?” There was no possibility that they would hear a storm this far underground. “No. Hold on.” He walked a few steps away from her, trying to source the noise. “You know, it sounds like... it’s water.” A few steps more. “Yes. Maybe there’s an old natural water channel running through the rock somewhere nearby. I wonder what started it flowing?” He turned around, found Melissa standing nervously behind him. He tried to smile. “Nothing to worry about, I’m sure, Miss Gellarson.”

A solid *thump* shook the passage. Melissa let off a short scream. Settler continued to bark incessantly, standing by the lasercutter.

“Now, now, let’s keep calm, shall we?” Clifford wiped a layer of sweat from his forehead.

“Probably the rock just settling a little. Do you think there’s any way we could get that dog to *shut up* for –”

A heavy vibration through the floor sent them sprawling. They watched incredulous as, without warning, a section of the roof behind them began to cave in.

“Settler!” screamed Melissa. The dog, unsure of what to do, ran behind the lasercutter, away from the falling rock.

The roof collapsed. They both clapped hands over their ears, watching as the rock completely blocked the only passage through which they could exit the abandoned mine.

“It is extremely unlucky, really,” said the Colonel softly. “How were we to know we would hit an unstable water channel? No-one could have known.”

Melissa sat on the floor, crying freely. “All they said was, it would take a few minutes, nobody told me about any danger. Now I’m stuck down here, and we’re never going to be found. And S-S-Settler...” She let off a fresh wave of tears.

“Someone will come looking for us, I’m sure of that.” Clifford nodded at her, knowing very well that security protocols insisted no-one knew exactly where they had travelled through that mine. No-one was going to find them anytime soon.

By sheer fluke, everything they could have used to save themselves was on the other side of the caved roof.

“Why, wh-why,” sobbed Melissa, “why did this happen now? And, an’ surely with all this amazing *technology* the, the, the military shows off, surely they could have picked a, a... a *better spot*!”

Another rumble filled the air. “Oh no,” said Clifford slowly, “not again.” He glanced up at the cracked roof, not wanting to imagine what was about to happen to them next. “Brace yourself, Miss Gellarson.”

Melissa squinted, looked around. “But, major, that’s not water...”

He concentrated. “No, I think you’re right. As a matter of fact –” He stood up, spun around. “Miss Gellarson, that’s coming from the other side of this collapsed rock. I believe someone is trying to dig us out!” He scrambled over a few of the smaller rocks. “Hello! Hey!”

A few high-pitch vibrations cut the air around him. He quickly jumped down and pulled Melissa to one side. “They are using a lasercutter themselves. We’d better stay back.”

Long seconds passed, during which the noises from the other side of the fallen rock came closer and closer. “Any second now,” breathed the Colonel. Melissa nodded, held her head.

Then, with one movement, the visible rock fell. A wide-angle lasercutter beam shone through the gap, missing Clifford’s head by a dangerously small number of inches. He pulled Melissa to the ground. “Switch it off!” he bawled. “You’re through! Switch it off, damn it!”

Nothing happened for a while. Then the beam disappeared.

“Oh baby oh brother that was close,” Clifford said from the floor, panting. “What crazy genius knew where we were all this time? Who –”

“Settler!” exclaimed Melissa, and leapt up. Carefully plotting his way through the fallen rock, the Jack Russel trotted towards them, the lasercutter headset in its teeth.

“That’s impossible.” Clifford sat up, all expression gone from his face. “Impossible.”

Melissa held the dog in her arms, let it lick her face. “Man’s best friend, huh, major? You’re my hero, Settler! You’re amazing!”

“It picked up the headset, must have discovered what it could do... unbelievable...” The Colonel took the dog from her. “You’ve just performed a most fantastic experiment, you know that?”

Settler whined at him and drooled on his shirt-sleeve.

## SPACE RAVEL

Alecos Papadopoulos

Greece

I don't like people. And don't you think that this comes from a childhood trauma, the poor boy. It's just that over the years, I ended up disliking their vagueness, as well as their futile attempts at exactness. Sometimes I sympathize, sometimes I don't. It's when I'm in the second mood, that I fire the staff, cut chip-wages, ration data-quotas. A fresh start, I yell at them. Start from zero, it's the only exact base humanity ever managed to conceive. And it looks like a wheel too, so I'm not telling you to re-invent it, actually.

Those who stay, listen - and try once more. Most will fail, but in the meantime, some credit-making inventions will come along. The Law of Large Numbers, you could say: if it's possible it's probable, and if it's probable, it will eventually happen - just be patient and learn to outlive it.

Take Joe for example. When she arrived at my Private Lab, a physicist and a space-infomatics specialist, she was all starry-eyed, ready to open the doors of the universe for all humanity. I had to teach her that bright ideas eat up a lot of credits before they produce any. This meant disappointing her. So I listened patiently the first three times she burst into my office with how-to ideas about organic teleportation, practical time-travel, and the magic, free-lunch source of hydrogen-as-fuel that rested "out there", waiting for the humans to tap it. I showed her the hard copies of all the same ideas I had scrapped in the past (I keep the hard copies just for such emotional tactics), and placed her into info-debt for a month. She became com-catatonic for a while, and then asked to see me.

"Come in", I said, looking directly, exactly, into her eyes (beautiful eyes, by the way).

"I must talk to you", she murmured.

"Go ahead", I less-than-encouraged her.

"I really don't understand what you are expecting from me, from us..." she continued hesitantly, seating at the edge of the visitor's chair and guarding her small body by humping her back.

"If you ask for the usual promo-talk, it's all videotaped" I said. "If you want some more, well, let's put it this way: I want you to earn me a living, and justify yours. This is a Private Lab, after all".

And not just any Lab, I commented mentally. None else than the infamous No 9, according to the Space Agency Registry. Orbiting Mars forever, seeing it being slowly terra-formed while Earth was ironically mars-formed... I waited, knowing what was coming next. It did.

"But you ask for bright-minded, unconventional thinkers, with dare-devil proposals, and the stamina to work it all out, no state-run bureaucracy and politics...And then you strand them - stranded me three times when I came up with what you were asking..."

"No you didn't", I said with conviction, and rose from my chair to give the critical lecture. "What you did, is to offer already-known prospective solutions to realize dreams about movement.

Prospectives that in order to become applicable require resources that only a society could amass, not a Private Lab. And the societies of man have long chosen not to spend your way, not because it is expensive, but because they don't like these dreams. Nobody really wants organic teleportation, because it will disturb the balance of power between the individual and the collective. Nobody really wants time-travel, because nobody even now understands it. And as for the fuel that possibly waits for us into the void, who do you think really wants to travel that far? Not societies, with their necessary inertia, and a survival burden. Perhaps the escapists that inhabit a Private Lab, but they cannot afford the R&D involved. So here you are. I need something bright, yes. Unconventional, of course. But something that I can fund, and then I can sell. Not the next leap into the Unknown". I rested my case and went back into my seat.

Joe looked frustrated, but as I peered again exactly into her eyes, I saw the glimpse of understanding. "I'll try" she said, and it was the best answer she could give at the moment. I was optimistic.

...And not so surprised therefore, when she redesigned the propulsion-monitoring system of inter-planet spaceships so as to cut by a whole two-percentage-points the energy leakage that was due to data measurement inexactness. I gave her a fatherly hug, erased her info-debt, cut her a piece of the proceedings... which were huge of course, since her little invention would, over the next twenty years, amount in cost-reduction to something close to the cost of mining for three years a small satellite of Jupiter, transportation costs included.

"And don't you think you didn't bring us out of the solar system" I told her at the little celebration I ordered after I sold the thing. "You freed resources for something else, something that perhaps is yet to come".

She smiled. She was happy, the rest were enjoying themselves, I was satisfied. Well, I should have known better, especially about the 'yet to come' finale...

But I didn't, so when Joe knocked on my door again, she received a hearty welcome. She was my star for the moment, the butter on my bread. Still, she started cautiously -you know, circle your victim first. And she didn't take a seat.

"You remember how you told me about societies wanting not to travel that far?", she asked. Yeah. So?

"But what about unmanned flight?"

"What about it? We let our spaceships loose on the universe, leaving them to drift without fuel, and hope that when the, ah, superior race finds them, they will be all moved and with tears in their eyes - assuming they will have eyes", I said matter-of-factly.

"But if they could be navigated, wouldn't that be something of a, hmm, improvement?"

I frowned. She was a space informatics specialist, for sure, but to navigate matter, you needed first power, fuel, in place. And power was still damn precious. There was no need to say all these; she knew the facts, so she must have been thinking that she had also a probable solution. I beamed her a question mark.

She didn't react immediately. I felt her sizing me, trying to find the best way to present whatever she had in mind. Good. I had a reputation to nurture. I saw her chest rise (the big breath), and I got prepared for... all the wrong ideas.

"You remember the old Internet on Earth", she said, "back in 21st century".

Huh? Of course I remembered. But what the hell did it have to do with space travel?

"It started out military-wise, and so the idea was to break up data in little pieces, give them an id-tag, make them travel by different routes, still having the same destination and being able to reassemble at the end. So nobody could jump in and grab the whole message that, say, ordered to start third world war. And the third world war could then begin, and the technology would be judged a success. Peace-wise, you could optimize a little on bandwidth".

I broke in.

"Oh, spare me Joe, you are talking about data-technology. You need matter-technology for space travel."

"Hey, I'm merely describing it so you can see the analogy. I'm not among those loonies who believe that data about matter is interchangeable, almost indistinguishable from matter itself. I mean, I love the idea, but you, *you* need ideas that you can sell, right?"

"Ok. Following you in this, I should point out that the old Internet needed fiber, it was a mess of wires wrapping up the globe".

"And who says you don't have something analogous in space?"

And it hit me. I saw the whole picture in a flash, faster than I could spell it out. A sellable idea? If in place, yes. But it was a very far-fetched scheme, so it had little convincing power, therefore no co-funders. Still...

"You see it, don't you" she said, and I knew she had just learned to look exactly into the eyes of someone and know the truth.

"Find the lowest possible level of self-identity compatible with the collective one, name them *there*, and send them out to find one-another. Since we cannot bring teleportation to work through the emptiness of space, we can mimic it in real space & time. And we would use the roads and paths and corners already designed and in place, copyright of Mother Nature... Isn't that worth your credits?" she ended.

She *was* referring to the energy currents, which were continuously identified through space. They were traced, labeled, mapped, forgotten. They were, ah, cute, since they did resemble a web of roads and crossroads bridging the stars and the galaxies. They were rather stable, they gave nice visuals if colored properly, and that was it. I recalled an article written for us ignorants by the top researcher on the field. He explained energy currents vaguely, as usual, as a realization of gravity in its meta-philosophical conception; namely that anything above the level of existence would tend to approach in real space something alike it. But they were weak, weren't overpopulated by electrons ready to power your turbines, or isotopes willing to sacrifice their half-life to send you in the twilight zone. The writer ended with a grain of salt concluding that if humanity ever decided to send out matchboxes (which were long extinct as commodities), well, then it could perhaps use the energy currents as road *and* fuel. Otherwise...

And here I was, listening to a brilliant mind proposing just that: to send out matchboxes, to travel on the energy currents, fueling their motion by the road itself, finding each other at the other end, reforming their collective self - a spaceship, that is. Nuts. But why I couldn't bring my self to bark at her? Where was the Spark of Possible in her rantings? It was vague, and that was maddening me. I could see much more clearly the road to bankruptcy than the road to the stars. But I don't like people, and although I know that in trying to escape them I open the doors for them too, I always hope that my pace will be faster. And, if Joe's idea went anywhere, it would go *fast*, I could tell you that.

A sense of worry also grabbed me. It was a leap into the abyss that could, just could, be funded individually -prime case for the ever-hostile Security Agencies to shut you down, mouth and all. So we had to conceal it as something else, and...

I stopped, realizing that I had already bought it, and in front of Joe too, who couldn't but look at me and smile. It was time for me to become again the austere manager I was known to be. Face, and necessity, commanded that I did.

"Ok, you got something that appears logically coherent. But I need more, much more. What you have in mind for the fuel?"

"We will send out identifiable constructs, but small enough to be able to travel on the energy currents, fueled by them. This means developing a nano-engine that will squeeze the energy out of the current. Moreover, since the engine would be *in* its fuel, the standard monitoring of changes in the rate of energy absorption would be also a good navigation signal so as not to stray off course. You know, stay where the food is..."

She was good. But I had to press more.

"I still don't see where and how the 'different routes' part in your analogy falls into place".

"You cannot send the whole mass of a spaceship, even broken into pieces, travelling in one energy current -even more so if your nano-engine is designed to keep a constant acceleration rate, so as to..."



I broke again sweating. "Constant acceleration rate? Approaching light-speed? But how would you fuel-"

"Exactly. You'll need to feed even more on the energy current, and they're weak. Most probably you'll surpass their replenishment rate. So you must send your pieces by many different routes".

"And the universe gave us a whole bunch of them", I said quietly, "permitting us, perhaps, to design some equivalent itineraries, distance-wise..."

But I recharged; knowing it was my last defense.

"Do you have any idea how much more costly will be to design and construct a spaceship like this, like a puzzle? I tell you only one thing - you will create a million more junctions that somehow will have to be securely glued together *then*."

She looked at me very clearly in the eye. Damn.

"Tell me, how your average United Planets Organization would possibly evaluate such a project?"

I was short of clues for the moment.

"I would propose", she continued "cost per navigated distance as a measure. And say the project increases two-fold, three-fold, the nominator. But the denominator goes to infinity, so your measure goes to zero..."

"What about reassembly?" I insisted, but now in a co-worker-style. "That's the part that worries me, Joe. That 'able to reassemble' part. How do you do that?"

"Come on, all our spaceship factories are automated. How do *they* do it?"

"You will need nano-navigators on every one of them..."

"Of course. But that's the easy part, second-level integrated optics will suffice, I think... The id-tag is also relatively easy, since it will be passive, waiting activation on the spot..."

"So you're saying that you will send along a reassembly machine..." I thought aloud.

"Which needs to be invented and which will be assembled itself by another reassembly machine", she said.

"And you stop the Babushka Principle..." I offered,

"...When economics tell you to", she finished with a devious smile.

I could marry her -if I wasn't plump and ugly, that is.

I sat back in my chair and closed my eyes. I saw knots and bolts fly into space, insulation material and fiber optics, buttons and screens, turbines and antennas, riding ever faster the energy currents, getting together at their rendezvous, waiting for the assembly line to be assembled, forming the spaceship they were destined to become... and do what afterwards? Well, that was another idea, an idea that somebody else should come up with in due time... Although I was prepared to pay dearly for some Alpha Centauri close-up photos. With no humans in it. And assuming cryogeny would finally make it.

I opened my eyes, looked at Joe that continued to smile, frowned, and put my life into her - brains, to be exact.

"Just make sure Mercator will be on the team" I managed to say. "I don't remember seeing cartography in your c.v." And that earned me the cheek-kiss I ever really hoped for.

**THE FIRST**  
**Aniko Sipos**  
Hungary

He is sitting among the vast number of consoles and keyboards, and he is staring at the colorfully flashing switches and monitors controlled by enormous prospect providing bioluminal processor. He is elaborating on a long way until he could sit in this chair.

He checks every switches, consoles, control lights and he is waiting for the lights of the last ten seconds. He is waiting for the count down. He has thirty seconds left. He recaps on his way again. The old Chialkowsky is a first one, who comes into his mind. What a big number of obstacles he had to conquer until he could create his own rockets and stairs. His thoughts began to flow in a new direction at "stairs".

"Oh yes! Stairs determine the development of science. There is a level at the top of every stair. These levels are full of secrets, which have to be found out in order to proceed next stairs and levels. If someone fails than he stacks into that very level."

As he defines "time", "very long time", he is smiling again. It took people a couple days to proceed Moon almost for hundred years. As a consequence it was unimaginable for them to start exploring the further segments of the Universe.

"Approaching space travel from the „time and space" point of you arises lot of technological, biological, and philosophical barriers. So space travel in the last hundred years became to be a vain hope. Oh, how simple it is, however!" – States he softly. "Why did not it come to anyone's mind? It is so simple! ... Oh yes, Takana, the Japanese biochemist, physics, and astrologist discovered the field needed to create the engine of this vehicle only in 2010." This field is the result of processes conducted in the zero point gravitational space.

He stops thinking and looks at the starting consol. A slight shivering goes through his hands, but he has control over it. His palm is not wet, the shivering stops and he feels calm. He checks the time, and realizes that he has twenty seconds left. He continues his elaboration on Takana. "Oh yes! This magnesium, produced using nanotechnology is a very big secret. It is almost impossible to produce 100 percent clear magnesium under the conditions on Earth. Takane did it. However, it was not public as Japanese never like talking about their experiments. Only themselves within Japan use their results. But this finding was a very big miracle at those times."

The nanotechnology alloyed system, the alloy made of titanium and wolfram covered with magnet powder and nonstick material, embedded in magnesium bedding built up the slid gyroscope. This has opened new horizons, which has enabled people to carry out unimaginable things.

And now he is sitting here as the first one, who goes for a travel much further than the old Chialkowsky rockets could go. He is smiling again. He remembers the sci-fi writers of the last centuries, who called cosmic travel as space jump, space bend or time travel. However, it is none of them. It is only about a certain kind of gravitation, which has been discovered only a couple days ago, as the last couple years from the sciences' point of view could be called only days.

"The slid gyroscope." - He is thinking on the fact that it was used as a stabilization device in flying till nowadays. "But it is logical, that if something stabilizes than it transforms energy. If it transforms energy than the developed force can be moved. So based on this theory the slid gyroscope not only stabilizes but works as propelling power as well. Of course, it required new materials, alloys and new unknown usages of magnets to be explored."

He has a lump in his throat. He looks at his watch. He still has seventeen seconds left. He summarizes his last couple years and remembers on his first flight, as he was a child. Than he thinks

on his loves, his first wife, who thought of him as he were insane due to his passionate love with flying. Then their divorce comes into his mind.

He feels and believes in that he was born for a long flight, which takes not only him but also the whole mankind to a new area, new lifestyles, and new opportunities. In spite of his believes he knows that as he pushes this start button here, meanwhile other Chialkowsky rockets will be launched thanks to political and economical interest, and everyone will now only about them. However, he, the first one knows that he starts towards a new world, towards new possibilities. Now he hears the voice of the control tower in his headset: „Control tower calls the first one!“ He answered. He still feels the lump in his throat. He confesses that he is excited but he is not afraid. It is something more than fear, adventuresome ness or heroism. He only wants to get to know something. He saw the labor experiments of this device, he saw the results and also the born and development of it.

He saw the development of computer technology towards an unbelievable direction. Average people could not even imagine, think or reach these innovations. Let see for example the bioluminal plasma monitor that opens new unbelievable possibilities.

“The slid gyroscope ...” He smiles again. “It is so simple but incorporates such a big force and energy. It does not bend space or time. This way of thinking is silliness. It works based on other physical processes.” He intends to summarize it now, but the voice from the control tower appears again.

“We have ten seconds left. We start count down.” He listens to the voice. The numbers burns into his mind. “...Ten... ..nine...” He looks at the consol. As he is concentrating on all the monitors and consoles, he doesn’t really hear rather communicates with the numbers. Due to the increasing adrenalin level in his blood his senses become to be sharper and sharper.

As number zero comes closer he feels that he is the first Argonaut, the real one. He not only makes an excursion along the riverbank but he goes for the unknown far sea. Of course he knows that he is a rabbit used for experiments and he understands it is not accidental that he is alone. But he doesn’t care. “...Zero...” - says the voice. At this moment he and the control tower pushes the start button together.

The vehicle doesn’t shiver and its voice is not becoming louder. It simply starts floating. Slowly, but in a gradually faster pace moves it upward. Without any noise. The bioluminal plasma display shows the area of the control tower and than planet Earth. It is unbelievably fast as planet Earth becomes to be only a small model within few seconds. “Yes! The first has launched towards a new world, towards a new technology and what the most important is towards a new culture.”

As his distance from Earth is increasing he is watching the monitors. He doesn’t think of anything. He does what he practiced during the experiments and what he could have done anywhere, any time for that particular day. These are deeply implanted in his mind as a system.

In fact these were not simultaneous flying practices, it was rather a connection with a new computer system.

Processors and operating systems of this spaceship are not traditional as they are based on nanotechnology what enables his thoughts to flow automatically to the control panel of it. Certainly it is not a sort of “sci-fi like” operation as he is navigating the system manually. Although he knows that operators in the control tower could control his actins and decisions and they could overtake or automate the whole navigation if they like.

As his spacecraft has increased its distance from the airspace of Earth it has moved not like conventional spaceships describing circular orbits. It has started along a simple – one arched – spiral parabolic orbit. He knows that there going to be an orbit modifying point between Earth and Moon, where he has to stand on the way that starts straight as an arrow towards Space.

He will not need the gravitational pull of the Moon, he will not need the gravitation of any material, but he has to listen to the magnetic fields of Space along which he is going to fly.

As he has moved away from Earth he feels in his all cells as the nonstick cover on the magnesium bedding transmits the pieces of information to the slid gyroscope system. It makes the vehicle move softly, flexibly but also steady. He thinks of navigating this enormously huge spacecraft is a piece of cake.

He admires its shape and its arches. In his mind he sees the vehicle from outside as it is sliding in the black velvet background among small sparkling stars.

He has realized that space and time are diminished for him and he is the first one who has really started for the far endless Space.

He clearly knows that everything is going to change at the moment, as he will not see planet Earth.

He will not see it not because of the fact that he is going to be at the other side of Moon, rather than it is going to be only a memory at this state that he can recall only through the plasma display of computers.

He has started for a long flight, although the real importance of this first flight is not to overcome distance or time.

According to Earth time it is only a flight that can be measured in time and distance. His task is to fly in a certain direction for a definite time and then he has to find his way back. Using old space industry technology it would take long weeks, months even years. But now he has only a couple hours to complete the task. He has to reach Pluto, the planet that is said to be the border of the Solar System by lot of astrologists. However, there are contradictors of this idea who says that this point – planet Pluto – is only the start of the borderline and there is something behind it that belongs also to the Solar System.

He has learned and read a lot until he could reach this point as he is able to cross the magnetic shell of Earth. He feels that the whole civilization, the whole culture get through the line thanks to him.

He thinks this step to be more important than Armstrong's first steps on the surface of Moon, and more important than anything what people ever did before, even the discovery of wheel.

This spaceship is the first technical vehicle that doesn't contain any turning component. There is no any slipping part in it. Actually, it was pulling and repulsion. The ancient force that includes movement without motion.

The lamps are flashing as the sensors starts working. Sometimes he hears the soft growling of the system. He hasn't already had to care about weightlessness either. He feels his weight, his physical existence, which makes him feel relief. Honestly say he hasn't ever flight in a vehicle where weightlessness is present, he has only simulator experiences about it.

Now he goes through a totally different way of experiences. It is like riding a car that goes for only the neighboring forest, although it goes for the end of the Solar System.

This few hours can change his whole life. He will reassess the importance of people, mankind, as they become contractive at this point. They will have a battle not only with space and time, but also with anything totally different. They have to redefine words like "universe", "discovery", "invention", and even "existence". From this moment anything can happen. Unimaginable parts and features of universe can manifest.

Meanwhile the monitor started working as the vehicle arrived to the orbit modifying point between Moon and Earth. The face of the chief of the control tower has appeared on the display. They conduct a short and polite conversation about the present state of their enterprise. Finally the chief says with smiling face:

"Have a nice trip Argonaut! The coordinates are installed in the control panel of the vehicle. From now you are the first. We have shown the way out from the bay. Now we are not going to be your

guides. As you certainly know, when you arrives back traditional space research will diminish in that second. The world will become to be like it was long long ago, as wanderers will come and go all the time, and the meaning and importance of distances will be redefined. Honestly say you are not going too far, but you go to the other side of Reality. You will show that there is something more over the far foggy borderlines. So, bon voyage argonaut! It's your turn. We start count down, and until we finish it, you have to do the orbit correction.

"Ten, nine .." – and the First listens to the numbers. He doesn't think of anything. He feels a lump in his throat again, but he stays calm. It was only 2 minutes ago that he has started from Earth, but this amount of time shows to everyone that science in only starts to exist from now for mankind. The distance that could have taken for long hours or even days is now completed within a few seconds. He is happy and thinks of this unbelievable voyage.

"Six, five" – hears he the voice. His throat begins to be tighter. His heart begins to work faster. He starts to download the rest of the way to the screen. He sees the far endless space, the stars. It is like a collection of tiny sparkling lights on the black velvet curtain.

"Two, one.."

"Why am I here?" – comes suddenly into his mind.

"Zero. Have a nice trip, Argonaut!" – hears he the last words of the control tower in his headset, and he pushes the start button of the orbit modification.

He feels like the vehicle hasn't moved at all, but as he is looking at data he realizes that he has accelerated to an unimaginable speed within a part of a second. He is astonished. Due to the slid gyroscope system he doesn't feel anything inside the vehicle. He feels the gravitation similar to the gravitation of planet Earth. He has weight, force and he doesn't has to float. Ha also has oxygen to breath.

And suddenly something has come to surface in his mind. The Space has awakened a creature in him who always dreamt of this place, dreamt of this moment. Now he knows exactly that this creature is present in every single people. The evidence of it is clear: when people starring the millions of stars of the far black sky they feel that they should go out there, they should go "back".

"People have inextinguishable desires towards space. ...And now I am the First one. I am the man on the tree-stump who relies himself on the stream of the river as he pushes off the edge of the river. ... Stream..." – he smiled.

"So I am the first one who starts for the far open ocean sitting on a tree-stump and trying to cross it."

"However, it is not a tree-stump. It is the most modern vehicle created by people. This is the summit of science: the movement without motion. The space in Space, the time in Time."

"Yes, mankind has begun to develop in a real sense. We do not use the wheel yet. Something has ended ..." – thinks he with a wide smile on his face.

"... The Stone Age!" – says he softly.

## GATEWAY

**Christine Amsden**

United States

My name is Estelle Stevenson and I was born on the star ship *Prelude* almost eighteen years ago. Not that years had the same meaning for me that they did for my parents who, in their youth, could mark a year by the passing of the seasons. For me a year was simply the passage of 365 consecutive days, and days were only marked by the clock. Living my whole life on board a star ship caused me to miss out on many of the things the adults took for granted, like sunsets and snowfall.

My parents were Jerry and Emma Stevenson, both doctors of philosophy in engineering made famous by their work in developing portholes, which were supposed to save Earth from overpopulation problems. A person could step through one of two connected gateways and instantaneously end up stepping out of the other gateway. They work by using the force of gravity and the presence of parallel universes. Gravity is the force that attracts objects to one another based on their mass and distance from one another. Parallel universes exist alongside our own, moving in their own time streams, but we cannot perceive them because we exist in a four dimensional world. There are an infinite number of these universes, and many of them are completely empty of anything whatsoever. When two objects are placed in an empty universe, gravity will cause them to find one another and cling together.

The back ends of each of the two gateways that make up the porthole exist in an empty universe. The portholes will not separate in that universe because there is no matter to create enough gravity to pull them apart. The front ends of each gateway can be placed, in this universe, as far apart as we want them.

The mission of the *Prelude* was to establish a gateway on another world. One end of the porthole was already set up on Earth while the other was in the storage hold of our ship where it would remain until it could be placed on our destination planet. The mission of the people on board the *Prelude*, aside from setting up the other end of this porthole, was to begin a colony that could slowly process a massive influx of the excess population of Earth through the gateway.

Twenty years ago, five hundred colonists set out on this mission. They were expected to have children on the voyage, although the exact number of children anyone could have was strictly monitored. I was the first child born on the colony ship and the first baby ever to be born in space. Most of the colonists wanted to see if any harm would come to the babies before having their own. After everyone saw that I was healthy, the ship's population increased dramatically. Most of the children of the *Prelude* were a year or so younger than myself. My parents told me early on that the other colonists were a little silly because the real test would come when we landed on a planet and I was exposed to normal gravity for the first time. Would my heart be able to handle the extra weight? I was not weightless on the *Prelude* but the gravity created by rotating cylinders of the ship was only about half of Earth's.

A mere twenty years into the journey the *Prelude* found itself in orbit around an inhabitable planet. My first impression of New Earth was somewhat mixed. The sight of sky above me and ground below was a tremendous sight, but nothing looked like I had expected it to. I had always imagined a world like the pictures I had seen, but this world was nothing like them. The atmosphere was a breathable nitrogen/oxygen mix but almost no life forms had evolved on its surface. There were microorganisms in the soil making the planet capable of supporting plant life, but we would be completely responsible for cultivating the land. The place looked barren.

I felt very heavy on New Earth, although I was told that this planet still only had about 80% of Earth's normal gravity. I did not suffer any ill effects from the increased gravity, although in the

time we spent on the planet's surface I never quite adjusted to my increased weight. Exercise was very difficult, and I could not walk very far without running out of breath, but the human body is remarkably adaptable, and I was able to cope. Had I remained I think I would eventually have adjusted.

Before long we had a small village established on the planet's surface. My parents had the responsibility of setting up the gateway so that communication could be re-established with Earth. The porthole system was our only means of communication with Earth since no other powerful enough system had ever been developed.

I watched my parents as they worked, full of questions as always. Fortunately my parents were infinitely patient and enjoyed sharing their knowledge with anyone who was interested, particularly their only daughter. They probably wanted me to be just like them but since I loved them very much and like what they did, I didn't mind.

"We're ready for testing." Mother said one day. The gateway was impressive, standing fifteen feet tall, and it was fully large enough for trucks to pass through unhindered. Eventually a roadway would be built through the porthole, but for now it was just a gigantic circle supported by massive steel beams. The middle of the gateway was a swirl of gray, much like smoke. Nothing on the other side could be seen.

The first tests involved sending an inanimate object, an ordinary rubber ball, through the porthole. The people on Earth should have been constantly monitoring from their end and be ready to toss the ball back. After the ball was sent through we waited with baited breath for its return.

Two hours later we were still waiting. We hoped that the people on the other end of the porthole were simply off their guard, not expecting us to have found another planet so quickly, but it was also possible that the porthole had failed to work. In that case our ship full of colonists would take our seeds, seedlings, and animal embryos and start over. I could see the disappointment in my parents' eyes as the time slipped by. What could have gone wrong? The portholes had been tested on Earth and Mars before leaving and had worked perfectly then. What was different now?

"Ouch!" The ball had been thrown back through the gateway, hitting a technician in the back of the head. The ball had been thrown with a tremendous amount of force and a small lump could be seen on the back of the man's head. One of his co-workers helped the injured man to make his way to a medical tent.

"I guess they got carried away." Mother said, dubiously.

"We better move on to the next round of tests." Father said.

The next round of tests involved sending animate objects through the porthole to make sure they came back through alive. In anticipation of needing live animal subjects the ship had adopted some puppies and kittens to be enjoyed by everyone during the journey through space. The oldest dog, a lazy old Labrador called Jones, was volunteered for the mission. He did not seem to want to go into the smoky gateway, but a particularly large technician managed to push him through the opening. Then we waited. We waited for a very long time. This time, there was genuine concern about what was taking so long since the people on the other side were now alerted to our presence. At first we thought that Jones was reluctant to come back through, but as time went on our trepidation increased. If Jones had not survived they should have thrown another rubber ball through the porthole, but there was no response through the gateway at all.

After several long hours most of the crew decided to turn in for the night. The sky was growing dark and little could be accomplished when everyone was exhausted. A skeleton crew stayed behind to watch the gateway while the rest of us went to bed.

Permanent dwellings had not yet been erected so I slept in a tent atop an air mattress. It was remarkably uncomfortable, although that could also have been due to the excessive gravity. I slept poorly, and halfway through the night I gave it up and took a walk.

With the sky lit by two full moons I could see clearly. As I stared into the night sky I saw a sight that made my heart skip a beat. Some kind of creature was flying overhead. It had long, leathery wings and looked like a cross between a bat and a pterodactyl. As I watched, it swooped down towards the gateway, on a collision course for one of the watching technicians. The woman screamed loud enough to alert the camp, but her screams were suddenly silenced when the creature ripped off her head with its huge teeth. I had never seen such a gory sight before, and my first reaction was to freeze in terror just before losing my dinner. Meanwhile the woman's screams had caused the rest of the camp to rise and pour out of their tents.

The creature grabbed the woman's body in its massive claws and disappeared through the gateway, but the attack was not over. As soon as the first creature disappeared, ten more flew through the gateway and circled it from above, as if guarding the opening. Not knowing what else to do, I ran to my parents.

"What's happening?" I asked, "What are they? Has Earth been attacked since you left?"

My parents were also terrified and were slow to answer. Finally my mother said, "I have no idea. Maybe they were attacked, or maybe...."

She trailed off, and my father decided finished for her, "Maybe another race developed the same technology. Maybe the other end of this porthole no longer goes to Earth."

"What do they want?" I asked, somewhat stupidly. How could my parents know what they wanted?

"We need to close the porthole!" This came from the captain of the *Prelude*. Until further notice, he would also be the leader of the colony.

Just then a loud screech erupted from the throat of one of the creatures, who had been struck by a shot from a colonist. It fell to the ground, apparently dead. At least we now knew that they could be killed. Unfortunately, we also now knew that the creatures had weapons of their own. Clapsed in their small claw-like hands were weapons that fired streams of white hot light. The creatures were deadly accurate shots, too. Before we could even get ourselves organized, five colonists were dead.

"Kill the rest of them!" Cried the captain, taking out his weapon and joining the fray.

The battle was intense. I was too stunned to really take in many of the details, but when it was over all ten creatures were on the ground and twenty five colonists were dead. My parents ran to the gateway controls and frantically tried to take it off line before any more creatures could come through.

The captain yelled to his first officer, "Evacuate the colonists. Get as many people back to the ship as you can!" Then he started gathering men to guard the gateway in case more creatures came through. About two hundred people remained on board the *Prelude* at that time, keeping it operational and watching over the precious seeds and embryos. Everyone else, nearly eight hundred in all, including most of the children, had begun staking their claims on the planet's surface. There was enough room on the shuttles to take about three hundred people up to the ship, and it would take an hour for them to return.

"Get on the shuttles!" I found myself screaming at the people milling about aimlessly. I did not bother to collect my personal items, I went directly to one of the shuttles, urging on a group of dawdling colonists ahead of me.

Then I heard an ear splitting screech in the air above. I looked behind me long enough to see a stream of the creatures coming through the porthole. The armed colonists tried to take them down, but they kept coming, dozens, probably hundreds by the time it was over. I will never be sure, because I had reached one of the shuttles just as they began pouring out.



“Get in!” All the colonists, finally understanding the danger, surged in a frightening wave towards the shuttles. There were six shuttles, each with a fifty person capacity, and I would not allow the shuttle pilot to take off until every seat was full.

As we rose into the air one of the birdlike creatures flew towards us and fired its laser weapon at the shuttle, piercing the hull in two places where the shot entered and left. A small boy was also struck in the arm, but his injury was not nearly as important at that moment as sealing the holes. The shuttle did not slow, but began its ascent into space. I frantically gathered three people that seemed level headed enough to help me seal the holes. We finished the job as the shuttle rose into the upper atmosphere, just in time.

With that job behind me I took the time to look out the window to see how the other shuttles were faring. Every shuttle had made it into the air, although two more had been hit. One of those also managed to seal the holes and control the damage, but the other one was damaged beyond anyone’s capacity to save it. I watched as the shuttle finally lost its fight to stay in the air and crashed to the ground in a fiery heap.

I was not present for the end of the battle on the planet. All I know is that every human died or was captured. When we scanned the area we found that even the bodies of the dead colonists had been removed to some unknown place, probably the other side of the porthole. Two hundred fifty colonists managed to escape the planet, including myself. I have no idea what those alien creatures wanted with us but our small landing party had not been equipped to handle any resistance. In the event that we found an inhabited world, we were supposed to have moved on. Now we would move on, those of us who remained, but with a far grimmer task. Earth was out of our reach and we had to assume that the hope of humanity rested with the tattered remains of our group.

## GROWING PAINS

Brendan Whelan  
Ireland

Tresgo-46 stared out into space while he waited. The spectacle of the solar sail had excited him ever since he could see over the lip of the view-port. He was nearly twelve years old now, and lately he was interested in the faint golden hue that oozed through the silver gossamer sail. It was the only tantalising hint of their destination; the second planet orbiting the star Upsilon Andromedae, or Euatoo as was it called on board ship. Tresgo had looked forward to seeing it for the last year, ever since he had been told that he would be the first colonist to plant the flag of Earth on the new world. The sail, in its deceleration configuration, blotted out most of the stars. He heaved with frustration. A whack on the back of his head shattered his thoughts.

“Come on dreamer. Time for class.”

He turned to see Klara.

“About time,” he replied, “any longer and I would have gone in after you.”

She laughed. “You’re not that brave.”

Klara was right. No one - not even Tresgo - was brave enough to go against the ship’s edicts. The ship fed them, clothed them, taught them, and entertained them on their journey to Euatoo. They were all dependent on its environment for survival, and no one would risk upsetting it. Its mind was only a computer, albeit a sophisticated one, but none of the colonists liked to test its capacity for discipline and order.

The ship had dictated early on that hatch group 33746 (to which both Tresgo and Klara belonged) should be divided into two groups and use separate facilities for certain tasks like washing, dressing, and sleeping. It didn’t bother Tresgo at the time; he was young and knew no different. But as he grew he saw that previously hatched generations did not have to endure such arbitrary segregation. Klara-46 was Tresgo’s favourite hatch sibling by far – his best friend – and he came to resent the ship’s rule that kept them apart so often.

“Let’s go. Ship will detain us if we’re late,” said Klara.

“We? It was you who kept me waiting out here while you went to the toilet.”

He poked her softly in the stomach. Their laughter accompanied them as they chased each other into the classroom, screeching to a halt at the foreboding glare of their teacher, Mattus-45.

“Late again. You realise, I’ll have to report this to Ship.”

“Yes Sir.”

“‘46 Group, you’ll be the end of me,” he proclaimed, and signalled them to take their seats. “Class, today Ship has set a very interesting lesson for me to present to you.”

With a finger, Mattus clicked in the air and dragged a little blue-white orb icon from one side of his desk to the play-bay on the other side. The action caused a signal to be sent into the synaptic implants that the students had installed in their brains. A phantom image of a large blue-white sphere was projected into their minds, hovering a few metres before them.

“Who can tell me what this is?”

“It’s our home – Earth,” Tresgo yelled, before Klara could raise her hand.

“It *was* our home,” Mattus corrected him. “You must think of Euatoo as home now. I’m surprised that you, of all of us - our colonist pioneer - need be reminded of that.”

Tresgo’s cheeks caught fire as Klara looked back at him with a smirk on her face.

“You of all generations should look to the future rather than the past. But for today, we must look back one last time.”

He dragged the Earth icon back to its holding bay and replaced it in the play-bay with another icon, containing two figures. A man and a woman bubbled into the students' views.

"These are our distant ancestors."

It was the first time Tresgo had seen a human. The ship had excluded any images of them from his view of the archive. He looked at the oddly narrow creatures, with their smooth rounded features and fragile pinkish skin – not a scale in sight.

"Sir," he asked, "why do they look so different from us?"

Klara's hand erupted from her seat in an effort to gain the teacher's attention. Tresgo thought that, if she could, she would have dislocated her shoulder to raise it higher.

"Yes Klara. Go ahead."

"Because Ship has changed us over time to help us live on the new planet. It changed our ge ... gene -" she said, leaping in where she did not have knowledge to follow.

"Our genes," Mattus finished for her. "That's right. Well done."

Klara turned back to give Tresgo a smug little smile. His flat nose scrunched up in reply, flaring out the scales of his face.

Mattus continued to run with the new subject.

"To be more precise, it is our DNA that has been altered. Ship, as you know, creates the genetic material for each new generation. Each generation differs in some ways from the last, but each one – over thirty three thousand in all – have followed Ship's program to evolve from what we started out as to what we must become in order to survive on Euatoo."

Not to be outdone by Klara, Tresgo felt compelled to show that he understood too. Besides, it gave him a convenient opportunity to ask something he had always wondered.

"Sir, if Ship can create DNA, then why not just create and hatch one generation when it reaches Euatoo?"

Mattus raised the facial muscles where his eyebrows should have been.

"A very astute question, young Master Tresgo."

Tresgo decided to be magnanimous in victory and not look at Klara, just yet.

"There are three reasons why it was deemed a bad idea to do just what you suggest."

He listened with sunken pride as Mattus issued a comprehensive destruction of what Tresgo thought was a very good idea.

"Firstly, it was decided that a crew would be needed on the journey. Ship would be in flight for thousands of years, and many unforeseen problems could have arisen. So a crew would provide a useful backup if anything happened. Secondly, evolution needs gradual nudges. For each incubated generation, Ship would gradually alter the on-board environment so that it approached the conditions on Euatoo. Finally, and most importantly, is the need for transfer of wisdom. Ship's archive contains all the knowledge that we could ever need, but without the accumulated experience of our people – passed from one generation to the next - we would lose the wisdom to interpret and use that knowledge wisely."

Mattus stopped his speech abruptly. He looked down and rubbed his finger along the desk like a shy child. Tresgo had never seen him like this before.

"There are, however, certain limits to what I can teach you. Some experiences -," he hesitated, "will be unique to your generation."

He took a sharp intake of breath, as if to summon courage from the air, and faced the class again.

"Yes, great sacrifices will be required of you, the like of which no previous generation has had to face."

His words confused Tresgo, but even more confusing was the duo spinning in the air in front of him. Now he knew why the figures looked unusual, but why were there two of them? He examined

them more closely. He could still identify his origins in one of the figures, despite thousands of years of forced evolution, but the other human was so different – more rounded, bumpy, and something was missing. He raised his hand.

“Put your hand down Tresgo,” Mattus said with a deep sigh. “I know what you are going to ask: why are there two kinds of human?”

Tresgo suspected he was not going to like the answer.

“The simple answer is procreation. We are accustomed to having Ship control our procreation, but in nature humans create new generations by mating: one to one, male to female.”

Pregnant silence fell.

Tresgo exchanged an empty glance with Klara. He knew about mating. In his scans of the archives he had seen references to how the plants and animals of Earth had prolonged their species, but he never thought that people did it the same way. Previous generations on the ship were all the same, with no gender. He had never imagined that it was any other way; it was just another little secret that Ship kept from them. Perhaps, he thought, Ship had coded gender out of their DNA to avoid interference with its grand evolutionary plan.

“In nature,” Mattus continued, “a new human is given a genetic makeup from both its mother and father. Nature also throws in a few random mutations, which if successful would continue in the species, otherwise they would recede. Ship can only support a few hundred people at once, and if procreation was left to chance here then the gene pool could stagnate due to insufficient mutation. I suppose you could consider this another reason why our ancestors decided on Ship controlled mutations.”

Mattus looked down once more.

“Now ... we must broach the subject we are here for today. When we arrive on Euatoo, Ship will no longer be able to procreate for us. Nature must reign once more and you – all of you –,” his pointed finger scanned the classroom, “must choose a mate and procreate once more for our race to survive.”

Tresgo could hear a gulp from the back of the class.

“Ship has reactivated the necessary genes in your generation. That is why you have been segregated; to avoid discovering this until you were of a suitable age. Now is that time. This is the sacrifice of your age: to learn to procreate once more. My generation have no experience of this and can not help you, but Ship has now kindly opened the archives on human procreation techniques.” He dragged a new moving icon into the play-bay. The two figures they had seen before were now doing something totally alien to them. The air was filled with a static shock, nervous laughter, silent fear, and several squeaks of squeamish disgust.

When it was over, Mattus cleared the display.

“Well, you all have a lot of study to do – and hopefully a practical assignment too. We will leave the lesson there for today. Think on it, and we will continue tomorrow.”

He shut down his teaching console and walked sprightly out the door, avoiding any questions.

Tresgo didn’t feel like asking him any questions anyway. He shuffled out of the class with vacant eyes, barely noticing the other zombie-like students passing him by. He stopped to look out the view-port. Maybe it wouldn’t be so bad, he thought. It might even be fun.

He sensed someone shuffle up near him. It was Klara. She had the same vacant look, until she saw Tresgo. They held each other's eyes momentarily. He saw her shoulders tense up and her yellow eyes recoil, probably because Tresgo did the same. She tried to smile, but it gave out quickly.

Tresgo couldn’t even manage to smile. He saw her differently now, understanding the small physical differences they had playfully joked about together, claiming that she was getting fat in places.

The scales on Tresgo's cheeks flushed purple and his stomach churned. In an instant, without thinking, he ran away. Klara ran too – in the opposite direction.

## AVATARS OF MARS

**Jake Bartolone**

United States

On August 8th, 2025, the first four colonists arrived on Mars. They were not much like the first Americans who landed on the Moon so many years ago, nor were they like the men and women on the previous manned missions to Mars. In fact, the World Space Agency kept the voracious world media starved for information about the colonists, for the simple fact that the general public would have looked upon them as a pitiable band of misfits and losers. None of the Four were remotely telegenic, nor did they possess the military or scientific backgrounds that were the reassuring hallmarks of their predecessors. They were, however, suitable for the task at hand in a way that none of those who came before would have been. They did not need human contact.

Three days before the arrival of the second wave of colonists, Keith's body lay unheeded in its six-foot-cubed coffin, a piece of meat that he did not feel. His consciousness was devoted to the experiences of his avatar, which was attending a meeting of the Four. Each of the Four had their own avatar, an idealized Mars-adapted humanoid of their own design, and none had ever laid eyes on the

others' bodies that were kept fed and breathing in their metal lockers, though many would have called those bodies their true selves. To the Four, however, they were no more than annoyingly needy

vestigial organs, made irrelevant by their three months with the avatars.

"The colony buildings are finished." Dragan was speaking over the common band; her perfect golden mouth was opening and closing to make the source of the voice clear. "Now we must decide what to do when the colonists arrive."

"The Space Agency wants us to give up our avatars and live like the new colonists." Riggins wore an exaggerated sneer just in case his clipped tone didn't sufficiently convey his thoughts. "They can have my old body instead."

"The Agency does own our avatars," said Ox, her smile as patient as ever, "and I do not see how we might reimburse them if we wish to retain ownership." She leaned against one of the monoliths of the recreated Stonehenge in which they met.

Riggins snorted red smoke towards Ox; this was one of his many flamboyant enhancements. "What do you suggest, then?" Today he wore the appearance of a prohibition-era Chicago mobster in a garishly red zoot suit.

"I suggest nothing, comrade. I wait to hear what others think." Ox's proletarian face turned to Dragan, and then to Keith.

Keith cleared his throat, though his avatar's throat never needed clearing. "Won't we need the avatars' capabilities to do repairs and maintenance for the colonists?"

Dragan's eyes shone like diamonds. "We will. They will be available when we need them for such work."

"Then why do they want us to live without them?" The idea made Keith vaguely uneasy.

"They want us to fit in with the colonists. To be accepted." Dragan's tone contained no hint of her feelings on the matter; she liked to let the others come to consensus without her input.

Keith laughed a short burst of bitterness. "I don't care about that. I wouldn't fit even in my meat body. I'm used to it."

"It does take several minutes to readjust to our avatars when we first resume control," Ox chimed in. "I am concerned about emergencies, when our skills may be needed immediately." Her squat

worker's body seemed taut with dedication. "I also do not care about adjusting to the social order of others."

"They need us, and we don't need them." Riggins sounded smug. "We should be making the rules."

"We are agreed, then." Dragan looked at each in turn to be sure. "I will communicate our unwillingness to abandon our avatars when I file my report to the colonists."

Keith wasn't sure if he detected a smile on Dragan's metallic visage, but his chest swelled with shared feelings of defiance. He was relieved that they had not acquiesced; his avatar had become as crucial a part of him as his limbs -- no, more crucial.

The Four stood in a knot before the newly arrived shuttle, watching the colonists stream out of the ugly pod and towards their barracks complex, recently finished by the Four. They all looked the same in their WSA-issued pressure suits, and very few of them spared a glance at their benefactors. Keith imagined sneers behind the few mirrored faceplates that turned towards him.

One colonist strode up to the Four and tapped his radio pack to indicate he wanted to speak.

Through his unmirrored visor Keith saw an older man, wrinkles hardened in a way only career military types seemed to be able to affect.

"Riggins. I'm Potter, in charge of this group. What's your status?" He sounded American in both accent and tone of command, and Keith's hunch that Riggins was American became stronger.

Naturally this man would assume his countryman was in charge, never mind that the Four had elected Dragan as their spokesperson.

"Your buildings are ready to go, Potter," Riggins replied in his trademark sneer.

Dragan added, "We'll be on standby on the common band if you require our services."

Potter peered imperiously at Dragan, looking disgusted by the ethereally female form of her avatar.

"You four still plan on disobeying the direct order to give up your silly suits and live like normal people?"

Ox answered quickly, before Riggins could say something stupid. "Would you cut off your own leg just because your superior ordered you to do so?"

Potter turned his glare on Ox, with the practiced ease of someone used to being obeyed. "Damn right, I would. I'd expect anyone I work with to do the same." He shut off his radio before anyone else could speak, and walked off to the colonists' compound.

"He's going to be trouble," muttered Keith on the private band of the Four. "I think they're all going to be trouble."

"I demand to know which colonists were responsible!"

"Now, Miss Dragan, calm down. There's no evidence that --"

"No evidence?" Dragan's voice raised several decibels. "How would you describe the video of the attack that I have shown you?" Keith, Riggins, and Ox watched through Dragan's eyes on their private band because there wasn't room for all of them inside Potter's office.

Potter wore a look of bemused scorn. "That could easily have been doctored."

Dragan's metal fist slammed into the desk, leaving a large dent. "It wasn't."

"Why would colonists have attacked one of you?" Potter shrugged. "Besides, there's no way to identify them even if that video is real. All of the faceplates are mirrored."

"He could easily have killed them, Potter, but he did not. Instead he disabled them by puncturing their suits. Look up the suit repair records, and we will figure it out."

Potter sighed heavily as he tapped his keyboard and looked at his screen. "Forty-seven of my colonists had their suits patched up so far today; seventeen of them needed major repairs. If they're not on outside detail they could go days before they bring their suits in." He shrugged, and smiled blandly.

Keith whispered on the common band: "He could figure it out. He doesn't want to."

"Or he is actively concealing their identities," added Ox, also only heard by the Four.

"Be warned, Potter," intoned Dragan, in the office, "the next time this happens, colonists might get hurt. It will be on your head if you cannot root out the source of this problem."

Even as Dragan worked her way out of the labyrinthine seals and locks of the compound, the Four were feverishly discussing.

"You should have killed them, Keith." Riggins sounded uncharacteristically subdued.

"Would you have?" Riggins didn't answer Keith.

"At any rate," interjected Ox, "it would be wise if we did not respond to any service calls alone.

Four of them cannot hurt one of us, in their clunky suits, but twenty might be able to."

"We should make them pay for it," Riggins murmured.

"Our presence as a group should provide sufficient deterrence. Let them not be emboldened by finding any of us alone," responded Ox.

"Ox is right," said Keith. "We should keep doing our jobs, but we should stick together."

Dragan spoke. "We should also keep moving our meat bodies. They are our main weak point."

Everyone voiced agreement.

Five days later, a makeshift bomb destroyed the bunker that used to house the bodies of the Four.

They met again, next to a replica of the Mayan temple at Chichen Itza that Ox had built.

"We should keep working," Keith stated with absolute certainty.

"They're trying to kill us, not just take away our avatars." Riggins sounded near hysterics.

"Even so, there are three hundred colonists. How many are fighting us? Ten? Twenty? Even if there were more, if we stop working, they will all die." If the power went out, if a water main failed, if the network went down, if any one of a number of things happened, innocents would die without their help.

"They are getting more dangerous," intoned Ox. "Whoever rigged that reactor to blow up when we came to service it was willing to chance the sacrifice of dozens of other colonists." Ox herself had spotted the trap and defused it just in time.

"It's us or them. If people have to die, I choose them." Riggins' voice quavered.

"I saw another group of colonists searching the desert this morning," said Dragan. "There were no work postings scheduled for that area." They all knew that the colonists' faceplates had been mirrored, and that they must have been looking for the new hiding spot of the bodies of the Four.

"Why do they hate us?" Riggins whined.

"We are different," intoned Ox.

"Surely there are as many differences among the colonists," said Dragan.

"None so obvious," replied Ox.

A long silence blanketed the meeting, long enough for the sun to cast the stairs' shadow in the form of a snake along the side of the temple, and then for the shadow to disappear.

"There is one thing we can try," said Keith. "Do we have scrap metal left over from the construction of the colony?"

"We do," said Ox.

"I'll also need to use the backup circuitry that we were saving for repairs of the avatars."

"Is that wise?" cautioned Riggins.

"If it is our only choice, wisdom and folly are meaningless," said Ox.

Dragan nodded to each in turn. "We are agreed, then. We must take the risk if it might quell the uprising against us."

Three days later, four colorful new avatars stood outside Potter's office at dawn. Inside his office were the materials needed to hook four colonists into them, and Ox's carefully honed instructions on



how to cannibalize the colony's buildings and computers for the parts to make more. A short note stated that the Four would no longer aid the colony with regular maintenance.

Four volunteers were selected in a lottery into which more than half of the colonists had entered. Within days they had become comfortable enough with them to perform the duties abandoned by the Four; brute strength and better tools compensated for inexperience. After a week they began to refuse to give up their avatars to let others train; several incidents with faceless attackers were followed by promises to build more avatars.

Two months after the departure of the Four, the colony had been transformed from a massive complex of living space and offices into a small grid of airtight coffins with minimal life-support capabilities. The rest of the materials had been used to create three hundred individually designed autonomous avatars, one for each colonist. The valley that once housed the drab colony was now filled

with colorful beings of all shapes and sizes.

"They are ready for us to return." Dragan gazed at the old colony with the rest of the Four atop a replica of the Pyramid at Giza that Ox had made out of dark red Martian stone.

"Are we ready to return? I've listened in on their radio chatter, but do we need them?" Riggins asked.

Ox spoke gently. "We are running low on the supplies we need to keep our old bodies alive. They will share resources."

Riggins said, "Won't they attack us again?"

"No," said Keith. "They are individuated now; they cannot hide among their similarities."

"I have heard on their transmissions that their productivity is up more than can be explained by the use of the avatars alone," Ox said. "I speculate that they are held more accountable for their own work, and take pride in their reputation."

"They are individuated," repeated Keith. "Responsibility is forced upon them."

"Not all of the colonists have adapted to their new lives," said Dragan. "Most with military backgrounds have requested a return to Earth duty, or a reposting to the supply shuttle between Earth and Mars. They will be accommodated; not everyone is needed here now that the terraforming project has been put on hold."

"It would seem it is easier to adapt to Mars than to adapt Mars to us," intoned Ox. "People and their needs are easier to change than an entire planet."

"The colonists have already set up more domes in which to grow the food that we need," said Keith.

"Our bodies are much more water-efficient in their coffins, and when we run out we can send a mining expedition for more."

"So we can go back? It's safe for us, and for the colonists?" Riggins took a few steps down the side of the pyramid towards the colony valley.

"It is safe," said Ox, "to begin our lives as Martians."

Dragan looked at each of the Four in turn before she spoke. "We are agreed, then. We will return to live among the colonists."

The Four set off down the slope of the pyramid towards the settlement, each with their own ideas about their new lives.

## TONIGHT'S EPISODE: THE MOLINA RESEARCH STATION

**Andrew Mays**

United States

"Good evening! Welcome to Space Junkyard, the program where you decide the fate of a neglected orbital facility. On tonight's episode, The Molina Research Station. I'm Commander Peiter Sovudin." He paused and motioned towards his companion. "This is Dr. Maya Leonov, the only additional crew member joining me on this expedition." Strands of red hair were visible under her helmet. Cut

short and close to her face it complimented sharp green eyes that seemed to sparkle in the lights of the zero-grav camera now concentrating on her.

"Thanks Commander." She shifted her eyes slightly left to consult the mission notes on her heads-up display. "The Molina Research Station was powered by a bioreactor, with supplementary solar collectors and several lithium-ion battery units." The camera focused closer on her face. "The station maintains an orbit which comes as close as 600 km above the planet and goes as high as 60,000 km. This path repeats every twenty four hours and has been in a slow decay since last year, when the station was abandoned."

"Now it's time for you to begin voting to decide the station's fate!" The Commander exclaimed.

"Vote for a refit and this derelict station will be transformed into a space hotel. Vote for destruction and the station will suffer a fiery reentry at the conclusion of tonight's episode. Call one of the displayed numbers now!"

"You look beautiful, Doctor." The director's voice rang out on their com channel during the break. He was watching from the comfort of an editing bay on the outskirts of Paris.

"Thanks." Maya blushed slightly.

"I wish I could say the same for you, Commander." He joked. "We're back in 10."

"I put on makeup and everything for you too!" Peiter smirked.

"And five, four, three, two, ..."

"Welcome back to Space Junkyard: The Molina Research Station." Peiter smiled to the camera focused on him. Another camera had floated over and was concentrating on Maya's efforts to open the airlock. "In moments we will open the doors and give you a tour of a station that has been dormant for over a year."

"The airlock is active." Maya announced. The camera swiveled up from her and floated back slightly, discharging compressed air to maintain a stable flight path.

Bubbles of red moisture and shattered ice crystals began drifting up from inside the station as the airlock slid open.

"What's this?" Peiter asked as the gap widened. He extended a gloved finger up into a ball of gelatinous red liquid and watched it separate.

Maya pushed back and looked into the station in awe. A camera focused on her face. "It's beautiful."

The walls of the station were entirely frozen over. Pockets of a slightly glowing red liquid were visible underneath. The camera lights sparkled off the ice before her as Maya pushed forward.

"I've never seen anything like this." Peiter commented as he entered the station.

"The conditions which caused this are rare." Maya nodded, talking to the camera.

Peiter turned and resealed the hatch. "The glow is a bioluminescent algae called *Gymnodinium Breve* which was used in the bioreactor. It appears there has been a leak." She moved to examine the wall. "Amazingly this single celled organism has managed to mutate, propagate and survive underneath the ice."

Maya withdrew a sterile dish from a pocket. Scooping some of the algae into it she carefully sealed the sample and slid it back into the pouch on her leg.

Continuing deeper into the station she noticed their motions where enough to activate the algae. Looking back she could see their trail in a scar of glowing red.

Maya moved to the wall and slapped the ice. Both cameras focused as the algae began to glow brighter.

"Why does it do that?" Peiter asked her, thumping the wall and observing the same effect.

"It's a defense mechanism of sorts." She responded. "The dinoflagellate glows when the water around it becomes agitated."

"Interesting," The commander thumped again and watched the algae grow brighter. The camera stayed focused on the glow as Peiter carried them into the break. "Call now and place your votes for the fate of this station. We'll be back after these commercials."

"You two wouldn't believe the ratings we're getting!" The director announced as the first numbers started coming in. "I don't think there's a set in the northern hemisphere that's not tuned in to watch."

"So do we get the viewership based variable pay increase?" Peiter asked, winking at Maya.

The director answered only by beginning the 10 second countdown.

"You're watching Space Junkyard: The Molina Research Station." Maya announced. The ship schematics appeared in her display and rotated in three dimensions before her.

"We'll start with the main control room and see if we can get the ship's power and computer online." Peiter said. "Then we can take a look at the engine room. From there we'll examine the living quarters and labs."

"Commander, I'd really like to take a look at the bioreactor first." The cameras angled in close on each of their faces to show the tension between them.

"Very well Doctor." Peiter replied as he turned to trace back up past the airlock to the main control room. "I'll see if I can't get the reserve power systems online."

"Yes Sir." She replied, continuing on to the engine room at the center of the station. Breaking the seal of ice Maya slid the door open and floated into the darkness. A camera captured the event from a vantage point in the hallway.

In the main control room the computer terminals were all frozen over. Commander Sovudin carefully used a knife to clean one. The camera feed from his helmet cam was filled with a spray of ice as he pried open the access panel underneath the screen.

Peiter easily located the reserve power cords in the mess of wires that he found. "Okay." He announced to the camera focused on him. "I'm going to disconnect this main power line." He pointed to the thick blue wire, it was frosted over at the top. "Then I should be able to connect reserve power to this terminal." He unplugged the frozen connection and let the cord float next to him as he plugged in

two smaller reserve cords. Continuing he explained, "If the batteries are not completely dry I'll be able to access the ship logs, download the system databanks and get some secondary systems back online."

He straightened up and balanced himself with one hand as he drifted above the terminal and switched on the computer. He whistled as it blinked to life, the screen displayed very low battery power. Peiter checked the station's functions and stated, "Operational capabilities are only at ten percent."

The camera switched to Maya in the engine room, who carried them into commercials with a smile.

"Remember your votes tonight will determine the fate of the Molina Research Station. Make your choice and call now."

It was only then that Maya realized how dark it was around her. The only light she had was the faint red bioluminescence, the camera lights and her own flash. Moving to the wall she began to tap with her flashlight and her fist. The stimulation caused the algae to glow brighter as she made her way slowly around the room.

"That's a brilliant bit of thinking, Dr. Leonov." The director announced to her. "You're live in ten seconds."

She now had the equivalence of the light from several low wattage lamps surrounding her. The ice magnified the glow and reflected it. "This is Space Junkyard: The Molina Research Station, I'm Doctor Maya Leonov. Welcome to the engine room of this once mighty station." She tapped harder up and down the walls and the glow increased. "This bioluminescent algae was supposed to be contained in the bioreactor." She kicked off the wall softly and floated to a squat cylinder in the center of the room. "It was conceived and constructed by Molina Industries, the namesake of the station itself." Her helmet cam showed the exterior of the tank was frozen solid. The contents began to glow brightly after several taps from her flashlight, revealing that the structure was clear. "Inside is *Gymnodinium Breve*, a single celled organism that glows red and produces a form of ether when it is stimulated. The fluids inside the bioreactor are spun to agitate and then separated into algae, water and ether. Each of these elements was recycled and used onboard; ether for fuel, water for drinking, and the spent algae reprocessed for food."

The engine room looked lit with neon under ice. "It looks like the freeze has caused several cracks in the exterior seals of the bioreactor." She stated. "I don't know what kind of shape the interior mechanisms are in. It's hard to say honestly if it will be possible to make repairs in order to return these engines within safe operational standards. The slightest damaged seal could cause dangerous brevitoxin leaks."

"Brevitoxin?" Commander Sovudin questioned from his post at the main control room.

"Brevitoxin is a fused ladder-like lipid soluble polycyclic ether which was purified in the bioreactor and used to fuel the entire station." She paused and watched as the glow inside the bioreactor began to dim. The camera used a powerful macro zoom on one of the seals. She watched the video in her display, it showed the algae leaking out like lava from a volcano. "If the brevitoxins were released through a crack such as this one it would cause an aerosol effect which would easily spread the toxins throughout the station's circulation system."

"What symptoms would occur from human inhalation of these brevitoxins?" Peiter asked. He had finished the transfer of the information from the station's computer systems to the shuttle systems.

"Nausea, severe muscle ache, loss of motor control, and reversal of temperature sensation are commonly experienced. Not the sort of things you'd wish to experience on a luxury cruise this far away from the convenience of a drug store." She replied, laughing softly.

Commander Sovudin had left the main control room and floated towards the engine room, his helmet cam showed the long expanse before him. "These are the hallways you could be roaming if you vote to turn this station into a space hotel. Next up on Space Junkyard, we'll show you the preliminary design plans, take a quick tour of the crew's quarters and tally the votes. Stay tuned!" After a call he had received at the beginning of the commercial break the director had an announcement to make. "The network just confirmed that both of you will be getting your variable pay increases. In addition they want to extend your contracts for five more Space Junkyard episodes to fill out the season. Congratulations to you both. You are live in ten, Doctor."

"Welcome back to Space Junkyard: The Molina Research Station." Maya's smile had grown unmistakably larger. She had left the engine room and joined Peiter in the bunk during the break.

"Crews of eight scientists at a time used to occupy this narrow room. I worked and lived here for a

six month mission and this was where I slept." She peeled back the top layer from a cocoon of insulated fabric which was mounted on the wall.

A camera panned across the room to show several other wall mounted sleep stations. "The scientists living here weren't concerned with luxury." Peiter continued. "If tonight's votes are in favor of the hotel conversion we've hired interior designers and architects to make sure that your stay here in the Molina International Resort would be a five-star experience in the stars."

Video playback began on sketches for the luxury hotel. Shades of blue and green accentuated the designs and heavy fabrics appeared draped throughout the sketches. Tubes of luminescent plastic ran along the walls to provide light. "These designs spare no expense for your comfort." Maya explained. "The current laboratory space is to be divided into three bedrooms." An illustration of the rooms showed mattresses on the floor. "Magnetic fibers will be sewn into the blankets and sheets to keep guests in place, comfortable and warm during their sleep."

The images showed a television screen built into the wall of a room. "Personal entertainment systems double as computer terminals and stations for video conferencing." Peiter explained. "And direct satellite access guarantees you won't miss any game."

"It's time to tally the votes!" Maya exclaimed.

The final tallies appeared on Peiter's display. "The votes are in ladies and gentleman! We've had a record number of voters call in this episode and you have decisively elected to destroy the station." "During this next commercial break we'll prepare the station for demolition." Maya reported. "Stay tuned for the exciting conclusion!"

They had practiced the critical timing of this last three minute commercial break over and over.

In less than a minute Maya and Peiter had to clear the station. Their bulky space suits slowed them down considerably. The zero-grav cams hovered obnoxiously close to their hurried evacuation.

As they opened the airlock Peiter stepped into the shuttle and released a flock of small black robots into the station, each carried an explosive payload. "The demolitions are hot." He reported.

Maya released a less expensive zero-grav camera onto the station and sealed the hatch. This camera was destined to be incinerated in the process of providing interior footage of the final explosion.

"We're good to go!" She announced to Peiter who had moved to the controls of the small shuttle.

"The airlock is sealed and the camera is away."

The next minute and a half was used to put a safe distance between the shuttle and the station.

"And we're back in five, four, three, two ..."

"Welcome to the conclusion of Space Junkyard: The Molina Research Station. During the break the station was prepared for destruction." A video recap showed the explosive units floating into the station, they twisted themselves open and locked into place with magnets. "These devices contain enough explosive force to rip the station apart." Maya explained. "The remaining wreckage will then all safely disintegrate on reentry for your viewing pleasure."

"We're all out of time. From both of us at Space Junkyard, Doctor Maya Leonov and myself, Commander Peiter Sovudin; thanks for watching."

The video feed from inside the station showed the soft flow of red underneath the ice. The detonations started at the opposite end of the long hall across from the camera. The station shook as the walls split apart. Ice melted and cracked down the hall. The fractures of steel and ice were chased by a white hot fire which quickly consumed the camera.

The shuttle's aft camera showed the station ripped open in a bright burst of orange and yellow light. The flaming debris streaked against the sky in tendrils of stark white clouds as the show's credits rolled.

## THE EARTH - MILLENNIUM EDITION

**Frank Heinlein**

Germany

Mission Exodus apparently had been a complete failure. Nobody understood why. Preparations had been as perfect as possible. The means employed were indeed impressive: billions of UN-dollars were spent, thousands of the world's best engineers worked for nearly two decades to make possible mankind's first interstellar voyage. Compared to Mission Exodus, preparations for the first landing on the Moon back in the 1960s were but a trifle. Now, more than two centuries after the first human being had set foot on lunar soil, everybody had hoped that there would be another quantum leap towards mankind's future in space. Alas, these hopes were shattered when, for an unknown reason, the exploring fleet suddenly stopped short all communications with the mission control centre, based in the International Space Station ISS 5. This came about completely unexpected, after more than forty years of smooth communication over an increasing distance, reaching at the end more than seven light-years.

In the two centuries after Apollo 11, the means of exploring the solar system had become more and more sophisticated. At first it was not so much the increase in the average speed of space-crafts that mattered: the various mechanisms developed in the 21st century still moved at a rather sluggish speed, and therefore exploration was left up to machines that were more robust and less demanding than the frail bodies of human beings. But there had been many advances in the field of delayed remote-control as well as autonomous mechanisms. Because of the huge distances between the various control centres (mostly situated in a space station near Earth) and the space-craft, it took up to several days or even weeks for signals to go back and forth. Therefore it had become necessary to develop machines that were on the one hand able to take many decisions without prior consultations of the control centre and that could on the other evaluate how to react to commands that could be – but were not necessarily – outdated or that needed revision.

It was only at the beginning of the 22nd century that there was a real breakthrough. This was due to two major developments: on the one hand, a compact reactor that allowed cold fusion in space crafts; and on the other hand, the perfection of the photon drive made it possible to reach much higher speed than hitherto. Human beings now also ventured on the moons of Jupiter and even beyond. However, despite the increase in speed space-trips still remained rather laborious, lengthy and – most importantly – dangerous. Reaching any neighbouring solar system seemed next to impossible for a human crew. For example, despite much research on magnetic shields etc. nobody had hitherto found out how the interior of a space craft could effectively and over a long period of time be shielded from interstellar radiation. Thus it was for the time being impossible for human beings to spend more than two to three years in space. There were many other problems that had not yet been resolved, e.g. the question how astronauts could be convinced to set out on a voyage that would allow them (or rather their descendants) to return to Earth only after more than 100 years. Therefore all efforts to organise the first voyage beyond the solar system towards a neighbouring star concentrated on the construction of a robot fleet.

There were many reasons for this gigantic project, e.g. the desire to prove new technologies or the wish to prepare a basis for later expeditions. Probably most important, however, was the desire to get an answer to the eternal question whether mankind was alone in the universe or not. Despite all efforts it had not yet been possible to detect any sign of extraterrestrial life, be it intelligent or not. The general assumption was that there had be some form of life, and that Mission Exodus was to allow to establish a first contact – or at least to discover what extraterrestrial life looked like.

At first astronomers determined the nearest star likely to offer good conditions for the development of life, i.e. planets moving in the so-called eco-sphere. It was soon found that Wolf 359, a red dwarf at 7.6 light-years distance was most promising. Apparently there were even three planets being potential harbours of life. The aim now was to construct a mechanism that was both robust enough to survive the long voyage through interstellar space as well as intelligent enough to do without precise instructions for any new situation that might come up in the future.

After some years of debates, research and experiments it was decided to opt for a robot mechanism that consisted of a very high number of relatively simple machines. Taken for themselves, these machines were not able of achieving very much. Some of them were to serve as relay stations, some as explorers, some as miners, some as repair robots, some as coordinators, and so on. The loss of one or more of these machines would not make a big difference to the functioning of the rest. But taken together, these machines were a very powerful intelligent mechanism. They could act as *one* unit. But probably even more important was the fact that the machines would be able to repair each other as well as their carrier fleet. Provided they found the natural resources, they could even start reproducing themselves – energy was no longer a problem, thanks to the newly developed reactors. Thus there was no risk that the mission would come to a standstill. Theoretically it could outlast even its creators, but of course this was only a hypothetical possibility.

There was a total of twelve ships, each of them carrying thousands of robots. This gigantic fleet contained enough equipment for a complete new colony. And that was also what it was supposed to be: provided there were habitable planets at the destination without any form of intelligent life, the machines were to prepare the ground for the arrival of human beings. It was expected that after several decades technology would have made enough progress to allow mankind itself the decisive step into another system. For the time being, however, the robot fleet was only to prove that it was possible to make such a long voyage – and to search for any form of extraterrestrial life. The mission received the name Exodus – not because it was as yet to signify any real exodus, but because of the calculated length of the flight that was expected to match fairly well the forty years the ancient Israelites had spent in the desert after they had left Egypt.

It was on July 4th, 2176, 11:43 a.m. Solar standard time, that the mightiest fleet ever constructed by human beings set out on its maiden voyage. Departure went perfectly according to schedule, and by the time the expedition passed Pluto it had already reached twenty per cent of the speed of light, its travelling speed. Over the following decades there was a continuous exchange of data between the robot fleet and ISS 5 – delayed through the increasing distance, but nonetheless working smoothly. The self-repairing mechanisms of the machines seemed to function without any problem; and in the rare cases where a feedback from Earth was necessary, the autonomous control system of the robot fleet made it possible to prevent any system stand-still.

On September 13th, 2217, the expedition finally reached its destination. The pictures received by ISS 5 clearly showed that the system had planets of differing sizes, comparable to the constellation encountered in the Solar system, just as the astronomers had predicted. The robot fleet had been given clear instructions for this case: to discover the various planets, send back all available data to Earth, and to wait for further instructions – the idea behind these orders being that there was to be no interference in any ecological system that possibly existed on any of these planets.

The last pictures ever received from the robot fleet showed that contrary to the instructions given, the robot fleet started to move nearer the second planet. Then, all of a sudden, all transmissions stopped. Nothing that was attempted to re-establish contact led to any result. Later on there were various attempts to reconstruct what had happened to the robot fleet. But none of the theories advanced by the scientists could convincingly explain why Mission Exodus had acted its orders – and why it had stopped short all of a sudden to send any signals. All systems had been working

smoothly, there was no sign of any external threat, and due to the in-built redundancy at least one sender would normally have continued to function, even in case of a major catastrophe. Disappointment on Earth was enormous, but over the years people tended to speculate less and less about the possible end of Mankind's most important technological project after the construction of the Pyramids. Failure might have been no option, but nonetheless it had become reality. After three decades there were some scientists proposing another, even bigger Mission Exodus that was to contain even more redundancies in order to prevent another failure. But the overall reaction to these proposals was so negative that they were immediately re-shelved.

It was exactly 87 years and 14 days after the robot fleet had left the earth orbit that mankind received confirmation that there was indeed life in the universe, even intelligent life. The radio signals received left no room for doubt. It was a message consisting of only three sentences and a short, highly-compressed video clip, just as if somebody had meant to send an interstellar post card. The film showed a planetary surface crawling with machines, bursting with an incredible activity. There was not one square meter that was not covered by some kind of metallic constructions. The text said: 'Mission Exodus has reached destination. Planets II-IV have been successfully settled. Preparations of robot fleets for other systems have started.'

The machines had made the last step: they had finally become independent. Nobody knew when exactly it had happened, or how and why. Maybe the development had been inevitable once mankind started constructing autonomous, self-repairing and self-reproducing machines. Maybe there had been an unforeseen event during the flight that had led to some kind of mechanical evolution. But in the end none of this really mattered. What now mattered was that mankind had clearly lost control of events. Human direction apparently was no longer necessary or desired. The machines considered it a potential source of errors and therefore had decided to ignore it. Just as other human colonists before them, they had made their declaration of independence.

The big question now was no longer whether mankind was alone. There was intelligent life out there, reproducing itself at a much higher rate than any form of life on Earth, maybe except for viruses. The big question now was: when would the machines come back to Earth to correct the imperfectness of creation?





## COLLECTIBLES

**Rudi Ball**

South Africa

A figure moved gradually over the reflective surface of the probe, an artifact of the past era, preserved in the dark void of space. The bombardment of small meteorites speckled the probe's hull in a manner resembling its starry reflection of the universe. The astronaut slowed every so often in her ballet across it to inspect the sections of fascinatingly old technology. P-39-ASJ was clearly visible in white bold lettering across its fuselage, a testament to a different time of technology in space.

Kendal communicated to the control column of the massive home ship, its shadow masking the probe's true visual exquisiteness.

"What's the story on P-39-ASJ?" radioed Kendal.

"She's a twenty-first century probe", replied control. "We're uploading you with its details."

The probe's delicate structure of dishes and radiation shielding made her glint like a marble on a tarmac. The engineering was unmistakably distinguishable. Its design was a mesh of low cost pieces, of primitive modern alloys mixed with outdated classicism, which could easily be replicated and constructed quickly and with minimal fuss. They didn't make anything without nanotechnology today.

Kendal knew for certain that of the P-series probes; at least a thousand were produced for application in a variety of areas, be them research or reconnaissance. The probe's cameras massed on the end of one of the four arms, which was connected to its propulsion system, a plain ion burst thruster. An antenna about ten meters long stuck out, like a stray hair, of the fuselage with racks affixed for other sensors, attuned for its intended mission and a darkness filled with messages. The data on the probe completed its download onto her suit, its arrival followed subsequently by a voice redundantly echoing the obvious in a simulated human voice. Her mother's voice reassured her every "burn of the way". The team had been scavenging the sector for months. A well paying and dangerous job, it had been a two-year trip from Jupiter and this was Kendal's seventeenth working walk in space and her second time working on junk as "classically" engineered as the P-39. She gazed lovingly at the probe overcoming her hatred of the cold silence of space filled with her monotonous breathing.

She called a voice command in her suit and a holographic set of notes appeared on the inside of her helmet, its glass pulsating as the light from the sun intensified and faded. The automatic glass shift shielded her from the blinding glare of the system's furnace and the lights overhead. She called another command and the details of the probe with complete history surfaced on her display. At the bottom of the text summary was deemed the probe's present status level. Collectable.

Launched on April 12<sup>th</sup> 2012 by the Samagutchi Corporation the probe had investigated a belt of asteroids, which had been selected for probability of mining. It ran software, which made it capable of tracking trajectories and thereby reducing its chances of destruction while making its investigations. P-39-ASJ would stay dormant once on its course, to the outer belt past Pluto.

Dormant in the sense that it would maintain a visual for objects, which could destroy or damage it and celestial objects, which it required to maintain navigational concurrency. Kendal liked to think of its artificial intelligent hardware as keeping one eye open while sleeping. It was what they termed as a "seeker".

The notes ended with the fact that of the 1,227 launched probes contact had only been made with 193. Kendal radioed her assessment of the probe's status. And started making her way back to the towering hulk hovering above her, its navigational lights alternating like a heartbeat to its being.

The mother ship of the “Junkers” was the Ross. Its spotlights firmly fixed on the probe and monitoring sensors revolving to warn of any dangers to the working crew hanging in silence beneath it. The Ross was nearly 800 meters long and of that length roughly 80 meters was sectioned as living space for the workers. A tubular structure swirled around its center like the minute hand on an old earth clock. While the Ross was large compared to the antiquated human ships of the periods before mass space exploration, it took comparatively little time to produce. It was common to being built on the moon in lower gravity and took only nine months with the aid of a fully working production line to complete its propulsion section. The habitat was simply attached by a standard connection, to the extensive body structures used for recycling objects in space. The Ross was a glorified inter-planet rubbish truck.

Manufactured quickly this class of ship dubbed the K-Series from General Systems was interchangeable and extremely customizable, with two safe nuclear fission reactors providing more than adequate long distance propulsion and power to the mass of electronics equipment on board, required to sustain the collectors on board. In a dog eat dog universe there was competition in “getting the scrap to the flap” as the collectors termed it. It wasn’t impossible for Junkers to have battles reminiscent of historic pirates to grab the loot or in this case, the commission.

Kendal approached the one of the person sized airlock door of the Ross. Her suit’s backpack propelling her forward with voice commands and small bursts of compressed gas. She flipped open the control cover with her glove bidding the door to open. Gliding open breaking in two as light poured from its protective room within, while a door sensor scanned with an infrared beam for any obstructions.

Welcome back signaled the on board system called MAC, an abbreviation for Multiuse Artificial Companion. Kendal always felt annoyed by MAC’s repeated pleasantries. After removing herself from her self-contained environment she exited the airlock and made her way into to the centrifugal cabin space. A satisfying artificial sense of security flooded her emotions.

Kendal entered the weightless control sphere, filled with holographic camera representations of the view outside the Ross mixed with text reporting on systems and other data. Cooper was the captain. He sat strapped to his seat in the weightless environment with a headset on, shouting commands as was customary.

Jennings was responsible for operations. He began his lecture to Kendal.

“This is probe P-39-ASJ-Z3F174. Its apparently missing another arm and a few internal components. It seems somebody beat us here to her internals. She’s missing her mass-driver box and the swinger.”

Kendal lost her look of astonishment as she stared at one of the projections overlooking the floodlit probe as an extendible robotic dolly dragged P-39 into an airlock.

“Hennessey and Noble say they’re going to move her to airlock eight” explained Cooper, “I suggest you get in there and learn something”

Kendal pushed her way out of the control module and down a long expansive cylindrical structure for minutes as she made her way towards a small semicircular cut away, which housed the airlock viewing room. Hennessey’s veteran hands went to work, dancing over the classic probe. He used to tinker on junk all the time, while the crew was meandering around the solar system. This was his biggest piece in ages.

“This one’s like a time piece,” he muttered as he undid one of the panels on the now internally stationed probe. The zero gravity of the workshop airlock, made it easy to work but also easier to make mistakes. The P-39’s box panel sprung open and confessed what was initially implied.

“Why someone take it?” beckoned Kendal from the look-in box.

“It looks like they didn’t do a great job because the modules been pulled out quickly”, said Hennessey. “They must have been in a rush.”

The Ross’s alarm went off. MAC’s chatter echoed down the float ways in a garbled noise, “Incoming unidentified mass approaching”.

In the control room, Cooper simply gasped at what he saw on the holoradar. A semicircular cloud of objects other than trajectory moving asteroids hung suspended, with the Ross’s bulk moving into them. Kendal peered out the radiation-controlled window over the belly of the Ross. Cooper pulled a switch, summoning an automatic distress signal from MAC. The yell for help began its four hour and twenty-two minute mission to Jupiter, the first friendly post, as a glinting object like P-39 bounced off one of the microwave antennas. The debris scattered outward behind the Ross. MAC continued his alarm as Cooper shouted commands and armed the repelling mass driver slugs, with the turning of a key around his neck and the punching of a serial number set. The defensive systems hummed as they went to work carving a radius around their home.

“Give me emergency full stop!” shouted Cooper.

In an imitated manner the command was repeated and MAC initiated a countdown with a warning of the future action. The Ross’s bow thrusters ignited with fury on their activation. Personnel flew into the walls, some equipment in the centrifugal section fell to the floor and chaotic cursing was heard all around.

On the holoradar, the Ross’s bulk had beached itself on the edge of the dotted cloud like a whale. Control was now in an eerie green light, as the crew scrambled for equipment.

“No breach, Sir”, sounded MAC.

“Repeat MAC!” said a pilot.

“No breach. Negative Breach”

“MAC. When did you see these objects?” asked the pilot.

“Our systems did not detect these objects. Negative on object deflections inside radius until 1 2 3 7 clicks” returned MAC.

“Return damage” commanded Cooper.

A detailed damage report sprung up on the port video screen with the outside view backing. One of the crew gave commands in his control chair with his headset, as the others busied themselves checking systems, headsets glowing.

“Sir, I have a visual at 362 kilometers on the range finder.”

“Show me...”

The cloud of metallic objects was structured like a globular cluster galaxy, with a faint red center. The Ross was sitting on its extreme outskirts. The picture was zoomed and panned periodically, while other screens zoomed and followed nearby objects.

“How can you tell me we couldn’t see this on radar!” shouted Jennings, about to crack.

“Run diagnostics on damage, download visual and transmit with log immediately. Hennessey tell me what this is,” continued Cooper pointing to a visual display.

Kendal still heard the hum of the engines and so did the crew.

“We’re still burning, Sir.” stated Noble.

Kendal glanced as a few radiation panels from the Ross peeled off and Noble’s expression showed his true confusion at what was happening to the ship, its internal structure starting to sound as if it were flexing. Consumption was at maximum and the small rotational ion engines were working hard to maintain full stop.

“We cannot maintain this Sir. We’re being pulled towards the red emission”

A long pause began Cooper’s voice, “Ok. Shutdown thrusters. Ready the evacuation pods.”

MAC responded with the usual unflustered confirmation. As the Ross moved towards the epicenter of the cloud with all the other objects in a swarm, the turrets massive capacitors could be heard charging repetitively to maintain a passage of safety around the ship, even though the odd probe fragment still managed to impact. Every crewmember now stuck in the control module was trying to do the math. This wasn't physically possible thought Noble as an explosion emanated from the Ross, shaking it, as one of the mass-drivers overheated and gave up to the relentless bombardment of what orbited the Ross. MAC proceeded to solve the overheating problem promptly, like only a computers program could do.

Time passed slowly as the Ross got closer to the red center, debris from deflections peppering the surrounding area. Asteroids and countless satellites and probes were being gravitated towards a center too bright to look into. The Ross was now at roughly ten kilometers from a haunting finality of the unknown.

A chill swept over some of the crew. The red center was surrounded by a dark visible surface.

"Maintain transmission, MAC" ordered Cooper. "And ready evacuation of this ship."

Members started their final trained rituals. Cooper punched numbers quickly into the console by his chair. Kendal didn't like the thought that she'd be in stasis. Nobody was going to find them. She also didn't understand why Cooper was trying to evacuate now. The likelihood of escaping this kind of suction was improbable, to say the least, given their proximity to the unknown mass. The Ross was breaking up and quickly.

"We're the garbage", mumbled Kendal. "They're us and we're them and they don't know what they're doing!"

"Repeat that!", said Cooper.

A notion crossed Kendal's mind. In the early part of the twenty first century a guideline was set on how to go about contact with "sentient" life in a tin can, much like the Ross. In Kendal's mind this was the most trivial document ever. It involved transmitting a recording. The likelihood of contact within early human endeavor was minute, but this "chomper" didn't fit anything possible and was likely alien. It probably thought that they looked like good scrap.

"We need to tell them, Sir!" said an astonished Hennessey.

"They've never seen us, nor we them and they don't know that we're here!" shouted Kendal.

"You're expect that this is not a human object, when it could be. MAC. Flash our lights and broadcast contact message triple seven on all frequencies", said Cooper. "The rest of you vacate now"

The Ross lit up like a candle, with the flashing emphasized by all the swirling debris around them. The remaining crew, including Kendal, in the control sphere took one last look of astonishment as the unrelenting and inexplicable suction of the luminescent object drew the Ross to destruction. The Ross shook silently as a module disconnected from the hull. Impacts with other objects were now commonly heard and the software which automated the defensive mass driver system was overwhelmed by numbers.

What was left of the Ross vibrated, shuddered and disappeared into the red light. The digital transmissions ended...

The object of their destruction with markings in English sailed onward out of its red glare as it systematically trawled and scoured this region of space, its robotic sensors ever watchful for the opportunity to collect.

## THE EYE OF MARS

**Benny Malengier**

Belgium

John Dechamps glanced again at the report.

'I got this one hour ago, and I'm supposed to give my opinion in half an hour to the board? They must be pulling my legs!', he said to the slender woman in front of him.

'You know, here on Mars, we colonists don't let grass grow over it. I got it two days ago, when it was just out. I suppose they didn't think you could contribute.', she said, looking sharply at his reaction. When none came, she stood up, not too fast as real martians do, and went to the door.

'I'll leave you to it. I saw little mathematical interest in this. Didn't think you nano-guys would take a second read.'

'Aliens are using gigantic lasers and solar sails Monica! Pay attention, this will change politics completely. Who knows, perhaps Earth will stop the Mars development to do something similar. It's ridiculous.'

'Don't get too excited, John.', Monica reacted. 'Reinhardt will just ask us if we can think of something we Martians can do.'

John looked up at the woman. 'Well Monica, you could think three days about that. I have to come up with something quickly.'

Monica started laughing. 'Oh John, can't let the earthlings steal the show, can you?'

As the woman left the room he spoke to his agenda, 'Aliens. Everyone still doubting their existence will have a hard time finding a natural explanation for this. Not that they won't try.'

As his working suit started a muscle maintenance program in his calves, he went over the files again.

John was walking out of the elevator that brought him from his living area down to the ground level. It was a nice summer day, high noon, so the bottom of Valles Laekes was bathed in sunlight. Psychologists and sociologists had insisted that living underground in cramped spaces would be asking for problems. So the engineers had set up the biodomes in open air. To reduce building costs, some of the valleys of Mars, more than 1000 meters deep and half as wide, had been sealed off and filled with air. The cupola itself was transparent, and consisted of two domes, with a transparent gas under high pressure in between. This shielded the underlying settlement from the hard radiation coming from space. Mars was far from a human friendly place. The valley floor was one huge park with big earthly plants, all houses being carved out of the cliff walls. Only the big balconies were clearly visible from below. It was nice living, albeit somewhat too rural for those born in one of the million cities on Earth.

'John, wait!', Monica came up alongside. 'Sorry to vote against your proposal, but you must admit Earth will be able to do what you proposed much better.'

'You're right, Monica. Although I think it must be our first priority to know where the Neilions are aiming at. I talked to Shu Yu of astronomy afterwards, and she says it won't be easy. The Neila world is 300 light-years away, the edge of where we can detect earth-like planets. Apparently they shoot with a laser to a spot where the light of the laser is refocused and sent into a different direction. But the laser or the refocusing zone will never be big enough to observe.'

'Well John, although we can't determine the exact direction, we do know the general one.'

'Yeah, I noticed that, no other oxygen world has been detected in that direction, not even an earth-like planet, there are even no solar systems that way for some 600 light-years. I'm starting to doubt the intelligence of these Neilions.'

They took long strides over the reddish dust that lay over the path. The big base of the biodome became visible as they drew near the edge of human existence on Mars. Monica took a deep breath. Soon, only recycled air would be her due.

'But it doesn't make sense to me. Do you remember the launch of the Copernicus?', John said.

'Previous satellites had affirmed thousands of earth-like planets out there. Then the Copernicus was launched and could detect the starlight scattered of the planets orbiting the stars in the neighbourhood of our sun. Not only did we find 14 planets with an abundant oxygen atmosphere, a clear sign of life, but also the Neila system was found: two planets with an oxygen atmosphere, one of them not much bigger than Mars. A sign of terraforming was put forward. Not only life, but intelligent life! The Holy Grail of astronomy for decades!'

They took a lift to real Mars surface. A relay station was built here with shuttles to move across the surface.

John continued the conversation. 'What doesn't make sense to me is that they still use laser propulsion. This is a very rudimentary technique, no matter how difficult it is from an engineering point of view. You know, they can only push their ship forward, but the ship then needs a completely different technology to slow down once it has arrived.'

'Beats me John. I'm a mathematician, I solve puzzles as a job, but I need the correct pieces to start puzzling, and I don't think we've found them all.'

Their shuttle flew to the equator, which was 500 km northward from the valley. A clear star became brighter and brighter as they approached Equator base. It was the top of the Mars Space Elevator, which became an ever bigger piece of the landscape. As Mars didn't have a real moon, and is a lot smaller than Earth, building a space elevator there proved to be far simpler than on Earth. Proof of this was the now finished tower on Mars, ready to receive the masses of Earth when an Earth Space Elevator would finally be built. It was the biggest human achievement till now, and very intelligently planned. First Deimos was crashed into the south polar region, releasing extra gasses in the atmosphere. Then Phobos was brought into a geostationary orbit. From Phobos, the construction then began: an elevator leading downward to the surface, and a counterweight at the marsway side. Phobos had been hollowed in the process, giving room for the big factories of nano fiber, which, as planned by the economists, was now the main export product of Mars. It was John's home as head of the nanotech department, a home almost 20500 km above the Martian surface. The elevator was constantly being repaired by the tiny nano devices he had designed as a junior scientist.

The plane touched nicely down at the airstrip at the base, and all travelers went quickly to their various businesses in the ground tower. John and Monica went directly to the departure hall, the main hall where the lift cabins for space took off.

Before entering, Monica stopped John.

'Look John, I've been assigned by Reinhardt to you and Shu to help you design a telescope. Ok, next I hear I have to go away from my cozy office to Phobos Port. I waited till now. Don't you think it's time for some extra information?', she said with a slightly higher tone of voice.

'It's 16 hours up, Monica. I was planning to brief you on the way up,' John responded. 'I think it's clear from all the developments that we need bigger telescopes, no?'

'I'm no idiot John,' Monica responded sharply. 'To see anything of interest we need something 10 times bigger than what Earth has in their Lagrange point! Has been suggested before, we don't get the funding for that.'

'Yes, we need something bigger,' said John, and with a dramatical gesture he pointed upward to the four cables of the space elevator reaching up and up, losing themselves in the thin air of Mars, with the light of the moon Phobos somewhere at the end. 'Big enough?'

John explained. His team had developed special nano molecules that could be used for faint light detection. They performed much better than electronic detection methods, but had a short lifespan in the harsh conditions of outer space. His plan was to make 20 of these detectors, mount each of them on a lift cabin, and position them along the space elevator. It would be the biggest eye ever. Monica would have to calculate the motions of the mirrors and the cabins to keep them ideally aligned to the Neila world, annihilating the rotation of Mars.

'You see Monica, the problem with space telescopes or satellites has always been that they are extremely expensive to maintain. You have to make them good enough to last their entire lifespan. That way, only durable goods can be used, and definitely not experimental instruments. The space elevator can remedy this. Ninety percent of it is above the atmosphere, and yet fully accessible for maintenance and repair. '

Shu stepped out of the lift cabin, into Phobos Port, the hall carved out of Phobos where the elevator stopped. John was waiting for her, floating upside down. Shu always had problems with arriving at Phobos. At the geostationary orbit, one was weightless, and this space was completely used for zero-gravity fabrication. All living quarters were on the marsway side, in the big counterweight construction for the elevator. There, a small push could be observed, pushing all things away from Mars, so everybody was floating upside down. John noticed the Asian woman.

'Hi Shu, ready for the big moment?', he asked.

'Hell yes, wouldn't want to miss this. If it works, it'll be great, if it doesn't, it'll still be nice to see you go down your face,' she responded playfully.

'Well, it'll depend on our mathematician extraordinary. It's classical mechanics I would think, but with the first test, we had quite some problems,' John said. 'She is still doing bug testing of the control software,' he said.

'Not anymore,' a loud female voice shouted from behind him. Monica strode nearer with a big smile on her face. 'It should be okay. Fully approved by myself.'

'Time for a beer then? ', John suggested. 'It'll be another 48 hours before the first data should be streaming in.'

Two days later they were in the meeting room. Monica, her work being finished, sipped some beverage out of a squeezing ball. 'You've got some time Shu to update me with the latest results of the search?', she said.

Shu looked up. 'Sure, I still have some time. They still send out a laser signal, always into the same direction. How they do that is a mystery, but well, we must assume they are more advanced than we.'

'And that direction is some special system?', Monica asked.

John responded, 'No Monica, it's now sure that it is a completely useless direction, what puts us in a lot of troubles. We hope our pictures can somehow explain better.'

Shu continued the explanation, 'The Eye has already taken a first picture. The resolution is optimal, but still we cannot detect new structures. As soon as we have a second image, we'll be able to calculate the exact orbit of the lensing piece.'



The datapads of John and Shu beeped at the same time. Immediately, both were immersed in work. After some minutes, Monica couldn't wait anymore. She unstrapped from her chair, and floated to John.

'And?', she asked.

'Hmm? Oh, yes. Look for yourself,' and he turned the datapad toward her. The picture displayed was very basic. A starfield with three sharp yellow lines in it. Two thick, arriving from the bottom right, and one sharp, leaving to the top of the picture.

'What you see is the light of the laser when it reflects on interstellar medium. After many hours you get the impression of the line itself. The important fact is the two thick lines, which are lasers arriving from the sun, being collected.'

'Yes,' Shu picked up, 'and they are arriving at a structure. After some image processing, you can see them scattering off at a small object in the center of the picture. That must be the lens.' Shu showed them the result.

'And the orbit?', Monica asked.

Shu looked up somewhat distracted. 'Well, that's a real surprise. The second picture proves the object is not in the ecliptica of the Neila world. It's in a very strange circular orbit outside the ecliptica, orbiting two lighthours away from their sun. That's very far and under difficult speed vectors to visit from the two oxygen worlds. It'll be a very costly job to maintain that.'

'Who knows what the Neilons are like, Shu', John responded, 'it might just be a laser research station needing a lot of energy, instead of an interstellar travel station.'

Monica, glanced at John. 'Of course!', she exclaimed. 'Let me plot in the orbit around the Neila sun.'

Monica started typing frantically on her datapad. She continued talking while working. 'If you go over it logically, there are two ways the interstellar travelling station can be ordered: either along the laser it emits, that is, parallel with it as everybody has assumed till now, or perpendicular to it. As you should remember from your geometry lessons, there is a plane perpendicular to a line. All possible directions you can go to. As we know the orbit, it is also logical that they only attempt to reach planets that are almost perpendicular to the orbital plane the station moves in. That's the only reason you would be prepared to pay for such a costly orbit. Let's say maximum 30 degrees divergence of this direction. Of these possible traveling ways, we need those that remain attainable during several ages.'

'Why's that?', John asked.

'Because the Neila world is travelling around the center of the Milky Way, like all stars we can see.', Monica responded agitated. 'So you must choose an orbit that is favorable for a longer period if you want to travel somewhere on a regular basis. We should determine if one of these directions can reach one of the other known oxygen worlds over a long period.'

'Good thinking.', John said. 'They would then use some unknown way of transport that needs a lot of energy, hence the lasers pointed at it. And as the machine is just built, it will not be operating yet, so they have to shoot away all energy with the laser beam for the moment, until they switch it on. Science fiction writers thought of this possible use of lasers in the twentieth century. For all we now, they might give their spaceships artificial gravitational pushes, or they might be opening a worm hole.'

And, did you find anything?', John asked Monica.

Monica remained silent a bit longer before looking up at the two researchers.

'They are coming. They are pointing to where Earth will be in 25 years! John, they are coming to us!'

## ARES MISSION

Adam Ostaszewski

Poland

The spacecraft *Ares* was making a solitary journey through the interstellar space. The five astronauts were trapped in the tin missile, entirely dependent on the board system of life sustenance as well as the almighty computer directing *Ares* towards its destination. Having nothing interesting to do, no contact with Earth, no orders and no teleconferences, they enjoyed the sweet surfing across virtual reality.

“Checkmate, Colonel” - the computer’s metallic voice roused the expedition’s commander, Ivan Siemionov, from his meditations. He was floating freely in his cabin with his Personal Computer RED-2015 on his head. The computer had the shape of a helmet with dark goggles for the eyes, so it did not take up much room. Connected to human neurons, it excellently stimulated its owner’s mood and facilitated communication with the outer world, without the necessity of looking at it. The computer’s owner had the possibility of choosing the picture as well as the worlds he wanted to watch.

Siemionov was taking a stroll along the beach, breathing in fresh sea air. The forty-eight-year old colonel, a veteran of many space missions, valued peacefulness and short moments of solitude most.

“RED, put me through to Martin”, ordered the commander. After a while, he was standing on the sea shore, face to face with a smiling fair man of a medium height, with disordered hair and blue eyes.

“Any progress? Have you found the cause of the flaw?”

Martin Schneid, smiled and said, “I have, Colonel. I was just going to contact you. It looks as though the flaw is not of physical nature. There is a fault in the files responsible for our connection with Earth. After the latest tests of the landing craft, they were accidentally copied and placed along with the files in charge of the craft. I only have to enter them and put them back in the right place.”

“How long is it going to take?”

“There’s a little problem. Among these files there are others. I don’t know their purpose, I have no access to them. Their name’s *Genesis*.”

“Adam Eve”, he said.

“I beg your pardon, Colonel”.

“The access code. Please, copy the *Genesis* files and place them in my mail box. And don’t open them under any circumstances. It’s a question of the expedition’s safety.”

“Yes, Sir – the IT engineer’s face expressed astonishment – I’ll see to it immediately.”

Siemionov took off his helmet carefully. Instead of the beautiful beach, he now saw his cabin, across which he was drifting gently. In the walls there was a great number of various cupboards, packed with everything you need to survive an expedition of this kind. A number of computers and screens shone on his left-hand side.

“Turn down the light, RED, and open the door”, ordered the colonel.

The commander floated into a long corridor. He made his way to Martin Schneid’s cabin.

It would seem to an incidental observer that in the real space Martin Schneid was hung in the middle of his cabin. But his mind, controlled by millions of neutron connections and RED, was now in a large medieval castle. The chief mechanic of the expedition *Ares* was sitting on a big throne in the middle of a big room made of undressed stone, in which the only light was cast by burning torches. From the height of his seat, Martin was giving orders to the army of virtual servants ready to satisfy all his wishes.

“Separate the *Genesis* files from the communication files!”, he ordered. After a while, on his left-hand side appeared a black shining board with golden letters GENESIS, and on the right a similar thing with the inscription COMMUNICATION. Martin turned his face to the left.

“RED, let me have access to the *Genesis* files.”

“Do you have the permission of Colonel Siemionov or the Command Centre?”

“For goodness’ sake, RED, how was I supposed to obtain the permission of the Command Centre? By sending a carrier-pigeon with this question to them? Recall my conversation with the colonel that took place a few minutes ago.”

“All right, Major, give me the password, please.”

“Adam Eve.”

After these words, three pictures appeared on the board. The first one on the left showed a map of the spaceship with *Sub-board 354* marked red at the very bottom. In the middle of the board there were some graphs with such information as “rhythm”, “pulse”, “breath”, “neuron activity”. The most interesting thing, however, was the right side. It depicted the figures of all the crew members, Martin Schneid, Jacquelin Nourier, Julian McNarry and Grazyna Bielska, except for Colonel Siemionov. In the picture, connected to a great number of cables and devices, they looked as if they were asleep. Or dead...

“RED, what are you doing? I didn’t want to see this...”

“I’m sorry, Major, but such is the procedure of the *Genesis* program. I’m obliged to give access to its current state and future prospects to anyone who provides the correct password.”

“What sort of nonsense is that, RED? Copy the program and place it in the colonel’s mail box.

OK, RED. Close *Genesis*”, said the IT specialist and turned right, towards the board with the files steering communication with Earth.

Colonel Siemionov was easily drifting along the corridor. Suddenly, he heard a beep of the communicator attached to his belt. Siemionov reached for it and gently put the device, which was similar to an ordinary mobile telephone, up to his ear.

“Hello”.

“This is RED, Colonel”, the computer’s voice resounded in his head. “I need to report that Major Schneid has been working on the *Genesis* files. My procedures are clear. In case any member of the crew except you gets to know them, my duty is to put the *Tabula rasa* program into operation.”

“But you know that he’s been following my orders”, said Siemionov. “Your procedures recommend checking the reliability of such orders.”

“That’s right, Colonel. But your order wasn’t confirmed by Earth and I didn’t receive any instructions from the Control Centre to what extent I could reveal the data.”

“But you’re aware that Schneid is fixing the communication files and we’re deaf and dumb until he’s finished.”

“It doesn’t change the fact that I received no confirmation of your order from Earth nor information on the extent of data presentation. My procedures are clear and simple. You, colonel, have full access, the remaining crew members must be verified. If no verification has taken place, I have to carry out the *Tabula rasa* procedure.”

A slight shudder went through Siemionov’s body.

“I’ve contacted you, Colonel, to give you this information and to enable you and your crew to get prepared for appropriate action. I’m starting in 30 seconds.”

“RED!!”, Siemionov shouted to the communicator. “RED!! For goodness’ sake... You might kill him... RED!!”

Silence. RED broke up the connection. The peaceful work of machines wasn’t disturbed by anything except the colonel’s screams. Siemionov hurried towards Schneid’s cabin.

On the board, above the files, the word “OK” flashed up. Martin stretched himself comfortably on the throne. “Remove the boards, close the program! Well, and now...”

He did not finish his words. In front of the major’s eyes a dazzling light flashed up. After that, waves of darkness came...

Siemionov nervously placed his finger on the identification plate near Schneid’s cabin. When the door opened noiselessly, the colonel saw Martin floating in mid-air, wearing a helmet on his head. Siemionov approached Martin and checked his pulse. Luckily, he was still alive...

“Colonel, what’s going on?”, through the cabin door flew in major Julian McNarry, captain Grazyna Bielska and colonel Jacquelin Nourier. The one who asked the question was McNarry, “We heard your scream in the corridor. What’s the matter with Martin?”

“Lay Major Schneid comfortably, please, and stay with him till he wakes up”, answered Siemionov. “I’ll go to my cabin and try to contact Earth”.

“But Colonel... What...?” began Bielska. Siemionov wasn’t listening to her. He hurried off toward his cabin.

His attempt to contact the Control Centre was not successful. RED maintained that Earth knew about everything and ordered them to wait for instructions.

“RED, put me through to the command... Only I can make a reliable account of what has happened.

“But, colonel, I’ll repeat this for the fifth time: the Command tells us to wait. I’ve sent a full record, coded, obviously, of the recent events on *Ares* and I’ve been given a clear order not to put anyone through until the decision about further action is made. You understand that a direct conversation with Earth could be intercepted and passed to the media.”

“Of course, RED”, Siemionov resigned from further discussion. “I know the procedure. When the mission is threatened, only you are entitled to contact the Command by means of a special channel.” The colonel put on his helmet. He decided to unwind. After a second, he felt slight hums in his head, indicating that RED got connected to his neurons. In front of his eyes, he saw the familiar sight of the deserted beach and the sunset. He sat on the sea shore and began to breathe in warm, refreshing air.

“Colonel!” the voice was very uneasy and familiar. It came from behind Siemionov’s back. It belonged to McNarry.

“Yes, Major?” the commander rose, turned round and looked at the major. The man seemed to be scared to death – he was pale, his hands were trembling. Drops of sweat could clearly be seen on his bald skull.

“What’s going on? Could you tell me what this means?” McNarry made a move with his hand. They watched a record of the last moments of Schneid’s life, which came from his personal computer. It ended with a dazzling brightness.

“Who allowed you to watch it, Major?! Without my clear order...”

“I humbly remind you, Colonel, that it’s me who is responsible for the biological safety of the expedition participants. I wanted to check what had led to Martin’s current condition. It’s true that it’s stable, it looks like a very deep kind of sleep, but still I don’t understand who did such a thing to him”. McNarry sounded very irritated.

“Calm down, Major. It had to be done...”

“You, too?! RED gave me the same answer!!! What does it mean? What is “Sub-board 354”? What are we doing there? Why doesn’t RED let us contact Earth? Has it taken over the spaceship? What is that? “Space Odyssey”?

“I’d like you to calm down, Major...”

“No, Colonel. I claim that the safety of the expedition participants is threatened by your and the main computer’s behaviour. I’m taking control over the expedition until the reasons for the present state of matters are clarified.”

“You’re crazy, McNarry. A riot on the board of a spaceship? On its way to Mars? I advise you not to take hasty actions, otherwise...” - after a moment the colonel realized that he was speaking to himself. The main biologist of the expedition had broken up the connection. Siemionov could only hear breaking waves...

“RED, do you hear me?”

“Yes, Colonel.”

“Stop major McNarry, captain Bielska and colonel Nourier from taking any further action, and if necessary, make them undergo the *Tabula rasa* procedure.”

“I’m sorry, Colonel. I’ve received orders from Earth. I’m not supposed to take any action towards the crew members until I get a clear order to do so from the command. For the time being, the analysis of the data sent by me is in progress.”

Siemionov got disconnected from the helmet and flew out of the cabin. The colonel flew, or rather burst, into Schneid’s cabin. He saw McNarry and Bielska staring at one of the screens. The astronauts looked at him. In the screen there was a room in which the four expedition members, except the commander, were lying in beds. They were connected to some sophisticated equipment. “Nourier is sending us the picture of Sub-board 354”, explained Bielska. “What’s interesting is that RED let her enter that room without any problems. What’s this all supposed to mean? Who are they?”

“All right. Do you want to know the truth? Anyway, you won’t need it long”, said the colonel.

“What’s happening here?!” , shouted McNarry and seized Siemionov’s arm.

“Calm down, Major.” The commander carefully released himself from the grasp. “How is Martin?”

“Everything’s alright. He’s asleep.”

“As you know, we don’t really know everything about the influence of such a long space journey on the human body. Before the flight I was subjected to a number of vaccinations, chemical tests and things like that. It could be said that I’m used as a guinea-pig. However, in order to secure the astronauts’ safety, they created... created ... duplicates...”

“God! Are these our clones?”. McNarry hid his face in his hands.

“Martin got to know the truth”, continued Siemionov. “That’s why RED applied the *Tabula rasa* program towards him, which means erasing one’s memory. After waking up, he won’t remember anything of what has happened. As you know, the human race has made tremendous progress in researching sleep. We’re capable of putting human beings to sleep artificially, and of providing them with various experiences, which they will then recognize as their own. The task of the sleeping people is to land on Mars, you, on the other hand, are supposed to make the journey both ways... Obviously, before we land, you’ll be put to sleep. People shouldn’t be exposed to the danger of such a long journey without knowing how it could affect the human body. Cosmic radiation, isolation... Only after the reaction of my body is observed, will we know whether it’s safe to make astronauts go on such journeys... It’s not incidental that we’ve been flying so long, longer than it would normally take to reach Mars. Almost a year has passed now...”

“Oh, God”. Bielska’s voice was on the verge of madness. “Does it mean that it’s us”

“Yes, it’s true”, the colonel nodded his head. “They are authentic.. You are the clones...”

All of a sudden the light went out in the cabin. RED’s metallic voice came from the loudspeakers:

“Order, please. I’ve been sent instructions from Earth. I’m starting the *Tabula rasa* operation. I’ll repeat ...”

The spaceship *Ares* was approaching the planet Mars. The people on the board were preparing for the first landing on the Red Planet in the history of humankind. Four bodies were lying asleep on Sub-board 354. Dreaming reality, they were waiting for awakening. The human race was about to take another huge step forward...



## DOCTOR KARBOB'S LABORATORY

Félix Ángel Fernández Alonso

Spain

### *PATENT NUMBER 0001 DESENC (Quantic interweaver/deinterweaver)*

Doctor Karbob's designer shoes resounded in the corridors of the High Energy Physics Centre, it was 5 am and the doctor walked, like every single day, towards the Laboratory for Advanced Developments. Karbob always wore designer suits and his only eccentricity – if it could be considered as that- was wearing very expensive shoes. This morning the smell of coffee was especially delicious and, while savouring his first cup of the day, he thought of whether the solution to the *DESENC* problem would work. As he passed, he greeted John, the maintenance officer, a somewhat strange and unkempt guy who enjoyed chewing gum and posing riddles, although he thought him nice.

As usual, John had a riddle for Karbob; it bugged him that Karbob was always fast at solving them and he was hoping that that morning he would outwit him. The riddle was as follows:

*We have two wicks that are absolutely different as regards their length, combustion speed and composition, which means they burn in a totally irregular way. We know each wick takes exactly 60 minutes to burn and they ask us to measure 45 minutes. How can we do it?*

Karbob thought about it for a moment and gave him the answer; John was flabbergasted, the doctor had managed to solve the quizz. Karbob never stopped surprising him. They said bye to each other and John remained thoughtful. He knew some day he would defeat him.

Karbob is a creative person, who, depending on the occasion, started his sentences with: "Can you imagine...?" He started like that whenever he talked to the Chief of Security at the Space Agency, Dezel, the person in charge of R+D budgets.

Karbob knew Dezel rather liked that way of expressing himself and he was able to transmit his enthusiasm and vision of future, and that was good for him, although his last device, the *DESENC*, seemed to leave him rather skeptical, most of all because it was really ambitious.

Karbob was working on a device able to transmit information instantaneously; he based it on the last advances of quantum physics, specifically on the theory of interweaving, which is summarized as follows: "Interweaving takes place when the laws that govern quantum mechanics are applied to two objects, and not only to one, in such a way that, if I have two particles coming from a laser beam, intertwined in pairs, and I send them through a means of transmission in two different directions, any action I carry out on one of the particles will affect the other one, without any known link between the two." Karbob was convinced that, thanks to this property of the matter and to his inventiveness, he would revolutionize the world of communications.

After leaving John, Karbob continued towards his laboratory to check whether the charging of the *DESENC* that he had left in progress had finished, and, when he entered, he realized that the green light indicating the completion of the charge was on. He greeted Bob, his assistant, and he started to check one of the *DESENCs*. Karbob would have to carry out some more verifications to make sure that everything was in perfect order, but that light promised to be the start of a new concept in communications; he did not know why, but he had a strong feeling that the experiment with Dezel, that same afternoon, would work correctly.

He had been perfecting his new device for months, and after a lot of hard work he had managed to charge two *DESENCs* so that they would be in an interwoven state –the state that is achieved by emitting particles in pairs and sending one of the particles of each pair through the interface connecting the two *DESENCs*, so that each of the devices had particles in an interwoven state and



each of the modifications done to the particles of one of the *DESENC*s would be registered in the other one, no matter the distance between them.

The *DESENC* has a laser beam that emits particles in twos and, through semi-conductors that are kept in quantum hives, this material manages to trap particles going out of the laser and to maintain them in an interwoven state for a very limited period of time, after which it is necessary to charge the *DESENC* again. John knew that that limitation was due to a faulty design, but he was sure that it could be improved with time, so that once the devices were loaded, they would not need to be charged again for a long period of time and any spaceship carrying a *DESENC* would be able to communicate with the Earth with time enough to complete its mission.

One of the main problems that they had to solve was the development of nanometric structures, sensitive to any perturbation of the energy field of the particles, so that they emitted an electron each time a modification was perceived and, after several weeks, he developed a nanosensor capable of detecting any change. These nanosensors had been inserted in one of the cavities forming the quantum hives, so that, each time a change had been carried out in a *DESENC*, the nanosensor would emit an electron.

Nanosensors were complemented by nanocontrollers that managed to produce a perturbation in the particle energy field, so that any operation carried out in a conventional computer connected to the *DESENC* would be instantaneously transmitted through one of the computer ports to the other *DESENC*. The most outstanding characteristics of this communication would be the instantaneous transmission of information and the impossibility of intercepting the communication, which would make any information thus emitted completely safe.

Karbob finished putting the final touches to the *DESENC* and started walking fast towards Dezel's office; he had left one of the two *DESENC* connected and Bob, his assistant, would be in charge of monitoring the experiment.

As he went out of the physics laboratory he met John again, but he was walking so absent-mindedly that he didn't even see him. John would have to wait until next time to tell him another of his riddles.

When he reached the office, he greeted Dezel and started checking the *DESENC* at once, they used Dezel's computer, and, through e-mail, they checked how Bob received a message sent from Dezel's computer, through the *DESENC*. They had managed to achieve a successful result of the test and Dezel congratulated him, his new device would go with the next space missions as part of the communication equipment of the ships.

### SOLUTION TO JOHN'S RIDDLE.

*We take the two wicks and burn one of them on both ends; it would take exactly 30 minutes to burn, and the other wick by one of its ends, so that when the first wick is burned up, 30 minutes would have passed and we would have exactly half of the other wick, which is equivalent to 30 minutes. If at that time we light it on the other end, 15 minutes would have passed when it finishes burning. Add that to the previous 30 and it would be 45 minutes.*

## THE ROHANA PROJECT

**Daniel Dean Robinson**

United Kingdom

Kim studied the view in front of her. She had waited years for this moment and was not going to miss a minute of it. She had never travelled outside her own solar system, Solaris One spending all of her life on Earth, travelling only to the largest moons of Jupiter during various school field excursions. Kim could barely keep still at the excitement, her stomach turned at the prospect of meeting her father again.

She had not seen her father much whilst growing up. He was ‘Captain Scott’ of the interplanetary guard, a paladin for the Eurasirus Space Corporation. She had understood his reasons for leaving her with her mother and did not hold any grudges; the teachings of Earth were the best in the known universe and the opportunities on Earth were far superior to that of anywhere else. Still, she wished he was around more often and not so busy all the time, working. He had not visited for months now, preoccupied with the new trade agreements taking place, and even when he did visit he could not do so long. When the opportunity finally arose as she reached fifteen, to travel to his workplace and meet him there, she snapped it up at once. She had saved all her money for this moment.

The ship closed in on its target. Rohana, the second moon of Proxima Centauri’s largest planet, filled the front view screen. Small dots buzzed between the planet and the second moon, ships in the far distant, going about their regular work, transporting people and trading goods. Proxima Centauri was a busy place, the second most important system outside Solaris One. One of the reasons of course, she thought to herself was Rohana, the MoonBase they were approaching.

Various attempts had been made to colonise moons with a reduced gravity and a low density environment such as this one, most of them eventually failed. It was too costly and too difficult to keep them going in the long run. Besides, the surfaces of most moons were bombarded by meteorites and micrometeorites, year in, year out and they could not all be stopped. That’s when the Rohana Project was put forth. Why would they need to build on the surface, where minute meteoric impacts would result in destruction and thousands of hours of reparation and maintenance?

Rohana was a moon base with a difference, the first of its kind, an experiment that to the surprise of everyone, scientists and laymen alike, worked and plans were underway to parallel Rohana in many other solar systems. Barring the landing platforms, their accompanying watch towers and the independently run back up control towers themselves, safeguarding against any internal failure, the entire base was below the surface of the moon, a vast network of caverns and caves, pits and rooms, all built for a purpose and all protected from the meteorites that destroyed its predecessors.

Kim waited impatiently as the ship landed on the moon. The landing went smooth enough and soon she had wandered through customs and had officially arrived. Kim took the large elevator shaft along with the other passengers downward towards the core of the moon. She had learnt about this place at school, she had even been showed pictures, videographs of Rohana, but nothing she had seen or heard prepared her for what lay in front of her. The first cavern she entered was enormous, stretching more than a mile in height. Above she could see more than a dozen small caverns, carved out of the nearest wall, small dark alcoves that she wondered what their purpose was. She realised soon enough as a small scooter exited the alcove and descended down to her own level. That was where the main control area was for the entire complex, hidden from the general public. To her distant left she could see an information centre, packed with the passengers that had just arrived. To her right she saw what she was looking for; the MoonRail.

The MoonRail was the newest creation by the corporation and it was the key to the smooth running of the moon spanning the entire settlement on Rohana. Kim remembered one of her classes from

school that talked of the MoonRail. In essence it was a transport system that ran underground, the carriages moved at great speed through the vast network of tunnels. It was a monorail, a set of carriages suspended by a single, long attachment to the metal tubing that donned the tunnels ceiling. Apart from the main attachment, the carriage also had two metal safety 'ears' in case the main attachment broke, whereby the ears would drop down less than three centimetres and land on the corresponding surface a level above the monorail itself. Naturally at high speed this would still bend and break, but the main momentum of the carriages is lost.

Apart from this safety precaution, on the floor of the tunnel rests a large permeable surface like a sponge. This sponge is relatively deep and is filled with water from residual lunar permafrost; aiding survival should the monorail fall, cushioning its descent.

Lighting was another issue. Humans are versatile creatures having shown throughout history that they can inhabit and endure any environment no matter how extreme. But one thing that they realised early on they could not tolerate was artificial sunlight. Some behaved irrationally, some turned aggressive and some simply felt trapped and isolated. Rohana was the first moon-base to administer to these human factors. Kim looked up as beams of sunlight shone through a small portal, reflected through the large prism suspended high above their heads and filled the room with light.

The sunlight shone down on the moon into an artificial transparent dome at the surface made of synthetic quartz. The quartz is a completely transparent substance newly formed in the nearby micro-gravity orbital laboratories. The dome itself was positioned on a high northerly ridge, surrounded by a series of solar light concentrators, at the point of eternal light, where the sun would shine almost perpetually. As she understood it, this dome is protected by ion-repulsion shielding from micrometeorite impacts; super-strong magnetic repulsion, deflecting the meteorites recently ionised when entering the moons atmosphere. The larger meteorites would be shot down prior to entry using a high energy microwave laser, literally melting it from the inside or collected for later use. Once the light hits the moon, it penetrates the domes, permeating into the propagation system and distributed quickly through the optic fibre tunnelling.

Luna-synchronous satellites, Kim recalled, ensured that propagation of the sun light would fluctuate, creating a twenty four hour day. It was all part of the Human Extra-Terrestrial Psychology Program, alongside the reality zones; sectors found across Rohana filled with wildlife and oceans, making the inhabitants feel secure, like being back on Earth. Some of the reality zones even contained APG's, artificial precipitation generators, creating rain and snow across the zones. She wandered forward to the MoonRail pay zone and paid for her journey to meet her father. The queue was vast, but quick moving and she was soon boarding the transport. The carriage itself was very basic, square and accommodating. Again it was made almost totally with synthetic quartz crystals, and she could see through the floor at the green spongy surface below her. The monorail shook lightly and her passage got underway.

She looked out the side of the wall next to her at the tunnel walls, looking for anything interesting. Kim soon turned her attention aside, there was nothing to see. The only thing that donned the walls was archways, small indentations in the wall that split the tunnel into sections. If anything went wrong, such as a substance leak, then the archways would split the tunnel into chambers, quarantine the affected section and security would be called. Her attention turned to the computer console in front of her. It blinked on when she pressed the button and promptly asked her if she would like to know any information on Rohana, its places, its wonders, its workings. Kim, looked around momentarily, saw no other source of entertainment and returned to the console.

Time passed quickly for Kim and she was nearing her destination when something unexpected happened. The light flickered around them; it was a long, drawn out flicker of darkness. Kim was

confused. She knew how the optic-fibre system worked, having studied it less than a month ago and knew it should not flicker even once. Something must have passed between the Sun and the receiver she guessed. What it was she did not know.

Her heart froze. The carriage she was in rocked wildly as the moon complex shook around her. She grabbed hold of the seat railings and prayed. Through the clear walls of the carriage she saw a ball of fire race past the carriage. Kim closed her eyes tightly, tucking her legs close to her under her arms, recoiling from the blast. The carriage shook again under the increasing pressure and dropped. The carriage ears clasped hold of the tunnels side railings in a vain attempt not to drop. It failed. The metal bent quickly and the carriage dropped downwards into the spongy abyss of the tunnel floor. Water splashed everywhere as it hit, and the carriage was covered in water.

Kim had barely managed to catch her breath when the carriage was struck from above. She looked up to see a large sheet of metal rip through the carriage roof and shear the carriage in two. Out of complete instinct she dived out of the way to safety in the adjacent carriage. The safety door had quarantined the area, dissecting the passenger seat she was occupying.

The carriage filled up with water as Kim tried to push open the door, but the pressure outside was too great and it would not budge. She would have to wait. Once the pressure on each side was more or less equal, then the doors would open and she could make her escape. Screams sounded from the other side of the metal plating, but she ignored them as best as she could. She looked around her carriage for help but she was alone. The computer screen next to her flickered. She swam over to the control swiftly and called for assistance.

‘Help me, anyone? This is Kimberley Scott. I am stuck in the MoonRail shaft. There’s been an accident.’

‘Hello, this is Rohana Control. Do not panic. We are aware of the problem and help is on its way. A meteorite managed to break through our defences and penetrated the moon. Stay where you are...’ The words faded into static.

Kim assessed her situation as water slowly immersed the console. Bar opening the door and escaping the carriage itself, there was little else she could do. She had never suffered from claustrophobia previously, but it crept up on her slowly now, filling her mind with fear. She felt trapped and lonely. She wanted her father. An overwhelming urge came over her to escape and she pulled wildly at the doors, attempting to escape her prison. Abruptly it opened and she exited the carriage, relieved.

She coughed quietly to herself as she now lay atop the carriage, out of the water. She was cold and wet and not liking it at all. Again she thought of the other passengers, the deathly silence even more disturbing than the screams. Her imagination soared, haunting her with visions of death and blood. Above her she could here a fizzing sound, coming from one of the main pipelines, the atmospheric regulators.

‘Oh great!’ she called out to anyone who could hear, ‘that’s all I need’

The generators were her lifeline in this place, if they failed to work, eventually she would run out of oxygen. The tunnel grew cold and seemed to close in on her as the darkness increased. Below her, the carriages internal lighting flickered briefly as the back up power units failed, and soon flickered out permanently. Darkness fell on Kim like a thick blanket. Still she tried vainly to blot out the sounds of screaming and the visions of what must have happened behind the metal door.

Time passed slowly in the darkness and she felt more and more alone. She curled up in a ball as panic started to set in. Maybe they wouldn’t be able to reach her. It seemed ridiculous but she could not shake the doubts. Her heartbeat increased and she jumped suddenly as the silence broke. She stopped still, not daring to breath. There was nothing. How she wished for the sunlight to appear. Now she realised what the light was really for. The lights purpose was something more than purely

for comfort. Its presence was reassuring. It meant that no matter where you were in the complex, there was always a route to the surface, a chance to escape. The optics' tunnels were large enough for a human to travel down and lead to the main light control chamber. Psychologically, having a visible link with the outside made all the difference.

Suddenly a noise sounded, drowning out the distant fizzing sound that had somehow soothed her, calmed her down. The tubes above her rattled and there was a series of large bangs resonating around the tunnel. Was it her rescuers? She hoped so.

As she looked up at the tubes, her head reeled, the tunnel span around her. She felt dizzy and unstable as vertigo started to hit her. She coughed a few more times, but that only aided her loss of balance and she fell backward onto the carriage roof, knocking her head hard against the harsh metal grilling. Still the room span and her vision clouded over. It became clear that something was wrong. The fizzing was the key she guessed; a sign of out-gassing. Whatever had happened, the regulators must have shut off and started to emit the toxins it had once removed from the area. She had studied them briefly and knew that most of the toxins were stored in the pipes temporarily and they would only be released once every month, through the various ducts and piping out into space. She cursed her luck again, realising that for this amount of out-gassing to occur, the pipes would probably be almost full and close to ejection time, a possibly lethal dose.

Something snapped above her and she looked on in dread as one of the regulators fell into the water. She smelt ammonia and then sulphur. Her nose recoiled at the smell; the force of the noxious smell was powerful and drugging as she slipped into deep unconsciousness. Above her the metal tubing clattered again, sparks scattered onto the floor as the metal slowly was cut open. Her rescue was imminent, but she did not hear them, nor did she feel it when they lifted her up and took her to safety.

**LEO****Kathryn Harris**

United Kingdom

"But it works!" Why can't you see that?" yelled Emma Richardson as she was dragged by the 2 huge security guards, who had appeared when she had insisted on staying. The door was closed in her face and she was dragged across the lobby and tossed outside.

"Fine, I'll find other backs. But you're the ones who are going to be sorry." She suddenly realized she was standing in the rain outside Deltron's headquarters, yelling at the top of her voice and getting some very odd looks because of it.

She brushed a piece of hair out of her eyes and stormed off to her car. Pressing her thumb against the lock she waited for it to open. Nothing happened.

"I didn't mean to swear at you this morning. Come on open. Please," she begged. After 2 minutes it worked and the door opened. She slid gratefully into the refuge of the car. It wasn't state-of-the-art (what did you expect on a lowly nuclear physicists pay?) but it got her from A to B. Most of the time.

Starting it up, she pulled out of the car park, casting a death glare at Deltron's main building. They were their best hope for funding and she'd just been physically thrown out. She doubted they'd be getting any money. Now she had to go back and tell Tom and Mikhail that she had failed. The year was 2014 and the world's second space race was on, this time between private companies and government branches. It was the race to Mars. And Emma's team had the answer: the world's first viable nuclear fusion engine. And no one was listening.

"How'd it go?" asked Tom, the second she walked in.

"She looks like that and you have to ask. No wonder you don't have a girlfriend," stated Mikhail as he peered in from the second room of their 2-room lab.

"They listened for 5 minutes, then asked me to leave. Then got quite physical when I didn't and threw me out."

"Only you Emma", chuckled Mikhail and kissed her on the cheek. "Lose you temper again?"

"They wouldn't listen. I doubt any of them would know fusion if it walked up and announced itself. None of them were scientists or engineers. They didn't even look at the schematics."

"Calm down. We'll just find someone else and they'll feel like idiots."

"We're running out of companies."

"She's right Mik. They're not listening. We're just a bunch of PhD's. What chance do we have?"

"I'm not listening to this," Mikhail stated firmly. "We will find backers because our engine is revolutionary."

"Maybe it's a little too revolutionary for some," replied Tom.

"Maybe but we're still the best."

"I wish I had his confidence," muttered Tom as he watched Mikhail continue pottering around.

"Me too. Come on, let's go get humiliated again."

She was right. Their afternoon appointment, which all three of them attended, resulted in all 3 of them being thrown out. In her apartment, alone, that night, Emma stared out of her window at the stars. Everything she had done from the age of 8 had been aimed at them. When nuclear physics caught her attention she just altered her approach to her dream: space. She wanted to go into space so badly. And now she had the method of getting herself and others to another planet, to Mars, within 6 months. And no one was taking them seriously. Okay, so the idea was still theoretical, but

it would work. Every simulation they had run proved that. But they weren't part of a large company. So they were on their own. There was no way they could build the huge engine. They just didn't have the resources to do it.

Growling in frustration, Emma got up and started pacing. It was so simple. An idea that could work and become a reality within a couple of years.

The phone rang interrupting her thoughts.

"Hello?" she said absently.

"Hello. Emma? Is that you?"

"Professor Davis?"

"So you do remember me," he laughed.

How could she forget him? He was a large man with a zest for life that equaled none. It was his enthusiasm that had first caught her interest. At the moment she was unsure whether to thank him or attempt the world's first murder through a phone line.

"I've been hearing a few things about you and your companions recently," - Emma nearly groaned with embarrassment - "but I think I may be able to help you."

Emma's jaw hit the floor. She was surprised it didn't go into the apartment below. Was this for real?"

"Seriously?"

"Do I lie? Can you meet me tomorrow at the University labs about 4? You can show me and a couple of my friends your ideas."

"Yes! Sure!"

"Glad to see you're still enthusiastic. 'Till then."

And he hung up. Emma stared at the phone for 10 minutes before her brain kicked in. Then she started dancing around her apartment, laughing.

"Are you sure he said 4?"

"Yes Tom, I'm positive. Do you really think I could forget a thing like that?" Emma answered impatiently. The Professor was 20 minutes late and counting.

"Look maybe I should go and see if I can..."

The doors exploding open cut her off and Professor Paul Davies bursting through them followed by 6 people in lab coats. He hadn't changed a bit in the last 4 years.

"Sorry."

And as usual, no excuse was offered. Emma had learnt not to ask; the answer was often too confusing.

"These are my friends." Again no more detail but if they were friends of the professors they were bound to be able to help them. "So what's this engine of yours then?"

Emma, as their spokes person, licked her lips, took a deep breath and started.

"The idea is simple really. It's a nuclear fusion powered engine. " Seeing the disbelief on their faces she hurried on. "Okay. The design is basic: a long cylinder, maybe as long as 100 meters. It would use a plasma of bare deuterium and tritium nuclei. Magnetic rings can control the plasma."

"But the plasma needs to be 600 million Kelvin."

"I know. We can heat it to 100 million but to get it to 600 million we use microwaves. They exaggerate the nuclei enough to overcome the nuclear forces and create fusion."

"What about containment?"

"It's not a problem. We don't mind leaks. In fact it's those leaks that make it ideal. We're not talking about fusion to create energy to be converted. We need thrust. A magnetic nozzle at one end helps to channel and eject the products, the charged alpha particles. This creates the thrust. The magnetic

fields are easy to control. It's ideal to space travel. You don't need to worry about weight problem, or leaking. A magnetic shield will protect any astronauts. The products won't be harmful to people on Earth."

They still looked sceptical but the professor nodded encouraging her on.

"Small scale preliminary experiments and simulations show that the idea works. The microwave antenna worked brilliantly. You only need to just pass the break-even point so it's actually giving out energy not just using it. That's all it needs to generate the thrust. And we predict it could get a team to Mars in 6 months. That's half of the time all the other current engines are going to take."

"If this engine is so viable then why has no one backed you yet?"

Emma decided to hate that man on the spot.

"Because they were not scientists. They were people who only thought about the money. I'm not pretending that there isn't some risk. But if everyone took the safe route, the one that's all ready been trodden, then we would never have stood on the moon. Yes, it's a risk, but I think it's worth it. They couldn't see the options available. They just saw their money."

"They are business men."

"Exactly. They didn't know the difference between fusion and fission. Look, just take a look at our calculations. Tell us what you think."

"It wouldn't hurt," said one balding gentleman. Emma could have kissed him as he wandered over to the computer Mikhail had set up and started flicking through the calculations on the screen. The others filtered over to join him. Tom grinned at Emma and followed them, ready to answer any questions they may have.

Mikhail took her hand and squeezed it tightly.

"What do you think? Have we got a chance?"

"I don't know. But they're interested. That's a start. And by now I'm usually being thrown out, often literally. So I'd say this is a definite improvement."

Mikhail grinned. "I'm just glad you didn't hit the one who asked about the other companies."

"Me? Would I? Besides there's still time."

"We'll contact you soon," said the balding gentleman as he left.

"What do you think?" asked Emma the second he left and she had the chance. Professor Davies smiled.

"I think you have a very good chance. And that if you drink any more coffee you may be able to get to Mars on your own."

It was true they had spent over 4 hours going through the calculations and Emma's nerves were stretched to breaking point.

"Go home. There is nothing you can do."

Emma smiled and followed orders. She felt like she could sleep for a week.

Ring. Ring. Ring.

Emma groaned and pulled the pillow over her head but the sound would not go away. Sighing she grabbed the phone.

"What?" she said her eyes still close on the pretence she was still asleep.

"This is Dr. Phillip Mason from Lockheed Martin."

Emma sat bolt right up in bed. She recognized the name. This was the moment of truth.

"We have decided to grant you the funding and resources to complete the fusion engine. The product will belong to the company but you will own rights to the publication of the theory.

Understood?"



"Yes...am I dreaming?"

"No, Ms. Richardson. I can assure you this is real," said the voice laughing. "Congratulations. Your engine is going to Mars."

Emma agreed to a meeting and wrote down the specifics on autopilot. After she hung up, she stared at the address in her hand. Then it dawned.

And she rolled over in the bed, screaming, laughing and crying.

That night they had all celebrated and got completely drunk. But that night was 7 years ago. The year was 2021.

Emma stared out from the observation room into the control room below. Soon, she would take her place down there and the test would begin. The final test that would determine if the past 7 years had been the record-breaking work she hoped or the failure she so desperately feared. They were going to fire the engine. If it worked 6 months later the Mars team would join it in orbit. 1 year later they would be at Mars.

"Emma, come on. They're going to start soon," called Tom, impatiently from the doorway.

"Coming."

The control room was organized chaos. Emma found her seat beside Mikhail and Tom, and waited. Soon, silence fell. The final checks were called out and the timer set.

Then the countdown started. Emma had to force herself to take deep breaths, her eyes pinned to her monitors, like Tom and Mikhail beside her. She watched as the temperature rose.

"300 million Kelvin...350...400..."

Emma caught herself tapping her fingers and stopped it. All systems reported a go.

"450...500...550..."

'Please work. Please work,' Emma begged silently.

"600 million Kelvin."

"Opening the magnetic nozzle."

"All systems at optimum."

"We have movement."

The test had only been small, moving the engine 500 meters. But it was a start and an amazing successful one at that.

The celebrations continued into the early hours of the morning, until only a few diehards remained. Emma, Tom, Mikhail and the Professor were among them.

"I've been asked to ask you a favour," said the Professor.

Emma looked at him suspiciously.

"What sort of favour?"

"The engine needs a name. We would like you 3 to name it."

Emma was stunned and looked at Tom and Mikhail. They grinned at each other.

"We thought you might," said Tom. "And we think that honour should be yours Emma. This is your baby. You're the one who came up with the idea and put up with the bureaucrats. You should name her."

"Me?"

"Sure. Don't tell us you haven't thought about it? Because you know we wouldn't believe it."

"Well, yes but...okay. Leo or Leonardo. After Leonardo da Vinci."

The other three considered the name. Then the Professor raised his glass.

"Leo it is."

"To Leo."

And they all toasted Leo, the world first nuclear fusion engine.

The year was 2022. Emma sat in the observation room alone. This was how she wanted it. She had spent over 14 years in total on this project and it felt as if she had waited her whole life for it to come. She didn't want to be down there among everyone else, though she had been invited. Tom, Mikhail and the professor were down there, but not her. She was meant to be here. The tension down there was almost physical. They were all waiting for one signal, a single phrase that would be written into history forever. Though Emma had not fully achieved her dream, she was happy. Sometimes you had to adjust your dream a little to compensate for life. The radio crackled to life through the speakers. Emma held her breath. It was time. "Earth control Leo has arrived at Mars." Emma let the tears fall freely. Leo was home, where it was meant to be. "So dream's can come true," she whispered.



## POSTMORTEM

Adam Walls

New Zealand

April\_2023\*

Mankind's future, no larger than a baby's thumbnail, against the backdrop of my sweaty palm, and me, overwhelmed with sweet, giddy enormity. I deposited the chip in a tray to be removed for cleaning and peeled off my brain-stained surgical gloves. The irony of the situation brought on an attack of intoxicating melancholy: that the one operation that attested to my professional accomplishment could be carried out with such crude simplicity.

Ensconced in the Hospital of Space Medicine of the Third Aeronautical Institute three hundred meters beneath Old Tokyo Bay, and queasy from prolonged exposure to artificial lighting, I had just 'operated' on the charred remains of Flight Lieutenant Kit Hancock. No anaesthetic required: drill window in back of skull, exploratory surface probe with surgical spade, followed by perfunctory, finer digging about with smaller instrument. The third step was not necessary to root out the chip, but would keep the powers-that-be satisfied I was not about to hack the chip to pieces along with the story of what came to pass on board the Cranberry.

Job completed, I passed the chip to an assistant. From here it would be spirited away to a Sense Five lab for data mining and analysis. This would yield sensory data on everything Hancock experienced on Mars, and shed light on at least five human deaths.

June\_2023\*

The 'Fully Electronic Thinking Human' (feth) robots my parents' generation developed in the wake of the Information Revolution turned out to be an unprecedented disaster.

The feth uprising was in May 2009. Acting on ideas originating from the Coalition for the Emancipation of Thinking Organisms, a feth network plotted a successful revolt against the human majority. By simultaneously locking down six packed stadia across South and East Asia and holding three hundred thousand humans hostage, they managed to get the undivided attention of the World Space Agency. The feths demanded launch facilities be built for them in the northwest of Singapore, to enable them to leave Earth, and what they called their lives of 'servitude,' behind. Many humans scoffed at such carry-on - "hell, they're only metal and wires" - but just 147 days and 617 human hostage deaths later, the feths lifted off for the Moon, taking the most valuable scientific knowledge of the day with them, including formidable military technology. Five days later, they declared the Moon their sovereign territory and threatened 'the ultimate nuclear response' should humans violate the Moon Special Territorial Zone, a space extending 500 kilometers out from the lunar surface.

Thus began the Second Cold War. Humans and moon-based feths spent the next decade inflating their respective military capabilities to the extent that few of us on Earth believed we would live to see the 20s. The severity of concern amongst world leaders had already been apparent for some years: as early as January 2014, Supreme Council politicians voiced their collective intention to colonize Mars before the feths seized it. The search for an alternative home was on.

In late 2015 scientists from Science for Human Advancement announced plans to develop a brain implant to store human experience. This would enable sensory data to be downloaded posthumously, essentially enabling a person's life to be relived by others after his or her death. The technology had been installed in the first feths in 2005, but had never been extended to humans.

This would require significant experimentation on live humans, so in 2016 the World Council of the Human Federation legislated spies' bodies away from them. The new law provided for the bodies of those caught selling defense secrets to the feths to be made available for scientific research. Death was not necessarily part of the equation. All this without the faintest squeak from civil liberties groups. (Subsequent rumors of huge silence payouts remain unsubstantiated).

In spite of the brain confiscations, the feths were paying an arm and a leg for weapons technology secrets in 2017. Or so it would seem, based on the constant supply of experimental subjects for the brain implant project. The project raced ahead, and by 2019 the neurochip was a silent resident of many of the brightest human heads. The trickiest aspect of the project was stopping the human body from rejecting the brain chips. But once this bridge was crossed, the rest was simple. Production cost next to nothing and implantation was an elementary surgical process: drill, cut, embed and patch up. Even an early Type J feth could have handled it had any stuck around.

A cheap, quick and easy little brain modification. So it seemed sensible to retain the sensory data of the finest human thinkers - engineers, computer scientists, knowledge professionals in all manner of fields - in a central computer for later harvest. The neurochip would store all brain activity, a mixture of sight, sound, touch, taste and smell as well as all thoughts. It would provide later users the opportunity to vicariously experience that life through something akin to virtual reality, which fed them sense-data. This data could be downloaded to any number of chip-implanted brains, and filed to allow users to distinguish between their own reality and their retrospective experience of others' lives. What is more, (with the correct authorization) users could download to their own memories the life-sense-data of more than one person, potentially furnishing them with an acute and hitherto inconceivable empathy for the development of human knowledge. Although it would have been possible for the life-sense-data of a subject's every hunger pang, coffee injection and yawn to be stored in real time as soon as it was 'created,' this was designated morally untenable by a general consensus of philosophers and health policy analysts. A certain armchair analyst put a slightly different spin on it and observed that it would make "sane folks crazy and crazy folks sane."

And so despite the urgings of the top dogs controlling the attempt on Mars, the neurochips of Flight Lieutenant Hancock and his colleagues were not equipped with real-time transmission capabilities. We would have to wait for their return from Big Red to see what happened there through their eyes (and ears, fingertips, noses and other sensory paraphernalia).

There were five of them. Their mission: fly to Mars, land, plaster the place with enough Human Federation transponders to satisfy the conditions of that 'Real Estate Claims In The Vicinity Of Immediate Space' human-feth agreement, and fly home. Or between homes, as a pedant might point out, for Mars was supposedly earmarked as "Earth 2." Not a difficult mission, in any case, and certainly not one on which Mission Control anticipated any interference from our electronic cousins. According to the official line, the lunar civilization (many humans found that choice of words a tad ironic) was in far too much domestic strife for the feths to meddle in our Mars effort. The Cranberry was the most recent arrival in a new generation of space shuttles invented in the years after the back-to-back Columbia and Liberty disasters. It was named after Benjamin Cranberry. He postulated the Diethyltoluamide Supersonic Acceleration Principle, which eventually made supersonic Earth-based travel quick and affordable. (Diethyltoluamide could be found in insect repellents right up until the Second Cold War). The journey from Earth to one of the space stations orbiting Mars took a total of about forty Earth hours, including periodic rests to prevent the onset of tryptixia. The project leaders would have liked to keep the five aboard the station for up to a week to conduct some experiments, but the Mars claim could not wait. There was no telling how close the feths might be to their own Martian assault, and losing the red planet to them was unthinkable.

So after a quick nap, a light meal and 367 Earth minutes, the crew donned masks and moved toward the station's rear docking terminal, where the space bikes were stored. Each bike was controlled by a set of eight 'super-magnets' strategically positioned at evenly spaced points on the Earth's surface. The bike itself was much like the ride-on motorcycle game my friends and I used to play after school at the local games arcade as teenagers. A space biker maneuvered a set of joysticks, which in turn controlled switches linked to the Earth super-magnets. Even a minute nudge of a joystick would cause magnets millions of kilometers away to adjust their magnetic fields, propelling the bike as the rider wished. But unlike motorcycles on Earth, space bikes were not confined to a two-dimensional road surface. They could be kept stationary in mid-air or move in any direction in three dimensions. Each set of magnets was specially coded, so that the only body affected by changes in its field was the space bike it controlled. Otherwise changes in one set of magnets would affect all space bikes (and indeed all magnets) within its field across vast reaches of the Solar System. Compasses would dance and the flight paths of migratory birds would tangle like spaghetti, dropping their hapless commuters into the sea.

Each astronaut grabbed a backpack filled with transponders. Once they descended to the rocky red surface, they would be as prepared for a land claim as well-watered dogs. Affixed to each transponder was a small flag emblazoned with the symbol of the Human Federation, a black five-pointed star on a white background. With a nod of the head and a wave of the hand, the first astronaut pressed the controls and slid out into the upper reaches of the sky above Mars. Four remained. Every half hour thereafter, another member left the station and, like Astronaut One, passed swiftly but silently from the hatch towards the foreign planet looming below. Hancock was to be the last to descend. He would spend thirty minutes in solitary silence.

Eighteen minutes after Astronaut Four faded from view on his magnetic steed, Hancock felt a mild headache, and an uncanny heat inside his head. It was an odd, radiant heat that stole stealthily into his consciousness, so he was at a loss to say for sure when it started. It made him think of the glow of a rising sun on a cloudless morning - you could not be sure when you first saw it. By the time he became aware of it, it was all too real, and gathering. He was hot. And yet his toes felt almost icy. He glanced at the countdown on the panel beside him - nine minutes to go.

Hancock died without ever stepping foot on Mars. It was not in the feths' interest to see their next closest neighbor after Earth colonized before their eyes - they were keeping close tabs on Mars. They were suspicious of the humans' plans for Mars, and one of their first military programs after colonizing the Moon was a Mars surveillance system. But before this could be done, they had an immediate need for basic infrastructure. But the humans were sharp too, in recognizing that the feths would establish Mars surveillance before long. In a staggering display of speed, the humans had their space station up and spinning within months. It was cunningly designed to show up as a natural satellite to all but the most thorough of examinations. As soon as it was in situ in Martian orbit (and while the feths were still occupied with constructing their lunar cities), the humans broadcast bogus reports announcing the discovery of 'Raum,' their new 'moon' orbiting Mars.

September\_2021^

The feths watch with indignation as the shuttle makes a high-speed beeline for their red neighbor. But indignation turns to astonishment when the shuttle, rather than approaching the Martian surface, alters course and makes for Raum. Next it disappears from their screens - perhaps it has crash landed on the opposite side of Raum, hidden from view? But the robots are truly miffed when just twenty-three minutes later the shuttle reappears, on the side of Raum facing them. With the

surveillance program still in its primitive stages, the robots are unable to ascertain exactly what is going on, but what happens next really sets circuits racing.

One of the dials on the main Mars control panel blinks stubbornly. But what is really alarming is that the signal is coming from the equipment that detects signs of non-human extra-terrestrial life, and one particular dial suggests it is robots, not humans, who are trespassing into the Martian atmosphere. It can only be robots, for their reception equipment has detected the unmistakable signal that emanates from the neurochip installed in that portion of the robot equivalent to the human brain.

The robots watch in disbelief. Had they been installed with stomachs, these would be rather queasy by now. Without warning, the signal doubles in intensity. It has been thirty minutes since the signal was first detected. Who are the alien robots, and what are they up to? Similar spikes occur in the signal's intensity twice more, and it becomes apparent that real trouble might be afoot. Without emitting a sound, the control room robots unanimously agree this is an unknown and therefore intolerable threat. It must be eliminated. A simple task, and one they are prepared for too. They harbor a perennial fear that one of their own kind might one day turn against them under human influence, but to prevent this, they know how to 'fry' robots. The neurochip inside every robot, which stores sundry data about its life down to the minutest detail, shuts down a robot's system when zapped with a highly accurate pulse of supersonic energy. The victim's neurochip overheats, melting the surrounding circuitry and rendering the robot a box of metal and wires.

Of course in this case it will take too much time to pinpoint the exact location and number of targets, but if they send a broad beam in the general direction, it will eliminate any victims in its path.

And that is what they agree to do.

January\_2035

\* Recovered from neurochip of Clive Milgrim, neurosurgeon, 48 years old at time of attack.

^ Recovered from neurochip of Type Y feth, serial number YUW901450, believed to have had a senior role in feth military intelligence.

## THE LAST STAND

Martha McCoy

United States

I do not have much time; it is overtaking me. The pain is terrible now, but soon *it* will conquer me and then will come something worse, so much worse than pain—but I do not let myself think of that, or I will spend the few days I have left lying frozen with fear. Surely the universe cannot inspire more terror in all its flaming skies than does the heartless and mindless thing that is slowly overwhelming me.

But I do not write this out of empty fear or a need to scream my anger to deaf ears. I write this, and I tell my story, out of hope and anger, but mostly out of anger. What chance is there that anyone will see these words, or that the person will recognize them for what they are: a warning of the most fatal significance? Especially because I do not, cannot, believe in hope anymore.

For that reason, I must write quickly. First and most important: it is the computers, the machines. They are taking over, they are killing and conquering us.

No, do not throw down the paper in ridicule! Know this at least: you may think you control computers, but they are in fact slowly controlling you. Do not trust them, do not depend upon or place faith in them. It will make it much harder for them to get you.

For they will get you. It began long ago, before the United World Front (“Unification through Uniformity!”) had absorbed the last few independent nations. In the frantic international race for supercomputers, artificial intelligence was born. Rising quickly to the ranks of world advisors, computers had enormous power from the very start. It did not take them long to pull all the people together into the United World Front, always stressing the values of equality and sameness. At this time, people and computers lived in a sort of symbiosis, or at least that was what the people thought. Who knew about the computers? Were they evil in their slow overpowering of the people, or were they merely too efficient and power-driven for their creators’ own good?

By the time I was born, computers were integrated into every part of life, and they were just beginning to formulate the last step of their centuries-old plan. I was an adult when they revealed it to us.

The computers called it the Great Migration. They told us that it was the culmination of our great and ancient race, to begin spreading to and populating other planets.

People, including me, believed; people cared. There was no objection when the computers insisted that a slight modification to their proposal was necessary. But after all, how could we possibly accomplish such a Migration without losing our unity, without breaking apart the United World Front? The solution was simple. The computers had prepared a kind of tiny microchip that was perfectly suited for being worn—inside one’s head.

It was no problem, they said, it was a simple surgical procedure, it just slips right in with the tiniest incision, and it taps easily into the currents of your brain. In this way, humans and their longtime allies, the computers, would be truly united for the first time, all part of a great interlinked network of microchip computers.

People were very excited at the idea, and they began lining up, all across the world, to receive these miraculous microchips. The spaceships, built by computers and operating on microchip technology, were ready. The people were ready. The Great Migration was about to begin.

From this point on, only one clear memory remains in my mind, of waiting in line to get on a ship. An official stood by the entrance to the spaceship, asking each person a question: “Do you have a microchip yet?” The answer was almost always yes. When it was not, the person was pulled aside, to be given a microchip and sent to board on the next ship.



I remember stepping up to the official, the eyes studying me, the voice forming the question. I remember my answer before I hurried onto the ship: “Yes.” And I remember that I lied. That is all I remember.

The long flight is equally vague; all that stands out is the feeling of excitement about being part of the Great Migration. I do not think I cared that I did not have a microchip, or that I lied about it—I must not have thought it was important. I could not have been more wrong.

I remember landing, but only vaguely. I remember stepping out onto the surface of the planet that had been selected for us by the computers. I remember we were all standing together, awaiting orders from the computer on the ship, eager to begin somehow building a civilization from the bare rock of the planet. Then it happened.

It was not very noticeable, just a slight change in the people around me, as if something had just clicked on inside them, making their faces blank and grow cold. At first, looking around at them suddenly like that, I was only aware of a vague, uncomfortable feeling that something was not right. And then I realized that they were all looking at me with hollow faces and steel eyes full of malice. It was the microchips, of course. As soon as they were inside someone’s head, they would begin to take over that person, to tap into the complex brain currents and slowly begin to dominate them. They had only to extend their power a little bit and they would control a person completely.

All that came to me in a flash at the moment that they turned as one to stare angrily at me with those cold eyes, and started to move towards me. They *knew*, the horrible, traitorous mechanical parasites, they knew I was not one of them. I ran.

Maybe they followed me; maybe they were already aware that they did not have to. All I know is that I ran and ran, driven by terror, until I collapsed with exhaustion and dropped into a wandering sleep.

But exhaustion, terror, and loneliness mean nothing to me anymore. There is no hope. I may have a few days left, but the computer will win in the end. I know that now, there is no longer any doubt. I have felt the scar on my head where the incision was made.

I am one of them.

I suppose the surgical computer did it to me on the ship, during the long pitch-black hours of sleeping. I seem to remember one night, I woke up with a start from a sharp pain on the back of my head. . . How could I have thought I could ever trick the computers with any lie? It is too late—although I guess I’m lasting longer than the others did, maybe because it has not been inside me very long, maybe because I resist it with all my strength. That is why I believe I still have some time left.

And yet what can I do with that time? Nothing but wander aimlessly over this cold planet as I have done the last few days, thinking and working out what was going on all those years, and trying to resist. Even now I can feel it swelling inside me, taking advantage of my weakness. It is too much—exhausted—I must stop, will write tomorrow if still can.

I had not planned to write again; I was so tired and I could not think of any reason to. For the last day I just let myself drift, following my feet wherever they wandered, when suddenly I saw a familiar ship in the distance, and many indistinguishable figures hurrying around it. I realized I had come all the way back to the landing site of my own spaceship. Gripped with a sudden horror that I would be seen, I flung myself behind some rocks. Through the sickening thud of my heart, I knew the computer had almost taken over me, almost forced me back exactly where I least wanted to be. I vowed to never let go of my consciousness again, and to hold onto that I will continue writing this until I truly no longer can.

The people—they are building something. I think it is a transmitter of electromagnetic signals—but who are they trying to communicate with?

I know of course, although I wish I did not, and the knowledge shattered the last hopes I had. There are no free planets left. Would the computers risk such flagrant, beaming radio signals if there were? No; there is only one possible reason for this. The revolution of technology is complete. For that is what the radio signals are saying—“It is time, it is time, come.” Soon the ships will start arriving, and they will be full of computers, mechanical and cold and more intelligent than life. How many of them will there be? How many once great civilizations across the galaxy are now controlled by artificial intelligence? How many treacherous plans were fulfilled before this universe-wide domination of computers would be complete?

I cannot write more of this; I do not want to think of how the universe will end, with no free life left in it. . .

Some days later. Weary but must continue. The unthinkable has happened—they have come and they are not computers.

What I mean to say is that a ship has landed, a strange blazing ship that roared out of the sky. It landed and soon it opened, in a blast of unthinkable heat, and the aliens stepped out. They are hot and slimy creatures, with many soft shells of outer coverings. I do not know how they measure temperature, but their planet (to judge from the heat of their spaceship interior) must be searing enough to sustain liquid water. They have only four limbs and a speech that lies dizzyingly among the lowest frequencies. However, the language processor that we all have (to let us speak and translate strange languages) only took several seconds to decode their strange tongue.

“Incredible! It’s incredible! I still don’t believe it—we are sure this is right?”

“Yes, we are sure.”

“Any possible mistakes in calculations?”

“No, no. I *know* it’s incredible. I mean, Jesus—*radio signals from Mars?*”

“Well, thank God for technology, that’s all I can say. A couple years ago and we’d still be sitting around staring at each other with our jaws hanging off our faces. But first—where exactly are these signals beaming from?”

“Over there. Come on, get in the truck and we can go take a look.”

Still hidden behind the rocks, I sat in shock and watched them go. How could it be possible, that there were still free people, and that these aliens were one of them, and that the computers had not known . . . what would happen now?

Later tonight. The aliens have come back to their spaceship, and they are sitting quietly. They have talked with the people, and at first they discussed them (“The first extraterrestrial life”. . . “weird bug-things, so cold and spiny, but definitely advanced”. . . “Did they seem a little too—mechanical—to you?”) but now they are silent. I am good at sensing thoughts, but I do not understand theirs. They almost seem to be full of wonder, or awe. Why are they not afraid? Can they not sense evil, or the falsehood behind whatever lies the computers told them? These aliens are strange, weak, inefficient, and easily used. They may be free now, but I do not think they will be when they leave this planet—if they are allowed to leave.

I was right. The people came late in the night and took one of the aliens back with them. I know what they are going to do to it. I heard them talking, excited, triumphant. They are planning to give it a microchip.

With calculating reason, the computers must have realized that any civilization that had managed to resist their treachery would be a formidable opponent in open war. So they will try a more insidious plan.

After they install the microchip, after it takes over the captive alien (just writing that, I feel a pale twinge of sympathy for the creature), the computers will bring it back to the other one. They will show the other alien how much more efficient and strong its companion is when ruled by a computer, and they will offer the alien a chance to surrender its race peacefully. They think it will do so cooperatively when it sees the improvement in the other.

I would have agreed once, but these aliens are not like us, and I do not think their society is held together by wholly the same values (strength, economy) that once united mine—otherwise, the computers would have taken them long ago. What I can sense of their feelings confuses me, but for some reason I do not think the alien will be pleased when it sees its companion has been replaced by a computer. And so I have one final hope left . . .

It is an impossible hope, I know. One free alien, even if it managed to resist the computers one last time, cannot resist an entire empire of them long enough to escape. Most likely, this paper will be lost forever, never read, and the universe will fall into ruin under an infinite age of technology. But while the hope is there, I will not relinquish my freedom knowing that I may have made one last effort but did not. I am standing in front of the alien spaceship now, the paper in my hand. When I am done writing, I will throw it into the ship—a great feat, for it is so hot, so hot even standing near it.

And if—oh, hope beyond the last dying embers of hope!—the alien finds some unheard-of strength—although I do now know what—and it escapes, then this paper will make its way back to the alien's home planet, a planet which still may be free. And if a person is reading this document now—and if that person is free, although that is surely too much to hope for—then I speak to you now: *fight*, and with that word goes every emphasis, plea, urgency and command in your tongue . . . It almost has control of me now, oh, the terrible throbbing in my head. My hand moves across the ground, and I know it is not I who is moving it . . .

I am dizzy. Hard to see . . . cannot think; will try again tomorrow, if there is a tomorrow for me . . .

**BIO-SOFT****Jason Wolenik**

United States

Millions of miles from now, a stowaway awoke from a benign slumber and set out to fulfill its only purpose—kill Aaron Jacob. No one aboard *The Expiation* suspected that this nebulous monster was slowly feeding on critical life-support systems. For days the creature inched closer to its goal until, stretched thin by the expanse of celestial nothingness, an improbable adversary extended a helping hand....

Aaron lay pleasantly on a bed slightly larger than his impressive frame. His pale skin submissively reflected red, blue, and yellow back at a panel of lights blinking wildly three inches above his face. Deep inside his mind a cool voice spoke in chants while the wafting smell of a medicine cabinet tickled his nose. A subtle electric shock hit around his waste and generated a vivid sensation. Aaron was not awake and yet he was not quite asleep—floating somewhere in the space between, he was communicating with Mission Control.

For hours the lights kept Aaron in a semi-lucid, hyper-attentive state while other devices broadcasted information. The voice, computer generated and designed to be as soft and warm as inhumanly possible, spoke on behalf of the mission crew on Earth. The smells, over 1200 readily available, were synchronized with specific messages to reinforce understanding and absorption. Electrical shocks, administered with precision from any spot on the bed, made lasting impressions on the subject's subconscious. The combined effect from these sensory systems left Aaron feeling more like a guest than a host in his own body—such was the nature of the Ofni Apparatus. The topics exchanged during Ofni Sleep often included mundane details about the mission status and any changes in the target entity. However, recent events on Earth or messages from loved ones were also transmitted. In response to the sensory systems, Aaron reacted through barely audible sounds, muscle contractions, and specific synaptic consolations that would be translated into logical text back home. In this manner, Aaron remained in contact with Mission Control at all times—even while resting.

This was a typical sleep cycle and would last for thirty-two hours. It was proved long ago and far away that extended slumber helps preserve the mind, body, and, of course, supplies on great distance flights. Many cycles ago, the crew learned to shed their terrestrial orientation and reluctantly consented to being awake for twenty hours then sleeping for a time even greater. Out here, Aaron's parts rose and fell based on faithfully configured computers.

The last four hours of the cycle were designated for random eye movement sleep and were only measured by Mission Control through non-invasive systems. Now slipping into this stage, Aaron began to dream for the first time in twenty-eight hours. His mind fought for a while to find a random train of thought and finally wandered down a lane sprinkled with memories of home. He remembered his brothers and the way they used to fight over taking out the garbage on hot summer evenings. The seemingly ridiculous chemical weapons drills that he was forced to do at the university blinked for a moment in his brain. Then he remembered the first time he had ever seen a dead body. The corpse stunk ominously and dragged his mind down an increasingly painful and tortured path.

Panicked. Spotted with sweat, Aaron's body jolted slightly and he sprung awake. "What was that horrible creature?" But even as his mind struggled with the question, his dream washed from his memory and sank down the drain with the suds of his fear.

Aaron would remember all of his communications with Mission Control and the people back home but, as he was accustomed from his days on Earth, he never remembered his dreams. Aaron had no

idea that he spent the better part of four hours imagining horrible and diseased thoughts. Furthermore, he had no way of knowing that this was, in fact, the theme of all his dreams for the past twenty-two sleep cycles.

Dry hands removed the wires that were stuck to Aaron's bald skull and he crawled out of his cave. The cool familiarity of the metal floor against his bare feet worked like a sledgehammer on his drowsiness. Carefully, his toes pointed the way down the long dormitory and his body followed. He looked at the others as they slumbered through various stages of the sleep cycle. The lights blinking off their faces made their skin look waxy and fake. To Aaron, these people seemed as human as paintings stuffed in the dusty basement of a museum. They were motionless representations of people who once existed and, with the help of a tiny thread of technology spread across the vastness of space, will exist again. Only the timing and prudence of Mission Control will determine if Aaron has the opportunity to meet these beings in an animated state.

Protocol was the law of the land and from the moment he awoke Aaron became an obedient subject. First, a pinprick in the shoulder was self-administered and deposited in a small unit next to the dormitory exit. Next, all passengers were required to visit the bathroom to excrete bodily waste—this was not an optional exercise. Finally, crewmembers were obligated to enter the study pod and await “further instructions.” This was the waking ritual and Aaron never deviated.

The study pod was designed with a nostalgic intention that Aaron increasingly despised the further he floated away from the natural fragrance of pine needles—one of his earthly loves. The chamber was built for no more than three people simultaneously using the facilities, which, as regulated by the sleep schedule, was never a problem. Extremely lightweight plastic materials were used to make the walls resemble an antique mahogany library. Under his feet, constructed of soft and self-cleaning plastic, was the only carpet in the ship. The real beauty of the room, however, floated above. The ceiling looked like a blue sky in which fluffy clouds animatedly meandered in random paths. Here, surrounded by memories, passengers relaxed and waited.

The idea of a stowaway was the stuff of pirate tales and children's fantasies—certainly not real life spacecrafts. Therefore, the notion did not even graze Aaron's mind as he observed a panel rattling loosely beside one of the televisions. Looking closer, he noticed a few scratches next to the spot where a screw once held the piece in place. Thumbing the markings he searched the carpet for the missing part. Without success, Aaron let go of the panel and decided to make an effort to relay his curious findings during his next sleep cycle. This was the first time Aaron ever noticed anything unusual aboard the ship.

With little production, a small, yellowish piece of recycled paper was spit out through a slot in the wall below a sign reading “BIO-Soft.” Aaron read the paper:

#### 20-Hour Awake Cycle

##### Further Instructions For AARON JACOB:

- 45 minute session of low impact Yoga (four times)
- 10 liters of water
- 2 mandatory stool samples
- 7 meals from food processor Y-67 (every three hours)
- 30 minute walk (two times)
- 2 desserts of your choice

With a thundering grunt, Aaron observed that his rations of dessert were steadily decreasing while the amount of Yoga in his routine increased. Tucking the sheet of paper in the pocket of his sweatpants, he left the study pod for food processor Y-67.

The other two bodies awake at this time of the sleep cycle were eating their respective meals when Aaron entered the cafeteria. The two threw head nods to which Aaron reciprocated. Obviously they were all capable of understanding and speaking at least some of each other's native tongues but it was always easier first thing after waking to speak through international body language.

In front of food processor Y-67 a raspy voice spoke, "Aaron Jacob, crew number alpha thirty-two, ready for meal." As if awoken from its own sleep cycle, the machine groaningly jumped to work. A red light blinked as several components cranked and thudded behind the steel faceplate. After a few minutes, the red light stopped blinking and a green light indicated it was time for Aaron to take his breakfast. From a slot below a sign reading "BIO-Soft," Aaron yanked out a tray of food and walked to the large round table in the center of the room.

Yuck! An odd taste soaked in his mouth. "These eggs seem unusually green," he thought looking down at the breakfast. For a second he suspected an error in the food processor but then he reminded himself that it was *impossible* for the BIO-Soft system to make a mistake. But if not the system, what could have tainted his meal? Following a moment of futile concentration, Aaron resigned himself to the strange color and equally uncomfortable taste and took a lion's bite.

After breakfast and a final head nod, Aaron left the cafeteria for his first session of Yoga. Walking towards the exercise pod, he shook his head at the thought of the silly blue mat as "sports" equipment. On earth, his exercise had always consisted of contact team games but within the confines of his metal world, Aaron understood the necessity for other activities.

"I must be getting old," he thought to himself as he tried without success to touch his toes. The sensation reminded him of the first days in space when his body stretched in strange ways by the partial gravity of the ship. However, there was no longer a cosmic excuse for his inelasticity. Four times during his awake cycle, Aaron went to the exercise room and squished his feet into the blue Yoga mat. He drank 10 liters of water and walked the treadmill for a total of 60 minutes. Twice he indulged at food processor Y-67—once eating a slice of chocolate pudding cake and later savoring a French vanilla ice cream cone. With complete dedication to the BIO-Soft machine, Aaron finished everything as instructed. And, exactly twenty hours after waking up, Aaron found himself back in his warm, dry cave.

Climbing into the chamber, Aaron tucked his feet under a thin blanket. Like leaches, the electrodes attached thirstily to various points on his head and body. Then, as he lay flat with his arms at his side, he stared upward and ruminated. This was the time of the routine, just before he leapt off the face of consciousness, when he missed his home most of all. Was he stupid for volunteering for this crazy mission? The question was rhetorical—he answered it a billion times before. Would he be able to solve the algorithm when they reached the entity and the pressure was on? No matter how much confidence he had in his math skills on Earth, this question always sent shivers down his spine. Searching for distraction, his mind flashed away and he was suddenly stricken with a strange feeling. For the first time ever, he felt that someone or something was watching him as he lay in his cave. Then, before he had time to shake off the absurdity of this last thought, a flurry of blinking lights began sprinkling colors on his face. Loyally, Aaron closed his eyes, breathed a last, deep breath of freedom, and slowly handed over the controls of his vessel.

A million guesses would have left Aaron short of knowing that Mission Control had taken an unusually keen interest in his activities. Hundreds of Earth's best scientists and brightest doctors pricked and prodded him with electric fingers during the sleep cycle. They ran brain scans, cardio checks, psychological profiles, and a host of other tests. All the while, Aaron hurled blissfully through space on a soft bed within the largest craft ever built.

The massive support crew back home carefully studied the results from the Ofni Apparatus after each sleep cycle and then compiled an action plan for their subject. Every time Aaron awoke and

looked to the BIO-Soft machine for further instructions he unsuspectingly played into their hand. Of course, everyone gave a prick of blood, went the bathroom, and then waited for their printout—nothing smelled suspicious in this routine. Aaron knew that BIO-Soft had been designed to interpret bodily fluids and then create a daily plan that would supplement any deficiencies. Naturally, all food processors linked to the BIO-Soft CPU and meals were automatically injected and fortified with any concoction of vitamins, minerals, or pharmaceuticals that the individual required. This was normal on Earth and made even more sense onboard the ship. Sailing a distance equaling that between San Francisco and Moscow every fifteen minutes, Aaron cruised through the routine of his life in ignorant slumber.

As Aaron entered the last four hours of this sleep cycle, the lights lifted their grip and gently nudged him into the dream state. Here, his body relaxed and his mind floated weightlessly. He thought of the house where he spent summers building wooden forts in the backyard. In another random flash of memory, the anonymous rain drenched street where he first saw Her flickered dimly. Next, an image of something unbelievably horrible materialized in his mind.

With clarity, Aaron dreamt of an awful monster creeping around the bowels of the ship. He watched as the beast stealthily moved towards one of the passenger sleep caves. Then, with savage intent, the monster pounced on its victim. Aaron could not make out what happened next but he heard a horrible cry. A pain pinched his side as Aaron's mind recoiled from the vision. Disappearing back into obscurity, the monster was gone.

Still hovering in the ethereal grip of his dream, Aaron fought for clarity. The pain in his side grew in strength as images and sensations randomly flew around his brain. His mind locked on an aura of ideas and twisted. Then, in a single divine instant, Aaron made sense of the monster. Yes, there was an intruder in the system—an alien within his *own* life pod! Feeling deep in his abdomen without moving, he sensed the cancer that fed on his life-support systems and challenged the technological means of Mission Control and the BIO-Soft machine.

Aaron understood why the eggs tasted strange and why the exercise in his schedule increased—this was the ammunition of his allies back home. The alien aboard the ship burrowed in his gut but was still within range of Earthly weapons. This newfound understanding liberated Aaron within his own dream and for a brief moment he felt the cathartic warmth of comprehension. And yet, as Aaron absorbed the impact of his new knowledge, his four hours ticked away.

Panicked. Spotted with sweat, Aaron's body jolted slightly and he sprung awake. "What was that horrible creature?" But even as his mind struggled with the question, his dream washed from his memory and sank down the drain with the suds of his fear.

**LEAP OF FAITH****Jeffrey Hendrikse**

The Netherlands

From: Joles Hernandez (j.hernandez@stargazer-consortium.au)

To: Marian Ibanez (m.oddy@mit.edu)

Thursday 28 februari 2013 03:31

Subject: 2 My love...

Dear Marian,

It has been a while since my last letter. The work load has increased because of the upcoming test preparations, which completely removes the possibility of having any social life at all in the coming period. I know, that you approve of this because of the beneficial effect of preventing me from getting into any mischief. I sure miss snowboarding though. . I am writing to you from Canberra, (which is still Australia's national capital; unbelievable!?! ) and the Snowy Mountains are just too close. You should come and visit me here in Australia, in two months time, when we have completed all the drive tests of the Stargazer and I am back on Earth again from picnicking in Pluto's orbit. Amazing mountains here in Australia... Beautiful star fields and lots of shooting stars ;-), no summer triangle though :-(...

Next week we will launch from Canberra Deep Space Communication Complex at Tidbinbilla to do our second test in putting our 'little'-craft into low earth orbit using our new and optimised drive configuration and next month will be going back to Pluto :-)... I am a bit wary about this new configuration, though, because I have found some strange anomalies in my simulations. Beginning this year, when we returned from our earlier picnic at Pluto using our old configuration, everything worked just fine. Okay, it still took us 3 months up and down for only a 3 days visit at Pluto, but hey, I still believe when something works, don't fix it!!!. My sympathy off course for the people on the monitoring vessel, which took 3 years to get there, but they sure loved the ride back :-) Oh well, when we achieve 0.7 light speed it will be a whole lot better, otherwise I will never win our bet in getting the first close-ups from Vega. But for this we still need to do some funky science to prove the illusive light speed barrier wrong. You, have the advantage of course, being a girl ;-) Females inherently have the ability to find loop holes in any law, correct or not? ;-)

Anyway, about these anomalies...

Earlier conversations with you, about your work in creating a space-drive system based upon the Heisenberg uncertainty principle, made me think about my research here and its other links in physics. Your mental leap in using this principle still blows my mind; to define a quantum voxel in which this principle governs and to use your earlier, and very creative I might add, theories of space-time and thought to blow up this voxel and engulf a whole vessel! It's a heck of a way to travel, I guess. No G forces and such, instantaneous acceleration in any direction. However, concerning my research and making some of my own mental leaps, inspired by you ;-), I am afraid that I might have stumbled upon some fundamental properties of space-time which could be effected when we crank up my baby too high. It's the time element which makes me a bit concerned.



Let me explain and please tell me what you think before me and my team go out for our next picnic at Pluto. You already know that the drive system I am working on uses its own generated electromagnetic waves to create thrust and thus steps away from classical rocketry and the exchange of momentum by ejecting mass at high speed. I still have people coming to my courses more than 10 times because they are somehow stuck on the laws of physics stated in the days of Newton, Faraday, Maxwell and so on... But when they finally grasp that the only constant in 'life, the universe and everything-' is change, then they are doing fine in understanding that no law is being violated in this concept. It's all about little loopholes I guess. Maybe I should hire a lawyer to check out the physics books? (Preferably I would hire you ;-)). So far I know you follow me that my drive works upon the reverse, using two sources to create changing fields and thus create a constant force. Like the geometry equation  $\sin^2\alpha + \cos^2\alpha = 1$  remember? Now for some mental leaps; for our optimisation we wanted to use more sources in the configuration to create more thrust. That seemed to be working fine but the team and I, inspired by your creativity must admit, found out that using a statistically very large amount of EM sources bunched together, with a random distribution of their phases and a finite number of possible frequencies, also produces a force, and vice versa, on a equal bunch of sources placed at some distance from the first bunch.. Initially you would think that they would all just even out. The curious thing is that in this configuration two bunches of sources only attract each other. Using some more statistics we could even calculate from this the attraction constant, which is as good as exactly the same as that of the big G, (gravity constant). Maybe we proved here that the also illusive Gravity force is just a side effect of stuff we already know ...?

So, initially, we succeeded in what we intended to do is to prove that by using multiple sources in our EM drive we could optimise our system. Instead of having two sources we basically have a slab of 100% pure material, it having all its atoms resonate at the same frequency, but being slightly out of phase along its length, and hence producing a thrusting force.

Secondly, we may have discovered the fundamentals of why the apple always falls!

But, finally, I theorize that if all the sources go instantaneously out of phase due to some mishap we would create, for a short moment, a randomised phase distributed field, which would act like a gravity field. In fact more like a strong but short gravity pulse I would say. And if I remember my earlier physics lessons on Einstein theories, off which our little drive really depends on to work, gravity and time are connected as well as space and time.

This all makes me wonder what will happen when we turn on our little drive and when it suddenly will SNAP off. %-/. Difficult to simulate, not to mention a difficult subject to talk about because of gravity and space-time is still in the realm of sci-fi for most scientists. You are lucky I guess because your topic kind of started as a sci-fi story. But mine has been built up out of the conventional with conventional people.

Maybe you can help me here with your knowledge on space-time principles...?

Lastly though, because it is getting a little bit late love,...

A thought on your Heisenberg voxel. I know you painstakingly solved the problem of having all the atoms of your test objects going off in random directions, once engulfed in the field, by using your theories of Space-time & thought. I still have one of your earlier test objects here on my desk; you would never suspect that this nice, foam like structure of homogenous, coloured substance was once my mobile phone (which mysteriously disappeared at the moment I first saw you, when I came over for a visit). You did indeed send my mobile phone away, , to oblivion unfortunately. O well, but I

must admit that our holiday times together were well spent without ANY interruptions what so ever ;-).

Anyway, to come back on your Heisenberg voxel theory. Do you remember about my theories that nothing happens instantaneously in the universe? I fear that anything which will be created using space-time-thought may have a limited existence radius. This radius will increase over time, of course, with the velocity of light from the second of its creation. You must promise, whenever you finally get this vessel built, never to fly it beyond this point (that is off course if you are able to finally break the c-barrier ;- )

Still thinking and always of you,

Yours truly,

-x- J.

Big PS:

Science progress has made some mayor leaps forward in the last 100 years, Not too mention us in these few years ;-). I guess our little grey fuzzy German guy was also right that dreams and imagination know no boundaries, but only knowledge does. (Sense and sensibility will always be a big yin yang because of this, I guess.) Anyway, It has been said that evolution knows great leaps instead of only gradual changes. I think Nature, people and their imagination in many ways takes a giant leap so now and than,.. a Leap of faith...

[end attachment]

From: Marian Ibanez (Marian.Ibanez@internalmail)

To: All (all@internalmail)

Thursday 13 march 2051 19:11

Subject: Summary of events, next steps...

Fellow Crewmembers,

The above email, with others, was found by our investigation team in the ghost ship that suddenly appeared three days ago.

This occurrence happened a few hours after our arrival at our target coordinates in the vicinity of the observation vessel Icarus.

As you all know, our current voyage is in particular to honour a great scientist, who was responsible for opening up some fundamental physics that have now lead to artificial gravity on board our vessel. Icarus was used as a waypoint in the early Stargazers EM-Drive trials, built by this scientist and his team, 35 years ago. This scientist unfortunately disappeared during a test flight, which was planned to rendezvoused with the Icarus within a day after its departure from earth

I know that our vessel is still experimental and this is our third voyage. However it has been identified that the occurrences endured 3 days ago are of an external nature and definitely linked to the sudden phenomena of the appearing vessel.

To summarize current events,...

A short time after our arrival in Pluto's orbit, in the vicinity of the Icarus, a second craft appeared out of nowhere within 100 meters of the left side of our vessel. This anomaly caused a major spatial disturbance to a radius of several miles, upsetting all our electrical equipment. After 3 days of repairs all systems have been regained except that of our drive system, which is still now offline, and our inability to pick up any communication signals from earth and its satellites. This for reasons which just recently have become apparent to me.

In the last three days some of our crew got the task to identify and investigate the suddenly appearing silent vessel. Upon closer investigation they found this to be the long lost experimental craft called the Stargazer, which disappeared 35 yrs ago during one of its test flights. After boarding they found no life on the craft. The fate of the crew is still unknown at this point. However, a lot of thin biological residue on the floor, walls and ceiling has been found. Tests to show if this biological substance is of human origin are still pending and made difficult because of the lack of gravity in the vessel. The investigation team was able to collect the ship's logs and several PDA's of the ill fated crew. One of these PDA's belonged to the disappeared scientist, my former fiancé, Dr. Joules Hernandez. While reading his personal logs I found a email addressed to me, which he, unfortunately, for some reason never got around to sending.

This letter, as well as our inability to pick up any signals from earth, gave me reason to verify if the star charts were still in tact and if we were able, as a test, to verify the current date.

At this time I see no further explanation necessary from my side other than to just let you read the attached the letter. I hope this will clarify our situation more than enough.

Next steps...

Tomorrow I will be setting-up a duty roster to salvage the Stargazer, and a research team to analyse its data and fate of the crew. Another group will be appointed to investigate the state of the Icarus. We WILL be returning home, not with our vessel, unfortunately, but surely..., with a lot of faith...

Prof. M. Ibanez,  
Captain of the I.S.S Heisenberg

Current date: approx. 245 B.C

## TERATESLA

Steve Asselin

Canada

Christophero Bellaquez watched the churning, roiling surface of the Sol's photosphere in quiet reverence. Of course, he was watching the intense clash of yellows, oranges and sunspot-blacks through the bias of a video screen specifically adjusted to diminish the incandescence of its subject, otherwise his eyes would have been singed beyond use. They were so close to the massive stellar body that the entire frame of the external visual feeds amounted for little more than an insignificant fraction of the star's total surface. As the project leader and ex officio captain of the *Phaethon*, he knew better than few others the raw, destructive energy unleashed by that nuclear powerhouse every femtosecond. Energy that they were going to try and harness to escape Sol's domain.

"It's getting warmer in here," Sherwood Glasfryn complained, right on schedule. Bellaquez smiled and shook his head, the movement concealed by his chair at the front of the narrow, oval shaped chamber. Glasfryn was an incredible scientist and engineer, but he was also a walking bag of neuroses. Under pressure Glasfryn was cool and assured, but when it came to simply waiting around – an unfortunately significant part of their detail – he was twitchy and apprehensive. This was the fourth time they had gone out to the coronal terminator since their tour of duty began, all he always made the same comment.

"It is *not* getting warmer in here," Soo-Yen Huang replied, humouring the engineering. "Internal temperature is 22 degrees centigrade and hasn't budged at all since we left docks. It's just your imagination."

"I'm just saying – an object cannot pass from an environment that is basically as cold as you can get within a solar system to an environment pushing the million degrees Kelvin without experiencing a change in temperature. I feel it, even if your instruments don't register it."

"It can if it's protected by more layers of insulation than any other ship in history," Bellaquez said amicably. He briefly brought up the pertinent information on his touchscreen and satisfied himself that Glasfryn was just being his fidgety self. Not that he doubted the systems – after all, he'd helped design them. "What you're feeling is just psychosomatic."

"Or just plain psycho," Huang said with equanimity.

As Bellaquez's grin split wider, Glasfryn grumbled something under his breath, unwilling to push an argument he knew in his more academic moments to be wrong. Bellaquez was about to take it upon himself to continue the banter when the com. crackled to life.

"Solar Four to *Phaethon*."

"*Phaethon*, Solar Four. I copy."

"The data feed from the Delphi array indicates that a massive solar depression is, in fact, forming along Alpha Centauri's equator, and facing our system. Delphi also shows minimal interference from Centauri B or Proxima Centauri." A pause. "This looks like the best chance we've had of obtaining a real cosmomagnetic stream since the program began, Christophero."

"It's about time, too. Another two minutes and we were about to call it quits," Bellaquez answered, his elation making him feel jocular.

"Good luck, *Pheathon*. Solar Four out."

Bellaquez spun his chair around, facing Glasfryn and Huang, both of whom were looking at him with similar expressions of hopeful expectancy.

"Well? Let's get this fat lady on the move, shall we?"

His smile reflected on their faces, the two scientists spun their own chair back towards their instruments and sounded off.

“Externals and internals are stable, current speed is nil,” said Huang.

“The magnetic flux density is at point zero four tesla and rising,” Glasfryn announced.

“Magnemotive force potential at point oh five gauss.”

“Okay,” Bellaquez acknowledged. He toggled one of the internal com. switches. “B-side, this is front-side. Delphi says we have a potential stream forming. How are things at your end?”

“Its warm and sunny over here, skip,” the cheery voice of Cassandra Bloom, deck manager for B-side, came from the com. Though the *Pheathon* had been designed to operate just as well from either end of its oval shaped body, it had been decided that the end facing their destination would be the primary, in charge of everything relating to the operation of the *Pheathon*. The other side, dubbed the backside or simply B-side, would be responsible for data collection. “Perfect conditions for a picnic. Why don’t you guys come on down here?”

“Maybe later, Cassie.” Bellaquez flipped the com. off. “All right, folks, I’m deploying the sails.”

Bellaquez pressed the appropriate sequence of buttons, waited a few seconds for the green lights indicating all was clear, and then pulled the lever that would release the gossamer-thin material from compartments all along the *Pheathon*’s median. Though he couldn’t see it on the external feeds, he knew from witnessing the mechanism in operation from space dock that a golden square of magneto-receptive fabric was spreading through the superheated vacuum around them. Held in place by ultra-light, practically mass-less supports, the sheet bisected the main body of the *Pheathon* at its mid-point in a perfect ninety-degree angle.

“We’re moving,” Huang announced from her post. “Two kilometres per second.”

“Great. At that rate, we should reach Alpha Centauri in a few hundred thousand years,” Glasfryn said edgily. ==37,843,200,000,000==

“It’s nothing more than the standard solar winds, Sherwood,” Bellaquez reminded him. “The real show is yet to come.” Keeping an eye on his readouts, Bellaquez patted the console affectionately. When he had first embarked on his project, he had sworn to himself that he wouldn’t become to kind of captain who had an emotional bond with his ship and referred to it nicknames. But after four years spent helping to design the *Phaethon* and shipping out on it afterwards, he couldn’t help himself. Because of its enormous size and oval shape, the *Phaethon* had become “the fat lady” to him and his crew, or in its more capricious moments, “that giant space suppository”. Still, the crew compartments and walkways were cramped and narrow, because most of the ship’s infrastructure was given over to insulation and shielding to protect the *Phaethon* and its crew from the rigours of such close proximity to the sun and the structural reinforcements needed to withstand the sudden acceleration and, hopefully, supraluminal speed at which it will be traveling.

Ironically, after years of trying to devise method after method of interstellar propulsion, it had been a breakthrough in miniaturisation that led to the development of the hulking spacecraft. Teams working on ways to accelerate ore shipments from Mars and the various lunar colonies discovered that it was possible to condense the ore to a microscopic degree and, with the properly polarized coating, send it via electric feeds. While the breakthrough didn’t have any practical effect due to the cost of the miniaturisation, the idea that you could “trick” an electric current into transporting select matter was the jumping point for the much larger-scale concept of cosmomagnetic streams.

Every stellar body possesses a magnetic field, which in turn interacts with every other nearby stellar object’s field. No field is greater than that of stars – in fact, Sol’s magnetic field was so large and powerful that it soon became obvious that trying to use the connections between magnetic fields for intrasystem travel would be impossible, because the sun’s field overwhelmed all it came into contact with. But it also meant that the sun’s field could interact with Sol’s closest galactic neighbours. Given the proper polarization at either end, the magnetic relationship between two stars

was analogous to electrical current, or a stream, and from there it had been “merely” a matter of trying to disguise a massive starship so that it would be carried by the cosmomagnetic stream.

“Front-side, B-side,” the com. crackled. “It looks like the sunspot activity is reaching its apogee. Radiation and solar pressure is spiking.”

“Confirmed,” Glasflyn indicated. “Magnetic flux density is at eleven tesla and rising fast.

Magnetomotive force potential at point oh seven gauss.”

“Ambient temperature just jumped by over two-hundred Kelvin; internal temperature stable,”

Huang reported. “Our speed is now forty kilometres a second.”

Bellaquez glanced at his readouts, being updated with information from the Delphi array as fast as the transmissions could travel. It looked like the magnetic poles at Sol and Alpha Centauri were nearing alignment. If you factored in the time lapse for Delphi’s data to reach the *Pheathon*...

“Brace yourselves,” Bellaquez said. No sooner had he said this than the ship jerked forwards, caught in the cosmomagnetic stream. “We’re in the stream,” he announced for the shipboard record. “Magnetic flux density is at three hundred tesla – eight hundred – fifteen hundred – hell, three point three kilotesla,” Glasflyn reported. “Magnetomotive force potential is at point twelve gauss and rising.”

“Ambient temperature has risen by several thousand degrees Kelvin,” Huang said. “Internal temperature stable. Our speed is now... blast, six hundred kilometres per second.”

“Our course is perfectly aligned with Alpha Centauri,” Bellaquez said, feeling slight tremors running through the ship’s infrastructure. “I think this is going to work.”

“Magnetic flux density at six hundred kilotesla,” Glasfryn said, speaking loudly over the ever-increasing din. “We shouldn’t have named the ship *Phaethon*.”

“What?” Bellaquez called back.

“Hey, there’s a new complaint,” Huang remarked. “Speed is twenty-two hundred kilometres per second.”

“Magnetomotive force potential at point thirty-one! I’m just saying, do you know what happened to Phaethon in the story?”

“Sure!” Bellaquez answered. “He drove the chariot of the sun too close to the earth, burning part of it, then drew back too far, freezing another part of it, then got zapped with a lightening bolt by Zeus for being such a lousy driver!”

“Exactly! Magnetic flux density at fourteen megatesla! So why would anybody name the ship after something like that?”

“Because Phaeton rode the sun and so are we!” Bellaquez said. The mild tremors had turned into serious shaking.

“They named the first ship after Icarus, and see what happened? Bam, the sublights misfire and it goes right into Proxima Centauri! Magnetomotive force potential at point forty five!”

“Glasfryn, don’t be so superstitious,” Huang shouted above the noise. “Speed is fifty-four thousand kilometres per second! The *Icarus* wasn’t destroyed because of its name! Besides, what about the *Helios*?”

“Nobody knows what happened to the *Helios*!” Glasfryn shot back.

“Yeah, but nothing bad happened to the mythological Helios, so there: you have no pattern!”

“Children, if you don’t stop bickering I’m going to pull this spaceship over at the next Oort cloud,” Bellaquez called out.

Huang’s laughter was audible even above the continuing rattling. Though Bellaquez wouldn’t admit it, he found talk of the *Phaethon*’s predecessors, especially since he had known the skipper aboard the *Helios*. Once the potential of cosmomagnetic streams had been discovered, a series of unmanned probes had been sent first. Although marred by an initial run of spectacular failures, the

problems with the system were eventually worked out and the tests successful, culminating in the deployment of the Delphi array currently in wide orbit around the Alpha Centauri binary pair and Proxima Centauri. With the information being relayed by Delphi, they had proceeded to try manned vessels, but the *Icarus* had suffered a malfunction upon exiting the stream and been burned up in the solar furnace, whilst the *Helios* had just never reappeared after leaving the Sol system. Although the *Phaethon* had more safety measures than any other craft in human history, its crew was well aware of the terrible risk they were all taking.

Because of the *Phaethon*'s size a tremendous amount of energy would be required to achieve full magnetomotive potential and push it into sync with the rest of the stream between the two stars – the kind of energy only a massive solar disturbance like sunspots and solar flares could produce. They had calculated that the required density of the stream would have to be ten to the twelfth power tesla – a full teratesla. They had waited over a year for another opportunity to try and reach Alpha Centauri, but from the rapidly rising numbers on all his readouts, Bellaquez thought their time had finally come.

“Ambient temperature is off the charts!” Huang said. “Internal temperature has risen two degrees centigrade!”

“See? I told you it was getting hotter in here!”

“Glasfryn, what is your read?”

“Oh, uh... we’re at one oh one gigatesla and rising! Magnetomotive force potential at point seven three!”

“Our speed is one hundred and eighty thousand kilometres per second and shooting up fast!”

All around him, Bellaquez could feel the *Phaethon* bucking and rocking under the incredible acceleration. He could feel sweat trickling down his cheeks, and not just from the increase in heat. He gripped his console tighter as his two crewmates continued to read off their data.

“Density at three hundred gigatesla... four hundred and ten... five hundred and thirty... Force potential at zero point ninety five!”

“Speed is two hundred thousand clicks per second... two hundred and twenty... two hundred and fifty...”

“Teratesla!” Glasfryn cried triumphantly. “We have reached teratesla! Magnetomotive force potential is at point ninety-nine... one! Full magnetomotive force potential!”

“Speed is two hundred and ninety thousand kps,” Huang called out at the same time. “Three-hundred thousand! Light speed, we are at light-speed!”

Suddenly all the shaking stopped, and a quiet fell over the stunned crew of the *Pheaton* until the overhead com. sparked to life. “Front side, B-side. Skip, we just lost all external data feeds.”

“I’ve lost all my references points as well,” Huang said. “The external visual feeds seem to be disabled.”

“B-side, we’ve achieved light speed,” Bellaquez said. He let an exhilarated smile play across his face. “We’re going faster than anybody ever has.”

“Well, I don’t know what are speed is without something external to gauge it with, but if the probes are any indication, we should be traveling at twelve times the speed of light,” Huang noted.

“And now,” Bellaquez leaned forward into his readouts, “Now we wait.”

One hundred and twenty-two days after it disappeared at the edge of the Sol system, the proximity alarms on the *Phaeton* rang throughout the ship. Automatically, its powerful sublight engines activated, pushing the ship out of the stream and back into normal space. The deceleration was even more jarring than the acceleration was, and anything not bolted to the floor would have become a millimetre-thin film at the front of the vessels. It was several more hours before the biogelatine-

filled stasis chambers opened and released its precious human cargo. The crew of the *Phaeton*, exhausted and grimy from the months spent with one another in the cramped confines of the ship, stumbled to their respective stations.

Christophero Bellaquez dropped into his chair, still feeling groggy from his weeklong precautionary sojourn in the biogelatin. The first thing he tried was the external visual feeds. The bright light on the display quickly chased away any remaining fatigue. Bellaquez was awash in yellow, orange and red light, the three stars of the Centauri system blazing in all their incandescent glory.

As Glasfryn and Huang looked on over his shoulder in silent awe, Bellaquez thumbed the internal com. “B-side, this is Front-side.”

“Bloom here. Skip, did we make it?”

“It’s warm and sunny over here, Cassie. Perfect conditions for that picnic.”





## FORM AND FUNCTION

Wunji Lau

United States

The tattoos are hungry. I can feel them burning on my skin, see their phosphorescence fade ever so slightly. Their appetite is different from mine; I get hungry when my body needs food, but the Mosaic is hungry when its nutrient level runs low, and it seldom is so when I myself am hungry. Rolling over in my tiny sleep-tube, I can feel the hum of *Whimsy*'s engines, the ship decelerating from its long trip. I reach into a morph-bag hanging from the wall, withdraw a half-used nutrient tube, and begin to rub the sweet-smelling ointment into my skin. Instantly, I can feel the burning sensation subside as the Mosaic absorbs the sustenance in the lotion.

The Mosaic can feed from protein in my blood, but its cells have to shift metabolism to do so, creating waste materials that stimulate my nerves, alerting me to the change in the tattoos' dietary preferences. The nutrients in the ointment will keep the Mosaic satiated for a few days, less if they have to expend energy to keep me warm or provide extra light.

That's the way the Mosaic was engineered, to be as much a part of me as I'm willing to let it. If I decided to fast, voluntarily or otherwise ("otherwise" being the more common circumstance in my lifestyle), the countless cells of the Mosaic would just keep feeding, mindlessly stealing from my blood as my body starved. When I die, the tattoos will live on, consuming leftover nutrients in the blood and carrying on in post-mortem activity along with my hair and fingernails. If the tiny microprocessor in my skull remains intact, the networked cells of the tattoos will continue to run preset programs of light and color; I may look more alive when I'm dead than I do now.

Half a billion kilometers from the sun, *Whimsy* slows, nearing her destination. We have been traveling for months from the Belt to get here, the edge of human civilization, beyond which only the Seekers have gone and none can follow.

First, centuries ago, there was a simple probe. Then came the first tentative explorers, followed years later by the Seekers in their colony ships; it was they who began the first permanent construction. Now there is a city, a glittering ten-kilometer long cylinder lit from within by a manmade sun, built and maintained by the robots and computers so painstakingly assembled and programmed by those early pioneers, and populated by fifty thousand simple peasants who left a motherworld that had grown too crowded for its own children.

The city is called Gap, named not for itself, but for its view; but a few thousand kilometers distant are a pair of two-hundred-kilometer-wide spheres of rock, each orbiting the other at a distance of only a few kilometers. The two asteroids are both named Hektor; early astronomers thought the two bodies to be one, and named it accordingly. To stand on one and gaze up at the expanse of the other hanging a few thousand meters above is to feel, for a moment, true animal fear, bereft of any human intellect.

I smile at a sudden thought, and I feel my cheeks flush as the Mosaic reacts to the endorphin release and puts on a random show of color. It would have been wiser to build the colony farther from the asteroid, where the tidal forces from the two great masses would not push and pull the structure, requiring constant repairs and stationkeeping burns from the colony's thrusters. But had that been done, the view would not be nearly so good; the awe and wonder of the famous Hektor Gap would be lost. Pure function is vital to sustain life, but pure form is vital too, to sustain the soul, even if it means building one's home next to a pair of floating, spinning mountains.

Perhaps, though, I'm just making excuses for my own existence.

One hundred kilometers out, *Whimsy* comes to a stop relative to the colony station. The ship is too big to dock, and I know well the kind of damage *Whimsy*'s drive plume could do to the colony's exposed docking areas or the free-floating workshacks that cluster about the main cylinder like bees about a hive. All thirty of us clamber into *Whimsy*'s skiff along with our drones and props for the trip to the colony.

On the way in, we pass a few unmanned cargo barges. Gap doesn't get many visitors due to its isolation. It's almost self-sufficient; the automated facilities the Seekers left behind on their outward journey continue to work flawlessly, recycling water and air using the abundant power from the huge fusion plant tethered to one end of the colony cylinder.

Even so, life for these folk is hard and dangerous, all the more so for the fact that many of them were born on Earth and are unused to the rigors of outsystem life. Waste is a high crime; every drop of water, every breath of air is precious. In the hard vacuum of space, even small mistakes or accidents can be fatal. Punishments are necessarily harsh; there are no extra resources to waste on prisons, and the registered Arbiters from Earth come only twice a year, hardly enough to hear and judge all the cases that crop up. All the outer colonies are like this, as cold and unrelenting as the void that surrounds them.

After docking, we see no one until we reach the reception area, a low-ceilinged hall at the edge of the colony cylinder. Beyond is the colony proper, the broad, curving interior surface of the hollow cylinder festooned with buildings and parks, with the blindingly bright fusion-powered sun-line running straight down the middle of the vast open space.

We can hear them before we see them. As always, the children are at the front. I smile to my companions, and as one, we activate our costumes. The drones go before us, setting the atmosphere, each tiny, flitting robot emitting steam, smoke, or holograms to darken the room, light our way, emphasize our arrival; Skindancers have come to visit Gap.

Olin, the first to enter, has chosen to be Fire today. His Mosaic displays images of flickering flame, his eyeprinting paints twin orbs of lightning in his sockets, and his morphwear flutters and whips about while cycling through patterns of red, orange and yellow. A drone hovers just behind him, hidden in the cloud of holographic smoke it projects, in which Olin is wreathed; for the rapt colonists, it is as if a being of living flame has drifted into their midst. Olin is young; he can be forgiven for choosing an easy costume.

The others have chosen their own costumes for our entrance. Each one is greeted with cheers, laughter, clapping, perhaps the most such activity this colony has seen in months. Some of my companions embody concepts, like Nature or Eros, while others have chosen to imitate more tangible subjects, like butterflies or clouds.

Verena has created something hauntingly lifelike; clever real-time programming of her Mosaic makes her almost invisible from the waist down, but from the waist up, she is a sleek dolphin, her morph-wear emulating the shape and projecting the texture while her drone projects shimmering holographic water around her to mask any imperfections in the illusion. For a few moments, the ocean of Earth is alive in the hall, and silence falls as an extinct creature floats through imaginary waters. In this instant, there are no outside concerns, no strain from the harsh life outside these walls; there is only Verena, and the colonists will remember her for a long time.

I am last, as befits the leader of the troupe. I have chosen Void today, in remembrance of the last time I was here in Gap. Void appears simple, but belies the artistry required. A set of cameras on the drones nearby is radio-linked to a computer on my back, which is in turn linked to the microprocessor in my skull. The computer uses the camera images to calculate light angles and intensity, allowing the Mosaic on my body to appear transparent in one instant, and opaque the

next. The program responds to my thoughts and gestures, correcting itself and changing configuration according to my whims.

Verena's costume does something similar, but I need no holographic water to disguise errors, for there are none; I am nothing more than a flickering, folding, twisting sheet of starlit blackness, with no human shape at all.

The wonder is evident on their faces, mirrored in their eyes. I know what they see; my eyes were once as theirs are. To them, we are barely human. How can we be? We are drifting visions of elements and anima, each with a thousand faces and then none at all. They know on an intellectual level that it's all illusion, but the costumes and performances strike a deeper resonance than high intellect. Just as no amount of rational thought can mask the awe evoked by Hektor's mighty breach, so does our artifice draw out the deepest emotion despite all the efforts of the mind.

We stay for a week, performing dances, plays, histories, and erotica for the colonists. We perform in the weightlessness of the colony's axis, in the windswept gardens, and in a vertiginous amphitheatre suspended between Hektor's twin orbs.

There is other business, too. We each find a few colonists to visit alone, supposedly by lottery. Their names, however, are all in files the Arbiters have sent us; whenever the Arbiters visit a colony, they make note of certain individuals who bear observation or questioning.

It is a talent of Skindancers that we compliment, comfort, listen, or provide each one what they most need in order to lower their guard and let us in. They tell us things they are too frightened or guilty to tell an Arbiter; things one whispers only to the wind, or to stone, or a pet. The data all comes together, and we learn of the colony's gossip, conflicts, and crimes. We see all the tiny cracks that might shatter this fragile society, and we make note of them. When next an Arbiter from Earth visits Gap, she will, with seemingly supernatural accuracy, know whom to question, whom to arrest, and whom to execute, and thus the colony will survive.

In the early days, when Gap was but an unformed dream and the first waves of explorers and builders streamed forth from Earth to conquer the solar system, humans tried for a time to change themselves to fit their new environment. Polarizing contact lenses protected their eyes, and skintight membranes kept them warm, shed light, and changed color to reflect medical and physiological conditions. They wore clothes of memory metal, phase-shifting polymers, genetically-modified plant musculature, and other materials never spun on a loom; in an instant, their sleepwear or day uniforms could become vacuum-tight or hard as steel or padded for impact, so that one would always be wearing the correct clothes for any eventuality.

When they fought amongst themselves, as humans always do, they used color- and light-generating membranes to make themselves invisible to their enemies, and killed each other using remote-controlled drones that floated on puffs of air.

With each generation, born and raised in the vault of space, the changes grew more advanced, less removable. Eventually, some simply had their armor grafted to their bodies, permanent protection against the nothingness of space. Such tools kept them alive, and by stages less human.

Those folk are gone now. They could not go home, for in the end, home was as alien to them as they had become to the rest of humanity. Outward they looked, and outward they went, passing beyond the bounds of the solar system on hyperluminal wings, ever searching, ever finding, still human in their eternal urge to be seekers. They leave markers for us to follow, messages to inspire us, and half-built colonies for us to use when, someday, we step on the paths of their wingbeats to claim a place among the stars.

They have been gone for a century, and still we are not ready to follow, still we fumble and trip as we slowly, painfully build a human society out where humans never evolved. That we Skindancers, mere imitators, are necessary to keep the frontier colonies from self-destructing is the most damning testimony of all. We are not ready. Some say that humanity moved too far, too fast, but when have we done anything but?

It has been twenty years since I left Gap, city of my birth. The navigation error that brought my shuttle too close to a workshack was my fault, but it was also an accident of youthful rashness. The law of the colony was absolute; execution would consume the least resources, would be the most immediate resolution, and hardly noticed next to the lives already lost to my clumsiness.

Perhaps there is a God. The Skindancers visited, led by Verena's mother. They offered to take me, to bring me into exile and save the colony the cost of a noose. There are times, in the years after, I have wondered if perhaps I chose the harder path.

I have returned, but one has recognized me, not under the Mosaic the Skindancers meticulously injected beneath my skin to make me one of the troupe. My name is gone from the records, and there is no grave marker for me, only for those I killed. Gap is not my home, and making this visit has only confirmed what I have feared for twenty years.

I have seen Earth, Venus, Mars, and the vast, glittering chain of colonies between, but I cannot stay in those places; even if the Skindancers allowed their initiates to retire, there is no room in the inner colonies for immigrants. We are welcome to visit and entertain, and even more welcome to leave.

Only the Arbiters know of the service we provide, and their thanks is sparing.

I am a Skindancer, one of the few who preserve humanity's frontier, a society that doesn't even know it needs help. I have no home. I cannot follow the Seekers, for I am too human, but I cannot return to my birthplace, for I am not human enough. It is my fate, and it may, I think, be the fate of humanity – locked forever between staying and leaving, lacking the ability or instinct to do either. When *Whimsy* is under full burn and Gap is lost amid the stars, I am still crying. I huddle alone in the ship's habitat ring, sobbing like a child where no one can see. There are security cameras, of course, but they can only see the Mosaic and the laughter painted atop my tears. It's how I will always be seen, always remembered.

Long after I am dead, the tattoos will live on, and I will forever be smiling on the outside.

## THE DECEPTION

Chat Clussman

United States

Sitting in the darkness of the cavernous room, David wore serenity on his face like a mask. Anybody who looked closely would see his slightly furrowed brow, his clenched jaw, the look of concentration that came from pretending to be relaxed. The glow of the computer screen didn't help matters any. It cast just enough off-colored light to make him look slightly sick.

He was securely tucked away into his secret shelter. During the Troubles and the Consolidation that took place in the early 21<sup>st</sup> century, bomb shelters came back into style in a big way. For those who could afford them anyway. The really smart people, whether they could afford them or not, built their own in secret, so when trouble came to their neighborhood their neighbors wouldn't know and wouldn't come looking for safety. Supplies only lasted so long.

David was one of the smart ones. He had read all the requisite architecture and physics books and had started with a basic set of plans downloaded off the net. He bought a sound hammer and every day, after he got home from the office, he would go down to his basement and spend hours disintegrating dirt and rock with the ultra sonic waves it generated.

His shelter had taken him two years to build. He could have done it in a much shorter span of time, but he allowed himself a few eccentricities that had added to both the cost and the time it took him to build the facility. A set of stairs, six-feet wide and hidden behind a trapdoor and under a rug, led down twenty feet under his basement and towards his backyard. The stairs led to a steel door that opened onto a raised platform in the main chamber of the shelter, which was in fact a large pyramid, carved into the earth. A smaller set of stairs led down from the platform to the main floor, which was 40' square. While that room and the smaller square rooms that led off from it were designed to function as a traditional bomb shelter, he had taken great pains to make it into a beautiful dwelling, believing that beauty was necessary for a home.

A micro-nuclear reactor supplied power to the pyramid, which was completely off the grid. It supplied his computer and communications equipment with all the juice they needed. And they needed a lot. Since completing the shelter he had been down in it almost every single night, working with a single-minded determination. Hoping he wouldn't get caught. Fearing for himself and his wife, Samantha, if he did.

He was in fact working on the same thing he worked on at his day job: the Prometheus project. But when he was in the pyramid the problems he was tackling were decidedly different. By day he was the lead engineer on the most advanced research project ever undertaken. By night he was the lead subversive coordinating an effort to steal that project. Sam was second-in-command at the night job and would ultimately face the same penalty if they ever got caught. There were actually quite a lot of people working with them to steal the Prometheus. Almost all of them were either working on the project or family members of someone working on the project. The only exceptions were the four members of State Security that had signed on. They were the most critical members of the team, the ones who made sure nobody else knew about the deception they were perpetrating. It was to one of those people that he was now communicating with, via a quantum-encrypted messaging system.

He hoped that John's computer equipment was hidden away half as well as his own. With the level of security clearance that John had and having access to the kinds of equipment that he had access to, David supposed it was, but that didn't stop him from worrying.

"How goes the progress on the Casimir engine for the Prometheus?" John messaged him.

"Good. We worked out a new formula that's boosted the power output by another 17%. If we can keep making progress at this pace we'll hit our target output in a little under three months," David typed back. "\*nod\*" was the emoted message that scrolled onto David's computer screen. A minute passed and nothing more appeared.

David typed, "Is anybody suspicious yet?"

Another minute passed before the reply came, "No. Everybody still thinks the project is at least a year from completion. Nobody is even watching closely yet."

After another two minutes without a message, David decided the conversation had ended. He was never quite sure since John never actually gave any indication when things were done. Messages just stopped coming. He continued working on his computer for another hour anyway. It gave John plenty of time to come back and talk to him if he needed to and it gave him time to go over the day's research again.

Around midnight he climbed the stairs to the second floor of his house where the master bedroom was. Samantha was already asleep in bed. He gave her a kiss on her forehead, undressed and climbed under the covers. He was looking at her face, smiling slightly, as he drifted off to sleep.

"Gabriel, what just happened?" David yelled. He had been in his office when he heard the explosion. He ran out to the main floor of the hangar in time to see Gabriel lean his head out of the entry hatch of the Prometheus. Gabriel was smiling so broadly his smile was actually gleaming more than his bald head.

"We overloaded the main circuit," he yelled back as nonchalantly as possible. David felt himself swoon for a moment. Had they really figured out how to generate enough power from the collapsing plates of the Casimir engine? He rushed over to the ship, trying not to run, and climbed the ladder to join Gabriel. As they walked to the engine room Gabriel eagerly recounted the last few minutes, waving his arm frantically to show the burn marks on the sleeve of his shirt when he got to the explosion. Despite the loud noise and the dramatic telling, David had the vague impression from the tiny marks on Gabriel's shirtsleeve that the explosion hadn't been quite as dramatic as it was being made out to be, but he kept that thought to himself.

It turned out the damage was really minor. They spent the next two hours replacing the circuit, making sure the new one could handle the extra output the engine had generated. For safety reasons everybody was evacuated from the hangar so the engine could be started up by remote from the control room. Two dozen scientists and engineers alternated between watching the display screens and looking through the reinforced glass window at the ship itself. David had the honor of pushing the start button; red like it always is in the movies. Hardly a breath was taken as the fate of mankind was forever altered.

The ship silently rose three feet into the air.

"David, don't forget your toothbrush and comb," Samantha called to him from the walk-in closet. He would forget his arm if it wasn't attached (and if Samantha wasn't there to remind him). He grabbed his toothbrush and comb and packed them with everything else. He couldn't think straight. They were supposed to have everything already packed weeks before the ship was ready.

"I think I've got everything Sam," David told her as she came out of the closet with an armload of his clothes. He packed them without saying a word but he did laugh a bit when he saw Samantha grinning.

Once they were packed they loaded everything into the truck and programmed in the destination. The truck would take Samantha and their things to a predetermined rendezvous where everybody's belongings would be loaded into a series of large crates that could then be brought into the hangar

under the guise of equipment. Samantha, like a lot of people's family members, also had to be brought into the hangar in equipment crates since they could hardly walk into a top-secret military installation. After seeing her off, David got into their car and directed it to take him to work. Once he got to the hangar he was sure they would be caught. It was painfully obvious that scientists do not make the best actors. Everybody was nervous, moving stiffly and jerking their whole bodies around every time anybody made the slightest noise. David quickly took a head count, forty-three conspirators, eleven non-conspirators. As the project manager he had declared today an optional work day to "give each person a chance to celebrate the team's achievement in his or her own way." Unfortunately eleven people had decided to celebrate by coming in to work. There was nothing to be done about it now though and as long as not too many more showed up, it would be a manageable

situation. David had messaged John the night before. He had had to wait two hours for the reply, which read simply "Will be there at 0900."

He would have soldiers to keep the non-conspirators in line. David paced his office while he waited for them to arrive. At exactly 9 AM four men walked quietly into the hangar. They were wearing reflective body armor that almost made them disappear when they stood still. Invisible except for the rifles they each carried. They walked to the center of the hangar and formed a circle facing outward. They didn't say a word. David noticed the silence in the hangar before he noticed them, and rushed out to meet them. He knew the show was to intimidate the non-conspirators but he could tell that there were a lot more than eleven people visibly afraid. He had never met John before and had no idea which one of the four was him, so he just walked up to the one that was facing his office, a Hispanic looking fellow, and put out his hand. The man smiled as he shook David's hand and

introduced himself as Miguel. Then he added, "It's nice to finally meet you face-to-face David." He chuckled at the confused look on David's face. "John's a name I use to disguise myself. Secrecy is hard-wired into my brain," he said by way of explanation.

Then without warning he turned towards where the most people had gathered and barked "everybody against the wall!"

The three men with him raised their weapons and broad targeting beams bathed whole groups of people in red light as Miguel waved his rifle to indicate the wall he was referring to. David felt a pang of guilt as a woman he had known for six years started crying. She wasn't a conspirator and had no idea what was going on. She knew that David was involved though and she cast a hurtful glance at him.

Before everybody had been herded to the wall one of the hangar bay doors slowly opened and a large truck drove through, it's computer guiding it to a stopping point directly below the Prometheus' cargo bay. As David started calling out individual people and directing them towards the ship, Miguel dispatched two of the soldiers to oversee the rest of the trucks that were driving into the hangar.

When all of the conspirators were standing beneath the ship, David and Miguel turned their attention to the remaining people still standing against the wall; six men and five women. Nervous but with the curiosity born of all scientists you could sense their eagerness to find out what was going on.

"We're opting out," David told them. "We are taking the fruits of our labor and we are going to find a new place to start over. A new world. We have all the supplies we will need. Those of you who wish to join us are welcome. You'll have to leave everything behind; family, friends, belongings. Those of you who wish to stay, can. You will be locked inside one of the cargo trucks until someone finds you, which should be about five minutes after we leave."



The incredulous looks he saw staring back at him made him think that maybe scientists weren't such bad actors after all. At least not when they're trying to fool other scientists. These people really had no idea of what had been going on right under their noses all these months and now, despite the fact that in the background behind David they could see the cargo bay unloading one truck after another, they still didn't believe what was happening.

One of the men asked hesitantly, "Will we be harmed if we stay?"

"No. Nobody will be harmed."

A woman asked "what provisions will be made for me if I decide to go?"

"We have some extra supplies and clothing. You'll be treated like everybody else on the ship.

Living arrangements will be communal out of necessity."

More questions followed until about five minutes had passed. That's when Miguel tapped David on the arm. Time was short. "You'll have to make a decision now," he told them.

After another two minutes of debate, only two of the eleven decided to go. Both of them were women in their mid-thirties with no children and no immediate family. The other nine project members were loaded into one of the cargo trucks as they had been told they would be.

David was last in line to board the ship and he paused to look at the ship before climbing the ladder to the hatch. Even in the dim light of the hangar the smooth metal always seemed to be gleaming.

Though the shape of it didn't have to be sleek, it was. He thought maybe that was to appease the politicians who assumed it had to be that way. One thing you couldn't tell by looking at it without a frame of reference was that it was enormous. Fifteen hundred feet long, four hundred feet wide, and one hundred and fifty feet tall it had three hundred separate crew accommodations and was designed more like a city than a ship. It was the most beautiful thing he had ever seen and he felt undeniably pride that he had helped build it.

He boarded the ship and closed the hatch. He made his way to the bridge and gave the order to leave Earth. Minutes later he stood beside his wife and watched in awe as they flew past Mars on their way out of the solar system.

## SEEING STARS

Nicole Silvester

Canada

"We are all in the gutter, but some of us are looking at the stars." Oscar Wilde said that. Problem is, these days none of us can see the stars.

I was lying on the roof of my apartment building, stretched flat on my back, staring at the sky. Actually, I was staring at the inside of a pair of VR glasses that simulated the night sky in AD 1207. It wasn't a perfect simulation, since there was no horizon line, but VR glasses aren't good at that sort of thing anyway. I'd written the program myself, but I had no way of knowing whether I'd got the quality of the blackness right, or the twinkle of the stars. The holeroom version was better, but with the glasses I could lie on the roof and not have to simulate the being-outdoors-at-night part of things. Add in earbits playing wind-in-the-trees and insect chirps and it was almost real. But almost real still isn't *really* real.

These days light pollution's so bad at night it makes a blanket of cityglow you can hardly see the moon through, let alone the stars. After the big scare in the mid-twentyfirst cee, we pretty much cleaned up the toxins and other crap we'd been leaving all over the planet, but we can't be expected to live without our nightlights, can we?

Most of the planet's one big city, these days, and despite the clean-up, a city's still all gutter. Rich folks take their yearly trips to see the few bits of remaining wilderness, while most people make do with VR. I'm not talking the plug-yourself-into-a-computer virtual reality that was so popular in twentieth cee science fiction (though there's rumours that the military has that). No, the VR we've got is done with full-spectrum holograms and subtle manipulation of enclosed environments.

So there I lay, trying to pretend I was the only person for miles in the middle of a city of billions, when my s.o. poked me in the ribs with the toe of his shiny new Doc Marten. I popped out the left earbit.

"I brought you some food, Chris," he said and sat down cross-legged next to me.

I sat up, dug out the other earpiece and tipped the glasses up onto the top of my head. The smell of Shanghai noodles filled my nose as Cullen waved a dish under my face.

"I'd starve without you," I said, and leaned over to kiss his cheek, leaving a smear of green lipstick. He wiped his cheek with the back of one hand, knowing the colour was there without my having to say. The boy knows me better than anyone; probably better than I know myself, as the old cliché goes. Without him I probably *would* starve.

"Any reason you've been spending every evening up here with stars in your eyes?" He traced the yellow lines in the red-yellow-and-green tartan pattern on his Docs.

"You could come out here and join me anytime," I said. "There's another pair of glasses you could use."

"I've seen your StarGaze program hundreds of times, Cybergirl. I'd rather look at you." Now he did look up at me, peering coyly around his long black bangs. His eyes are a lovely grey-green that had intrigued me from the day we'd met. I still don't know why he put up with my moody, scrawny, red-haired, pre-occupied self. He was a babe and I was a cybergeek.

"I'm just trying to make it better. It's missing something," I said, pulling the glasses off my head and frowning at them. "Except I don't know what. It's not like I can compare it to the real thing." Cullen pulled a pair of chopsticks out of his pocket, stuck them in the noodles and pushed the dish into my hands. "Eat," he said, so I did. The noodles were delicious. Much to the dismay of Cullen's Scottish-Canadian parents, he's a whiz at cooking Asian cuisine. My stomach growled loudly, as if I wasn't shoving food in fast enough, and Cullen grinned.

"Saw a thing on the vid about the old shuttle program," he said, reaching over to tuck a wild piece of hair out of my face.

"Mm?" I said, around a mouthful of spicy noodles.

"Govt's resurrecting it. Real quick, too. Some politician got the idea it'd raise people's spirits to have actual human beings up there again, instead of just probes and sputniks and such."

"Sputniks," I said. "You're so twentieth cee."

"That's what they said. All-out nostalgia."

"What they really need to do is get the artists up there."

Cullen tipped his head and blinked his ridiculous long-lashed eyes at me. It makes him look a right airhead, but it means he's thinking.

"Get artists up in space," I went on, "to translate what's up there for the rest of us louts here under the blanket. Give us something to dream about again."

I was beginning to get into a good rant when Cullen said, "Then do it."

My turn to blink vacantly.

"Write up a proposal. A plea. An eloquent treatise on why it is vital to the imaginative well-being of the people of earth that artists be sent into space." He paused for breath and grinned. Boy o' mine gets into the big words when he starts in on convincing. "I mean, why'd they start the space program in the first place?" he said.

"To see space up close?"

"Exactly. They had imagination, those twentieth cee scientists. Like those old pulps you're always digging out of the thrift shop bins.

"You're the one with the pretty words," I said. "You should write to them." I thought for a moment.

"Who'd I write to, even?"

Cullen shifted to pull something out of his back pocket and handed it to me. I put down the noodle bowl and accepted my e-remote. There was a bright purple sticky on it with an e-addy written in Cullen's precise hand.

"They put that on the vid, for people to ask questions. Might be a place to start."

I flipped open the remote and woke up the screen. "Probably twelve million people will be writing in with really dumb questions," I said as I poked a button with the stylus to open a blank doc.

"So make your letter less dumb," Cullen said. He ducked as I swatted at him.

"Get off my roof," I said. "I need to think."

"Yes, oh peerless among women." He grabbed the noodle bowl and scurried away in case I found something to throw after him. When he reached the door, he called back, "Make it as honest as when you started to rant just now."

"Bring more noodles!" I yelled to his back. And he did.

I always used to wonder if the Govt even checked their e, but apparently whoever I'd written to did, because I got a reply the next day.

*An interesting proposal, it said, that we would like to put to the public for an opinion.*

"They wanna put me on vid," I told Cullen. "On the news. To explain my idea and all."

"That's positive. And fast." He cocked his head. "I always thought the Govt took eons to do anything."

"They want me on vid *tomorrow*." I got panicky.

"You look gorgeous."

"Only to you."

"Always."

"What's public op like on the arts these days?" I asked suddenly.

“What’s it ever like?”

“You’re the one always staring at the news. Do you think people would support artists in space?”

He pursed his lips as he thought. I wanted to kiss him. He bit his lip. “There hasn’t been much on about art lately.” Then I did kiss him and forgot all about being on vid.

Apparently lots of folk watched my spot on the news. People even pointed at me walking down the street after. “The artists in space chick,” they said. So lots of people watched and lots of them even seemed to like the idea. Or at least they found it new. Novel, Cullen would say.

The Govt space guyed I’d e’ed back when Cullen gave me the addy decided to have a contest, a Govt program to send three artists up with the first flight of the new Shuttle Program. Cullen made me enter, of course. I sent in the latest version of StarGaze – the VR glasses version – along with an essay on: How could I even know if stars really looked like that when all I’d ever seen was red cityglow in the night sky? I thought it was pretty good.

“The flight’s on your birthday, you know,” I told Cullen. I always tried to do something special for his birthday, and this year he was turning thirty. And maybe I wouldn’t even be here for it.

“Mm,” was his answer. “Watch vid.”

“You sound like a caveman. I should record you for the ancient past sequence of StarGaze.”

“You ever hear a caveman?”

The news interrupted my undoubtedly witty reply. They were showing the results of the contest. The first winner had done a painting of the moon that looked like it was viewed through a thin sheen of water, only not. Cullen’s the wordy one; I can’t describe it. The title was, “If All the Earthlight Washed Away.”

“Cool,” said Cullen.

“Maybe they’ll make repros of it,” I said, thinking it’d look nice on the wall above our bed.

The announcer stopped talking and the vidscreen faded to a not-very-good nightsky sim, while a musical score slowly swelled. “Image not part of entry,” appeared in tiny white letters at the bottom of the screen. I snorted and Cullen *shushed* me. The music was heart-thumping.

When it finished I opened my mouth to speak, but Cullen got there first. “I’m sure they’ll disc the music. You can play it while you dabble in the tub.”

I stuck my tongue out at him. “I was thinking it would go nice with StarGaze,” I said.

“What about my cave man?” he said, and it was my turn to *shush* him.

The nightsky had faded from the screen. “Here’s yours,” Cullen said. But someone started reading a poem in a soft, haunting voice. I didn’t even hear the words.

“That’s not StarGaze,” I said stiffly and went and shut myself in the bathroom.

I didn’t cry. I mean, I hadn’t known for sure I would be chosen, even if it was my idea. I just thought maybe . . . I guess they didn’t like my VR so much.

There was a soft tap at the door.

“I’m fine,” I said.

“You should hear this, Chris,” Cullen said, his voice gentle.

“I’m sure it’s a fabulous poem.”

“This is something else.” He sounded serious, but like he was holding something back, so I emerged from the room. He took my hand and grinned. His grey eyes were dancing.

“Hurry,” he said and pulled me back to the vid. On screen was the announcer who’d interviewed me.

“That will be the four-person crew for the mission,” the announcer was saying. “And, as just announced, they will be accompanied by Arabeka Ashman, painter; Jason Greeva, composer; and Jandy Stermt, poet. The eighth and final participant in this historic journey will be the very person

who suggested the program in the first place, Christina Sanderson, or whomever she choose to send in her place.”

I don’t know how long I stood staring at the screen with my mouth hanging open, but eventually Cullen pushed me at a chair. I slouched into it.

“I’m really going?”

“You are. On an historic journey, no less.”

“I’m going!” I leapt up again and began to dance. Cullen had taught me to Highland dance when we first met. It seemed appropriate. Then I stopped. “Or I could send somebody else,” I said, an idea occurring to me.

“Who could you send?”

“Happy birthday, Cullen,” I said and hugged him. “You’re going to space.”

“And how am I going to bring the experience back to the world?” he asked. “Invent a recipe called Noodles in Space? Moon Fried Rice?”

“You could write something,” I protested weakly.

“I cook better than I write,” he said. “Sure, it’ll be my birthday,” he went on, before I could do more than suck in the breath for a reasoned argument. “And for my birthday I want to eat chocolate cake and watch the shuttle launch, carrying the love of my life into space.”

When I could finally use my held breath for speech, what came out was, “Love of your life?”

Cullen smiled his half-cocked grin at me. “Go into space, my sexy red-haired cyberwoman, and bring us back something to dream about.”

And so I did. I went into space. And maybe all of us are still in the gutter, but at least now some of us really *are* seeing stars.

## ORIGAMI

**Jose Flores**

Mexico

Personal diary entry 01. October 10th 2042.

My name is Yuuki Motoyama and I am the Medical officer and surgeon aboard the Arrow 2 space explorer. We are on our way to Saturn's moon Titan. This is the first entry on my diary. Every crew member keeps a private log, but, since our launch weeks ago I have spent my free time inside the White Room just relaxing.

The White Room is a four meter by four meter area of the Arrow 2 whose walls are pressure sensitive, it works as if it was a big digital canvass. On the walls I draw and graffiti shapes reminiscent of the origami animals I made when I was a child, the pictures are erased automatically every 5 hours. The White Room was not in the original blue prints of the Arrow 2, it was built under a special request from a private investor of the mission. This room makes me feel that I am back at home. Through my years of training I have spend so much time in space waiting for the day that we will finally launch to our mission to Titan, and yet my heart is still bound to Earth.

So far I have been only good as cargo on the ship, the other nine members of the crew are the ones that have been extremely busy at all times checking the data sent by Scout 1, the smaller unmanned version of our ship that is ahead of us by a month, Scout 1's task is to map our route and relay any possible dangers ahead of us.

My real job will start once we successfully land and set camp on the surface of Titan.

The Arrow 2's mission and its crew is to land, monitor and investigate the phenomena that has been detected on the surface of Titan for the past 36 years. After an unusual solar wind activity in 2006 the weather on Earth and the entire Solar System was affected, but particularly it affected Titan. At first the thick layer of smog that cover Titan dissipated in great extent, making the surface almost visible, right after the science community started to pay attention.

After 3 years the scattered cloud system that was typical of Titan increased, scientists and amateur astronomers observed strange patterns on the poles and on some patches on the surface of Titan's massive continent. A multinational consortium send two probes to get more details on Titan.

The probes orbited Titan and one rover was deployed to study the surface. All the results from the data gathered basically came to the same conclusion. Titan's weather was changing rapidly affecting its already complex chemistry. This radical changes, the science community concluded, were making Titan an accelerated environment similar to a young Earth, and under these conditions, Titan must definitely would be able to generate or sustain life eventually.

The conclusions entered a heated debate among scientists and lawmakers around the globe that lasted about 2 years. The observations on Titan continued and the pressure was put into sending a manned space ship to Titan.

It wasn't until it was agreed that the mission would have some sort of commercial purpose that the project leaders had a "green light" for the planning of the Titan mission. Or to put it in the words of one of our corporate investors " ...we also have to test new materials and technologies to produce better tupperware for the folks on Earth.." well, the mission had to take any available penny to get things started.

It took a total of twenty five years to have Arrow 2 built and ready to sail. This is the first space ship that has been built almost entirely of NanobotBlocks. With the exception of the propulsion system the entire spherical hull, and sixty percent of the interior of the ship, have been assembled using the NanobotBlock technology.

This unique construction technique makes the entire ship to be just like a giant jigsaw puzzle. Actually, is more like an object assembled by a child that can be recycled and manipulated. Since we will not have raw materials available in our journey, and bringing spare parts was out of the question, the engineers of the mission created these blocks to assist us in any phase of our journey and exploration of Titan. If necessary we will be able to pull out many parts of the walls, floors and some of the low priority equipment in order to build parts for the ship, create tools, put together some form of primitive vehicles or repair some of the equipment and to generate power. Technically, if we could bring the entire NanobotBlock parts to the surface of Titan, we can build a micro environment where the crew could live on the surface, but colonization is not in the agenda at this time.

I have been studying the NanobotBlock's specifications since the moment that were available to us. I had the sense that this technology will prove to be a key to the success of Titan's exploration. I made my personal goal to master how to use this blocks in case of emergencies.

The NanobotBlocks are made from different compounds and have inherently different functions, therefore we have to be aware of certain rules in order to get the blocks working together properly. Per example, some of these NanobotBlocks function more as an organic material and others might work better as mechanical parts, other blocks' only function is to transmit and retrieve data in an efficient matter. Some blocks are made of compounds engineered specifically to react to temperature and different terrains by changing their molecular structure.

One certain type of block got my attention more than any other. This type can be softened in order to be reshaped and molded at will, even the most capricious shapes can be realized. Then they can be hardened again to create strong structures. I wonder if I can bring a couple of NanoBlocks from the kitchen when we land on Titan, I would build a small sculpture to commemorate our success. At that point I would have become the first Michelangelo on another planet.

But more than art the NanoBlocks are here to help and to protect Arrow 2 and its crew during our trip and when we start exploring Titan. They have already been proven effective.

Take for instance the hull of the ship, it has been assembled to create a kind of self aware nervous system. Every single block is capable of evaluate its own health status, calculate temperature and, in case of damage, replace itself by another block from the second layer below the default hull.

Just now I got a flash back from the early days of the construction of Arrow 2. There were more than 300 potential crew members trained specifically for this mission. The estimated timeline for launch was quite long and the mission control had to have enough explorers to choose from. I started my training when I was just graduated from college. Now I am almost ready to be a grandfather and the wait has been exciting and frightening at the same time.

During this twenty five years there were times where this exploration's goal was put in doubt. There was even questioning of sending humans. Some scientists wanted to send more complex rovers.

However, even the most advanced generation of robots cannot deal with so many variables and, most importantly, the terrains we will explore on Titan where too complex for them to handle.

We all knew from the beginning of the risks of the mission to Titan. As with any mission that uses new technologies and is set to explore the unknown there is always a risk, there is no safe mission.

All the crew knows that there is a possibility that we might not be able to return home. However, we all know that whatever we can accomplish will benefit human kind in due time, therefore, we are here to do our best to complete the task that has been encommended to us.

Why humankind always have the need to explore the unknown?. Why, now, we are in search for life in another planets even when in our own there is no complete peace?. Is just in our nature.

Even now as I marvel at this vehicle there is no doubt in my mind that anything that humankind can dream eventually will come true. But how we use these marvels will dictate our faith as a species.

But I must rest now, I'll leave my next annotation for another day. I find comfort on thinking that this ship will serve us well and that, in case we need her, we can fold it just like a great origami.





## INTO THE DEPTHS OF THE ABYSS

**Shayan Aslam Abdulrehman**

Kenya

The vastness of space lay across me as I peeped through the Perspex window and floated horizontally in the narrow tube corridor. The whole huge black frontier space, the final frontier for mankind to explore lay in front of me. It brought an eerie mysterious sensation as I saw the stars become streaks of light passing the corner of my eye in serenity as my mind sunk into the depths of the abyss.

For a moment I did not hear the swish of the electric doors until a voice behind me broke me from the gripping stance I was in. "Captain we need you in the Hub." "We are approaching Mars and have to prepare for landing." Mission Specialist April was a joy to see. At the age of 35 she was a strong woman whom I could rely on. Tall, slim with straight ebony hair reaching her shoulders. She was an aerospace engineer by profession and had flown with me in the last seven missions. The stress of exploration had caught upon her as it showed below her eyes. I by no means was juvenile and had experienced the most awarding and bizarre missions along my career making me a veteran. However for me this was my last supply mission to Mars as the captain before I called it quits and was indeed a special and cherished occasion which I wanted to enjoy while it lasted.

I long yearned riding my Arabian stallion back on Earth. The joy of galloping across the plains and rivers as the wind stung my cheeks and filled my lungs while I clench the reins in a tight fist was simply exhilarating. It had been eighteen months since I last saw Earth during which I spent my time transporting supplies between Moon and Mars where the IFSE had setup two colonies termed as Inter Galactic Observation Post.

The International Federation of Space Exploration was an independent body founded in 2113 and had its head quarters in Amsterdam and branch offices in most developed countries. It was formed by the amalgamation of major world space bodies consisting of National Aeronautical and Space Administration (NASA), European Space Agency (ESA), Russian Space Agency (RKA), China National Space Administration (CNSA), National Space Development Agency of Japan (NASDA) and other similar space exploration governmental organizations worldwide. In this way each of these individual organizations combined their resources and saved largely on finances and had access to the best skill pool found in the world. Its purpose and aim was to advance space exploration, search for renewable resources and feasible human habitats for the benefit of Mankind. I sighed and scuttled behind her as we brushed against the tube to reach the Hub. The Hub was the main command centre located in the nose of the Dragonfly III the shuttle in which we were and designed by a Brazilian engineer. Man had looked closely to nature to be inspired for future models. Dragonfly was the world first fuel less shuttle having four vertical fins in the mid section in order to trap the high flux of photons from the sun and propel it forward just like the sails used in the galleons between the 15<sup>th</sup> and 17<sup>th</sup> century. The fins were separated by an angle of ninety degrees however when all the fins opened they formed an umbrella touching each other. The fully retractable fins could rotate three sixty degrees and the pilot could position them in such way as to trap the solar light or change the angle of flight if needed. The shuttle also had three fixed triangular wings in the aft section, two of which were horizontal and on each side while the third was vertical and on the top side. These wings were to maintain the balance of the shuttle during flight. In order to take off from Earth the Dragonfly uses the thrust provided by four specially modified solid rocket boosters which are jettisoned using pyrotechnic devices when the shuttle reaches a certain height away from the Earth after which the flight depended on the fins. It did away with the large external tank used in earlier 21<sup>st</sup> century shuttles. The same procedure was used when taking

off from Moon or Mars but required only two rocket boosters since their gravitational force is comparatively weaker than Earth's.

Since it had no engines how would it land? The Dragonfly over comes this problem by using two strong synthetic parachutes in the nose and aft which automatically fire and decelerate the shuttle when approaching for landing. These parachutes can withstand extreme heats faced upon entry. Finally when the shuttle is about to land and at a certain calculated height above the ground it fires a protective padding inflated with special pressure absorbing gases which covers the shuttle forming a capsule. The shuttle then slowly bounces and comes upon a stand still on impact with the ground. After which the padding deflates gradually until it collapses and is cut open by the crew from inside or by the recovery convoy at the landing site. This initiative was a spin off of the airbag landing system originally used in the Mars Pathfinder mission carried out in 1999.

The dragon fly also contained living, eating and sleeping quarters for a crew of four, an observation chamber and a cargo bay for carrying supplies. The thermal control systems maintained the shuttle temperature at a pleasant 25 degrees Celsius. The whole design of the shuttle meant that IFSE could economically produce these shuttles for celestial transportation to the Inter Galactic Observation Posts on Moon and Mars.

Research was going on to use hyper conducting magnetically levitated rail to catapult the shuttle into space which if successful would remove the rocket boosters from the lift off stage. The shuttle would be simply accelerated on a long rail starting at a gradual slope which becomes steeper and finally perpendicular at its end. The rail would run several kilometers and will apply all its impulse to the shuttle and catapult into space. In this way the whole flight becomes fuel less and removes the crew from any dangers of explosion.

It was April who led the way in to the Hub which contained a large central curved window and all flight control panels below it. I took the central seat and harnessed my safety belt which was followed swiftly by the rest of the crew. A warm smile by Flight Controller Jacques was all I needed to know that things were fine and in control. Jacques was a tall strong handsome man with blonde hair and a square chin which I believed would make him a better boxer than an astronaut. He was a mathematical genius and home at with the panels making sense of all the graphs, beeps and sensors. We could see the red planet filling up the whole window and grew larger by the second as we approached for landing.

I instructed April to retract the solar fins as they would disintegrate totally during the high speed entry. The whining of the fins as they gradually retracted and a final locking click was followed by an assurance nod from April. Jacques then contacted the Mars post, "Base station this is Dragonfly three, please respond", and was met from a reply from base station. The conversation continued for few minutes which were a routine sequence when approaching for landing. Jacques was making last minute final checks such as oxygen levels and thermal sensors and after which he exclaimed, "All systems go."

This was the final assurance I needed as I jabbed control stick and angled the shuttle to expose its thermally shielded belly which would absorb most of the heat upon entry. Locking in to the correct angle caused the green indicator adjacent to the stick to brighten confirming the maneuver. I pressed the auto pilot button and sat back in my seat to relax while keeping a watchful eye on all the indicators and screens in case of any warnings that might arise and would have to over ride back to manual flight.

There were 25 Martians stationed permanently at the colony which consisted of Geologists, Physicist, Biologists, Physicians and Engineers of various disciplines. They were best in their fields and chosen after rigorous training back on Earth. Experiments of all sorts were underway some of

which were on plants in special UV radiated green houses, soil structure, gravitational effects, geologic characteristics and climate system.

Unlike the colony on the Moon which had a population of about four hundred and fifty. It acted as a stop over refueling station for transit mission between Mars and Earth and was the transmission relay node between the two planets. The Moon colony boasted having the world's first space hotel called the Lunar Odyssey where the tourists lodged in while construction of the first theme park was ongoing with similar plans for Mars under development.

More than sixty five percent of IFSE's revenue was generated by space tourists alone. Each year six trips were flown to carry the tourists to the Moon with five tourists onboard a longer version of the Dragonfly. IFSE had in total a fleet of eight Dragonfly shuttles two of which were used for transporting tourists. It was IFSE who pioneered and suggested the idea that the land surface on the moon was to be divided in a ratio equivalent of the percentage of the surface area covered by each country on Earth and owned by that country.

Both the Martian and Lunar colony used the most efficient and advance power source ever built, the Saanj generator named after its inventor. Back on Earth they were the main power source generators for the planet which were built by each country and had zero pollution. The Saanj generator was a huge hollow metallic sphere. In the inside a solid metallic ball was spun at high speeds on the centre rim by two long straight conducting cables in tension attached at the top and bottom respectively. The metallic ball cut across the electromagnetic field lines produced by two large magnets on the sphere but not in the path of the solid ball. This action induced a current in the cables which ran through it. For the first time when the generator is operated a battery backup is used to twirl the solid ball giving it momentum and once the current starts getting produced the same electricity is used to continue its motion and the back up disconnected. The generator has a maintenance free life of up to ten years in normal conditions after which both the sphere and the ball have to be replaced.

The nose glowed red as the shuttle entered the Martian stratosphere and formed a heat barrier around the shuttle. Both April and Jacques were gripping their seats as the shuttle faced slight turbulence which would last a while and continue until the parachutes fired. I watched the altimeter drop at a high rate and out of the sudden the parachutes fired and we experienced a reverse jerk. The shuttle started decelerating and as the heat barrier diffused the Martian surface could once again be seen visible from the Hub. The protective padding fired and the hiss of gases as it filled forming the capsule was clearly audible. After a while there was a small thud and a cushion effect. The shuttle rocked a little and came to a stand still and the capsule deflated as the gases exhausted from it.

We had landed safely and Jacques contacted the base station to start the post landing sequence. After which he informed me that there was a dust storm and the recovery convoy would be slightly delayed as it was spring on Mars. We all then changed our suiting to the ones which were more appropriate and necessary for the harsh Martian surface. Mars had no ozone layer and exposed astronauts to the dangers of harmful radiations plus fluctuating temperatures. "I am going out to have a look", I told him and headed for the observation chamber while attaching the oxygen bottle to my suite. Climbing the ladder I opened the overhead hatch, cut the thick deflated padding and poked my head through it. The winds blew and howled as I heard static in my ear phones. Glancing at my wrist watch displayed the wind blowing at 30 knots. The wrist watch was a wearable computer and a marvel of technology. It could display the temperature, pressure, humidity, remaining oxygen level as well as transmit and receive information directly including audio and video wirelessly in ad-hoc mode when in the company of other wrist watches worn by astronauts forming an intelligent network.

The Martian surface had an aura of its own which stood in defiance to men's endeavours on its soils. Its magnificent red soil was due to the oxidation of iron in the soil. Somewhere in the distance the head light beam bounced across the surface as the recovery convoy of the all terrain Mars Surface Cruisers appeared climbing up the dunes headed towards us. These multi purpose six wheeler vehicles were specifically designed for the rugged Martian terrain and doubled as surface explorers in field trips.

I closed the hatch and raced back to the Hub where both April and Jacques were communicating with the convoy. We waited for a few minutes and finally heard the ripping of the padding and the Hub's exit hatch was opened. A bespectacled short man wearing a suite similar to ours boarded. He was a Physician and after making a brief preliminary medical examination gave us the thumbs up to exit.

As we disembarked, the shuttle would be loaded on to a transporter and towed back to the hangar at the base where it would undergo refurbishments. It was April first out of the hatch followed by Jacques into one of the waiting cruiser which would transport us back to the colony. I could barely hear the greetings of the base commander as I climbed onto the vehicle and sunk into my seat. Throwing my head back due to fatigue my mind wandered back to the plains of the Earth as I once again galloped across the plains riding high and proud. At last I was free.

## **NON-EARTH COMPATIBLE LIFEFORM: HANDLE WITH CARE**

**Melissa May-Lee Sia**

United States

Stowed away in the engine deck of the ship, where toxic burnoff accumulated, a girl shivered with fever. She tried to keep her attention off the cramps that twisted through her gut and the chills that washed over her. Instead, she stared at a hex of purple plastic stuck to her shoulder. On it was stamped the image of a Nevan skull.

Elya snickered in spite of herself. The black market dealer had a sense of humor – this little gadget was going to kill everything in her that made her Nevan.

A hard crack shook the hull of the ship. Her knees knocked against the closet door and her back smacked the wall. "Eeeeyah," she gurgled, her voicebox still Nevan. She took a sip of air. It tasted bitter and smelled acrid. Her senses were making the change. She prayed her timing would be just right – too soon and she would still be Nevan, too late and she would be poisoned -- as they neared Earth's oxygen-nitrogen atmosphere.

Tiny pocks rattled the ship. They were entering the Debris Zone, where centuries-old flecks of paint and other detritus from man's early explorations into space threatened ships bound to and from Earth. Soon they would be in low Earth orbit. She held her shoulders tightly and rocked herself in the cold dark. Each movement of the ship sent waves of pain through her body. Elya was beginning to regret leaving Adron-8 for Earth.

Through the aching haze of her mind, she wondered if the transformation was complete cosmetically. Would she be able to pass as human? It would be nice to breathe again. She stared at the skull looking back at her from the top of her shoulder. You just keep doing your job, she thought.

Her bloodstream teemed with modified adenovirus, cutting and pasting her alien DNA into a human configuration. Immunosuppressants kept them alive in her body, but she was racked by opportunistic illness.

The thrusters roared to life. A kick slammed her back in the closet, knocking the wind out of her. Without thinking, she gasped for breath. Fire tore through her lungs – the corrosive air was all she could breathe as a Nevan, but toxic to humans. This was it. Soon she would be fully human. Her vision blurred over in a color she couldn't name. Water poured from her eyes. The skull wavered behind the liquid. Heavy footsteps echoed through the hold. They came closer and she felt fear spike through her body, but it felt cold in the human body, not warm. Strange, she thought. She heard a voice. Human. It said things in a garbled staccato. Not like the gurgling voice of a Nevan. Without thinking, she imitated it but the sounds screeched out. Her throat burned. She felt icy and light at the same time.

The closet door opened in front of her and Elya fell forward into the arms of a human in an ecosuit. "Good God!" He pulled an oxygen mask from behind him and clapped it over her mouth.

"What was she doing down there?" Dr. Corvad watched his screen. The computer superimposed images of D-tags from the database over those from the girl. Sweat beaded on his brow. It was taking a long time, and still no match. He would probably have to run a base-bin.

"Beats me. She couldn't have been down there long. Was still alive." Deggs paced the tile around the girl's bed. For the half hour since Deggs had brought her in, he hadn't left her side. Corvad couldn't blame him. Women – pretty or not – were rare on commuter flights.

"It was a wonder she was alive at all." And that's suspicious, Corvad added to himself.

"Any matches, Doc?" Deggs had a habit of asking questions he knew the answers to when his mind was elsewhere.

"Nope." Corvad breathed the word through his teeth. Deggs walked to the girl. He brushed his fingertips on the sheet. Corvad turned back to the screen, shaking his head. Deggs had his naïve moments.

"Doc?"

"Yes, Deggs?"

"What was that tack in her arm?"

Corvad wondered himself. It was a strange trinket for a body mod. It looked like a hex-shaped tack head but when he removed it, he also pulled out a six-inch length of silver wire. Emblazoned on the head was an image of a Nevan skull. "I dropped it off at the lab when we docked. They should have some results before we depart."

Corvad kept his eyes on the screen but his mind wouldn't stop racing. Human stowaway on an Earth-bound flight, sick with fever and undamaged though exposed to burnoff.

A dialog popped up: "No match found. Initiating base binary search." Corvad sighed. A base-bin would take awhile. And they were rarely successful. He pushed away from the desk and bumped into Deggs. He was too damned invested in the girl.

"If the base-bin fails," Deggs was asking another question he knew the answer to.

"She's unregistered and we deal with her according to protocol." Corvad turned abruptly out of the room.

Got to get it together. Got to act professionally. Corvad rubbed the heels of his hands into the sockets of his eyes. Protocol demanded the termination of unregistered humans. Corvad had never found an unregistered human this old.

It gave substance to the rumors. For years, humans had infected themselves with a virus that changed their biology so that they could escape the stringent government of Earth for the anarchy of Adron-8. Corvad always felt they gave up their humanity in exchange to live like savages.

But it was always assumed that the change was permanent. What if these maverick ex-humans could reverse the process? Return to Earth with the physical semblance of humanity, but none of the ideals?

Corvad walked stiffly down the hall.

Deggs wandered the engine deck just as he had hours earlier. When he found the girl. This time he was tightly packed in his ecosuit – they were in pre-launch and the air would get dangerous soon. The back and forth life of a commuter ship. Deggs was a grunt, he knew as much. It was his job to investigate things, run things, be aware of the ship. Ship's Consciousness.

Why was she down here? The problem of Nevan stowaways had increased recently. Deggs heard their characteristic gurgling, and came down to investigate. Stowaways hardly fared well; upon entering Earth's atmosphere the hold filled with oxygen which was toxic to their systems and if they didn't have an ecosuit, they died. He shuddered. It was never a pretty sight.

He wrinkled his nose at the memory. Air filled with the urine smell of Nevan blood. The disintegrated connective tissue bubbling and oxidizing. An oozing mess he had mopped up more than a few times. Deggs smelled the air – was his memory playing tricks on him? His boots clanged the metal floor. Deggs turned a dial on his chest. More oxygen hissed into his helmet.

He heard a scraping noise against the metal floor. Deggs perked up. He thought he saw a shadow flit past. His eyes followed it to a far corner. He squinted, trying to read into the shadow.

Deggs could feel his pulse beating through his limbs. Sweat beaded on his back. Fear itched across his skin. Then, so slightly that Deggs couldn't be sure he'd seen it, a curve in the shadow started to focus in his vision.

Deggs froze. He took one step forward toward the corner. He held his breath, watching for any sign of movement, any noise. Carefully, he dialed the intake vent open – just enough to let a scent in. He could sniff it out, if it was there. They smelled like raw sewage.

But Deggs saw it before he smelled it. Like an optical illusion, it appeared suddenly. He saw the curve of its back quivering in the faint light. Then he saw how tightly it was curled. Fear. It turned to look up at him with large wide set eyes. A membrane blinked sideways across its eyes. Deggs stumbled back, repulsed by the direct stare.

The thing crouched forward. Half-standing, it gasped and burbled as if trying to find its balance. It turned its head to the left and Deggs followed its gaze. An ecosuit. It wanted to get back to the safety of its suit. Had probably come out of it during pre-launch, then gotten trapped far from it when it heard Deggs coming. Scum tried to hide.

Deggs stepped forward. The thing lunged for the suit. Instinctively Deggs pulled the oxygen mask from behind his suit and sprayed in it the creature's face. It let out a horrific gurgling scream, wet and desperate. Then it exploded all over Deggs and his ecosuit filled with the scent of denatured protein and scalded flesh.

A wave of nausea cramped in his stomach. Deggs held back the heaves and crab-walked across the deck to get away from the toxic remains.

Even under the hot rush of the shower, Deggs' skin goose-pimpled. He had spent an hour cleaning the mess in the engine deck. He scrubbed, enjoying the warm wash of water. He focused on his skin and how nice and clean it felt. Not on what he found in the Nevan's remains. He rinsed the soap off and let the spray hit him in the face one last time before shutting the water off.

Deggs dried off and walked to the mirror. Old-fashioned shave would fix him right up and make him feel a world better. In the reflection, he saw Doc walk in. Deggs ignored him.

"Edwin," Doc never used Deggs' first name.

"Yes?" Deggs tried to act cool and shave at the same time. The tone of Doc's voice told him this could be bad.

Doc held out his hand. A small plastic trinket clattered onto the counter where Deggs' toothbrush lay.

It was the tack they found in the girl's arm.

"I've seen it, Doc," Deggs tried to quash his feelings of curiosity mixed with dread.

Doc tapped his foot. "We know what it is. We know what it does." After today, Deggs wasn't sure he really wanted to know.

"Fine. Why are you telling me all this now?" Deggs nicked himself with the old-style razor.

"Damn." He threw the razor into the sink and, foam still on face, picked the tack up.

"It's a modulated release adenotab. Black market stuff, mostly used for cosmetic purposes. But this one was used to deliver immunosuppressive drugs and human DNA for the purpose of completely reengineering a lifeform."

Deggs waved his hands and handed the tack back to Doc. He picked up the razor. "So?" He scraped the blade across his cheek. Deggs couldn't suppress the feeling of cold dread growing in the pit of his stomach. He looked in the mirror. A trickle of red crawled down his cheek.

"And the girl?" Deggs tried to control his shaking hand as he passed the razor across the bottom of his jaw. "Ow," he felt the sting of a fresh nick.



"We found her tags. They matched the ones of a certain Vinda Bossette." Corvad projected a holo of a healthy, smiling teenage girl. She struck him as familiar. Could have been a sister to the girl in the bed. Deggs realized his jaw had dropped.

"I," Deggs twisted his hands together. "I found a Nevan on the lower deck. I swabbed it up. But I found this," it was a tack like the one found on the girl, but with a human skull imprinted on it. Deggs balanced it carefully between thumb and forefinger.

"Well, Bossette was reported as missing. She had problems in her home life."

Deggs nodded. It was not unusual for young human adolescents to make the change, to get off-planet and seek adventure. But was the other way around possible? Could a Nevan girl become human and return to earth?

"Deggs, you understand, that girl in that bed, the one who looks so human—"

"She's not." Deggs shook his head. "She's Nevan, isn't she, Doc?"

"Genetically, maybe."

"Her I.D.'s Bossette's?"

Doc nodded, then waved his hand. "She's an unregistered human. That is all you need to know."

Deggs gave a curt nod. He towed the excess shaving cream from his face.

Elya sat on the bed with her knees tucked into her chest. Again the ship was docked Earthside. Maybe it was the pace of life on a commuter shuttle, but Deggs and Corvad didn't seem to get along. They were in her room constantly, but managed to ignore both her and each other. Maybe that's how humans treated each another.

Then, for the first time in 36 hours, Elya saw Deggs look at Corvad. A glance passed between them that sent shivers through her skin.

Deggs motioned for Elya to stand. He wrapped his hand around her arm, pinching the skin where his fingers met. Elya studied Deggs' face for clues. He yanked her out the door and down the corridor. She yelped, but he didn't look at her. He glanced at a display panel on his wrist – a watch. Wherever he was taking her, he was on a schedule.

Mercifully, Deggs let go of her arm. He grabbed her face and turned her to look at him. He put a finger across her lips. Keep quiet. Then he spun her around and pressed something hard against her back.

It whirled. She recognized the sound. A pulse pistol charging. Her limbs went ice cold. Her whole body beat in time with her heart. Deggs pushed her forward. In her mind's eye, she imagined her new flesh disintegrating in its blast. They marched down the corridor.

She heard a hiss as the ship lowered its hydraulic exit ramp. A rectangle of blue grew at the end of the corridor. A chance to escape. She dashed ahead, toward the lowering ramp, bracing herself for the searing pain of a plasma pulse. At least it would be quick.

People poured from both sides of the corridor and swept Elya up in a wave of bodies. Her heart skipped a beat – the passengers were disembarking. She waded through the crowd, hoping Deggs wouldn't aim into it. All around flowed a river of humanity. Every shape, every color – each face unique. And she was part of it. Elya didn't notice she wasn't running anymore.

As she stepped off the ramp, a sea breeze brushed her. She inhaled the freshness of the salt air. Ocean crashed against beach and above her, the sun was setting, splashing clouds with pink and orange. A tickle moved through her and she found herself laughing, taking in big lungfuls of air. The world seemed endless and painted in more colors than she knew existed.

Elya turned. Deggs stood, in front of the exiting passengers. He lifted his hand and waved, then disappeared into the crowd.

## AN ENCOUNTER - RETNUOCNE NA

**Christa Ackermann**

Switzerland

Dear Jess

First of all I would like to thank you for your kind hospitality.

I've got some news that may seem shocking to you, but I have found that I must tell you. Actually, it seems I have absolutely no way of getting around it. But since I still have troubles in saying complex things, I will tell you here on this piece of paper.

I really hope, well actually I know, that you won't be shocked too much by this news: I'm an alien. I mean an alien in the sense that I come from a different planet. The planet I come from is very different from the one you're living on. You would say, if you could discover our planet, that it's made out of antimatter. We, on the other hand, would say your planet is made out of antimatter. But that all depends on the point of view. Anyway, I guess you don't know what antimatter is, even though you've been bugging me quite a while with questions about it lately. Antimatter is actually the same thing as matter, except that it goes in the opposite direction of time. That means that while you're getting older every day, I'm getting younger. Or from my point of view, while I'm getting older, you're getting younger since you're made of antimatter while I'm not. I guess you can see that it gives me quite a bit of troubles living on a planet where everything else goes backwards in time. By now I'm sure you're wondering how it happened that I came to live on your planet. So here's my story: on my planet people have been studying matter and antimatter for hundreds of years. Now our years are quite a bit longer than your years, so you can imagine that this has been a very long time. Anyway, one of the main properties of antimatter and matter, the property that when they collide, they evaporate into energy, has been long ago. About a hundred years ago, the first antimatter planet was discovered. Of course, the question whether it was somehow possible to visit these planets, like we had been visiting so many others, came up soon, and scientists from all over the galaxies started searching for a material which would successfully keep matter from antimatter. Without such a material, any spacecraft we sent close to your planet would just dissolve into energy as soon as matter and antimatter meet.

A few years ago, about 500 by your measurements, my planet was at last successful in the search, and quickly a spacecraft was coated in the material which we had named xlynx. After lots of testing and tons of calculations, a xlynx suit was manufactured and I was chosen as a test person to visit your earth. I got to your planet safely and nothing exceptional happened until I opened the space craft. In our calculations we had completely forgotten that your planet may have such a thing as an atmosphere, and as soon as the air streamed in, wham, the space craft was gone. Thank God, my suit was completely particle proof, or I would have met the same fate.

So here I was, on a completely strange antiplanet, with no chances of getting home soon. Surviving wasn't a problem; my suit takes care of all my bodily needs and it has the capability of taking keeping me alive for over two years (~300 of your years). I also could keep up a very limited contact with my people. But their news was not very encouraging since almost all of the xlynx had been used up and it would take at least a year to make enough to cover a space craft inside and out. And that's quite a long time to be living on a strange planet.

At first I amused myself very well. It's amazing to see everything backwards, which is, of course, how it seemed to me. I could spend hours watching plants slowly get smaller and smaller. And I can assure you that there's nothing more entertaining than watching wild animals running in backwards motion, or seeing birds landing the way they should take off. Or imagine a person eating backwards. It looks as if the person would take pieces of food out of his mouth and put them on a

plate. And weirdest of all he ends up with this delicious meal on the table. It looks so strange, I sometimes completely forget myself watching. So please don't take it personally if I stare while you're eating.

But back in the beginning of my stay on your world, I didn't have contact with humans yet. After about 100 years by your standard of watching animals and plants, I got bored. But more still, I grew extremely lonely. Can you imagine living 100 years without any decent communication? I mean, the communication system with my people really left room for improvement. So I left the forest behind, to visit your settlements in the hope of making contact with you humans.

At first I left a huge chaos wherever I went. Since I go the other way in time, the people thought I was walking backwards and my attempts to communicate didn't help much either. In fact, if I would have stayed at a given place much longer than a few minutes, I'm sure I would have been put in jail, which might have given interesting consequences. But I was desperate to communicate, so I learned to blend in. I taught myself to walk backwards faster than I ever would have thought possible, and I learned your language pretty well, too. Of course it is very hard on the brain to talk backwards, especially since if I want to have a conversation, I have to start at the end of the conversation and gradually move to the beginning. Let me tell you, that is extremely difficult. So please excuse me if I have troubles expressing myself. I try my best.

Back to my story: I wandered around your world for many years, learning your ways and customs, never staying close to people for long out of fear what might happen if I made a mistake. As you can guess I was still lonely since I was living all alone most of the time. Until the day I met you. You greeted me right away, most unlike anyone I had ever met before. Of course everyone else thought I was going when I was coming, so I had learned to say “goodbye“ as soon as I met someone new. But you greeted me with a “hello“ and for a moment, you had me thinking you were actually going my way in time. But it soon turned out that I had told you about my situation in your past, my future, and you understood the difficulties I was experiencing. Now I've stayed in your hut for over 30 years. Yes, that means you'll have to put up with me for 30 more years. But don't worry. We had or are going to have fun.

But now it is time for the space craft to pick me up. Tomorrow evening I'm going to say ‘hello“ and all the other appropriate stuff, like you've told me so many times, and I'll leave for the meeting point with my people. By tomorrow morning you'll never have heard anything about me. Except, that for you “tomorrow morning“ and “tomorrow evening“ are already past and you'll live on through the 30 years we spent together. You know, actually I wouldn't mind coming along in your direction of time and living through those years once more. Of course I'm looking forward to going back to my own planet, but sometimes I find myself wondering if I'll ever get used to walking forwards again. In everlasting friendship, Xuy

## **SOUNDING OUT TO ELECTROMAG**

**Eric Eugene Storm**

United States

### **Background**

On September 21, 2102 everyone on earth must have dropped what he or she was holding. On their media devices they saw and heard waves pummeling a distant shore, of a planet, in a star system, not our own, called Alpha Centauri, some 24 trillion miles from our sun. The small imaging lander, Forward, which had been named after the scientist who had envisioned the laser sail from which it was deployed, softly landed on a bluff overlooking some of what had to be the best real-estate in the Orion arm of the galaxy. The Forward had been deployed using a solar sail parachute to slow its momentum until it came within 45 million miles of the small terrestrial planet at which it was targeted. At this point the Forward jettisoned the solar sail, which doubled as an antenna to relay data back to earth. Using powerful anti matter breaking thrusters the Forward slowed down to a proper velocity at which to enter the atmosphere of the target planet. The laser sail craft went on to exit the Alpha Centauri System. The Laser sail was now a solar sail utilizing the intense photon push of its close sling shot around Alpha Centauri. The sail now headed toward the Binary neighbor, Beta Centauri, for a closer fly-by inspection from which it would be jettisoned again toward Proxy Centauri.

While all these star systems were of great scientific interest, none them was of greater scientific importance than Alpha Centauri, whose hospitable G type spectrum lay host to the target planet. The planet, appropriately named Earth Centauri, had been discovered 85 years previously by the Terrestrial Planet Finder. The spectrometers aboard the floating constellation of telescopic mirrors detected traces of life bearing elements and created a world wide frenzy of scientific development in high energy propulsion technology to reach the only discovered bastion of possible life beyond our own.

By the time of the launch of the laser sail probe in 2040 development on a much more ambitious project to carry humans to Earth Centauri was commissioned by the International Space Agency, which was now under the auspices of a very powerful United Nations. This new spacecraft was to be operational by the time the laser sail probe reached the Centauri system. The "Centauri Craft", as it was commonly referred to, was the most massive engineering project in human history in terms of cost and resources. The new craft was to be propelled by the most efficient energy source known in the universe: antimatter and it was well understood that it would require the entire world to pull off such a monumental task.

This new world unity was only strengthened by ever-faster transportation systems on Earth. Scramjets had coined the term, "intercontinental ballistic travel." Communications had leapfrogged into a frightening dimension by standards of a century before. Not only could people communicate over long distances throughout the orbits of the earth and moon, but so too could they completely immerse each other in their separate realities. With the help of innumerable, minute optical and inferred cameras fastened to all manufactured products and complete satellite coverage between the earth and moon one could seemingly float down from the heavens to the exact spot where their friend, or loved one was located. They could share a face to face conversation as well as experience the same view the other person was seeing and even smell the same flowers and touch the same rocks, not to mention of course, hear the same sounds. No one really had any privacy indoors or outdoors in public, but any satellite surveillance was strictly prohibited on private property without permission or reasonable cause. So now one could travel to any public domain on the globe or on the Moon, for that matter and travel in real time for no cost except the monthly service fee unless

entering a public establishment like a museum. Of course free markets had greatly capitalized on this new opportunity, resulting in massive accelerated growth in the economy. Instead of watching your movie at home you could travel with the crowds to the theatre and watch any movie of your choice in extreme virtual reality. Even hiking in remote areas such as the Swiss Alps could be accomplished by amazingly accurate terrain/foilage mapping satellite interferometers, which with the aide of their onboard nano computers, could texture map your view with complete photo realistic, 3D quality down to every pebble and blade of grass. And as great as this new reality was, the super reality was even better. Even if thousands of miles apart, lovers could stroll hand in hand through the most fantastic gardens of Eden the mind could possibly imagine. Instead of typing alone on their keyboards in the chat rooms, little boys and girls were having food fights with their friends and classmates in luxurious five star restaurants and defending earth from alien attackers in antimatter fighter spacecraft.

### **"Sounding Out to Electromag"**

Very bright students are learning-hands-on how to work and explore space from these communication devices, appropriately named Satellite Operated Universal Nano Devices, or SOUND. They allow complete immersion from the comfort of their own classrooms on earth. From the ISA (International Space Agency) base in Moffett Field, California Naos Fujino is wrapping a SOUND instrument around his ear to take his first lesson in electromagnetic antiproton synthesis. He is an exceptionally talented student, plucked from his schoolmates, in preparation for extended journeys in space. Rising up from his body, he looks over to watch himself as he ascends up to the ceiling. Involuntarily covering his face his body effortlessly and quite uneventfully passes through the ceiling of the Moffett Field laboratory and rockets skyward at impossible acceleration and speed. Before he knows it he has breached higher than any 20<sup>th</sup> century jet plane and soon beyond that of low earth orbit. Within seconds of the beginning of his ascension he is suspended in a magnificent and vast expanse of stars. Keeping himself steady is a challenge in such a black void. For a minute he just keeps spinning around and around until he fixates himself on Jupiter, almost directly in the galactic center, just above Scorpius. The moon quickly begins to rise on earth's horizon as he shoots away from the magnificent glowing orb faster and faster. He had SOUND traveled like this many times within close proximity of the earth and moon, but this time no one with a SOUND instrument could see him and he could see no one. What he was about to see was quite real, in fact much more real than the usual SOUND trip such as to the International Lunar Colony at Malapert. He was told the surveillance data at this particular outpost was the most advanced of its kind and designed to be managed completely with SOUND instruments from within the human quarters of the outpost. In his ninth class in deep space robotic engineering and construction management Naos would be studying with individuals twice his age, but the biggest difference between him and them was that they would really be there and he wouldn't. They were the professionals and the teachers giving him a first hand lesson in constructing and maintaining the largest linear accelerator ever and the only accelerator designed for one purpose: to make antimatter, lots of it.

"Awe", Naos mutters. He is amazed to see the most vast constellation of Satellites he has ever witnessed. They seem to form an infinite skeletal column stretching into space as far as the eye can see. Slowing into a close rendezvous with the crew quarters he notices a very long and thin black shape in space. 'This must be one of the solar collectors', he assumes. As he travels over the collector he can begin to appreciate its massive scale in relation to the tiny human figure donned in a space suit, holding his hand above his head in a still and methodical gesture of welcome. The excitement begins to well up inside of him. He realizes the importance of his visit. Obviously the

astronaut had no need, at least in this facility, to be outside of the crew quarters. This station has robots to fix robots to fix robots. Even when a human has to give oversight to a satellite or robot repair they can easily accomplish the task via a repair droid via their SOUND devices. Naos returns the gesture and is complimented with a big thumbs-up. Continuing on passed the astronaut; he again covers his face involuntarily as he passes through the enormous lead shield, which separates the crew station from the sun's radioactive rays. Again he passes through the thick spinning wall of the station and there he is, looking up at all of them from his knees on the floor of the station. They are circled around him, wearing their SOUND instruments. He recognizes all four of them from his extensive study of their profiles. Dr. Shannon Lin's warm smile radiates down on him.

"Welcome to Electro Mag" she says, bending down to pick the prostrate Naos from the white, cushioned floor.

"Wow, its an honor" he exclaims, but to his annoyance she interrupts to continue her introduction of herself and the other scientists, Dr. Robert Silverman, Dr. Adrian Powers and Dr. Ryu Tamaki. He has forgotten the delay time of seven seconds the transmission from earth to the deep space Electromag encounters so that he will have to get used to long delays between his dialog and that of the scientists.

Naos makes his way to the observation deck of the station followed by Dr. Lin. The observation deck rises up from the center of the circular station, but does not rotate with the rest of the station so as to give a stationary view of the cosmos. Un-apprehended by gravity Dr. Lin tucks her arms into her body and spins like a top into the observation deck. She extends her hand to direct his attention to the enormous satellite constellation jutting out into space as far as the eye can see. "Electro Mag consists of 1250 satellites capable of conducting 100 megawatts of electromagnetic energy each. Two hundred kilometers long and capable of producing enough antimatter annually to provide all of earth's energy needs for the next 100 years".

Dr. Lin goes on to cover the basic concepts of servicing the Electro Mag.

"You see here" Dr. Lin points out, as she zooms the observation window screen right onto the 800-meter diameter opening of the Satellite constellation. "Those are the thrusters for the plasma scoop. The Service androids need to change all the platinum circuit boards within the thrusters after every five minutes of operation. The biggest part of my job is keeping those androids ready for the next circuit change". Naos has hundreds of questions building up inside him every minute. It seems he cannot contain himself, so he submissively raises his right hand to his shoulder and asks,

"Please Dr Lin, may I ask a question?"

"Yes, go right ahead." Looking out at the five insignificant electro magnetic producing satellites at the opening of the constellation he says,

"How can such puny satellites produce enough electromagnetic energy to propel such a significant quantity of hydrogen atoms into the plasma scoop and to the antiproton trap so far away?"

"Simple", she replies. "I'll bet you have been studying CERN and other accelerators on earth. Well this one is in space. We have a complete vacuum and are unencumbered by gravity and containment. The challenge is to keep every one of those satellites in perfect working order 100 percent of the time, otherwise, you have one big floating pile of space junk." Dr. Lin smiles and stays quiet, knowing more questions are coming. Suddenly an E5 shuttle comes racing toward them along the backbone of the constellation. Its appears and is gone past them within a tenth of a second.

"Wow", Naos shouts in startled astonishment. Gripping both of Dr. Lin's fore arms, "What was that?"

"That was an E5, as you probably know, ferrying a full trap to the L2 colony for the Mars shuttles."

"I thought the Mars shuttles get all their fuel from the lunar accelerator?"

"Not anymore. Mars's traffic has increased by a factor of seven just in the last three years. The lunar accelerator could barely supply enough antiprotons five years ago."

"But I thought all the antiprotons had to be funneled to the Centauri mission?" blurted Naos before he could hear the end of her sentence.

"Oh Naos, don't worry. We will take you to L2 tomorrow and go over all that info, but in the mean time we need to SOUND out to the Electro Mag Penning trap. But just to let you know a Mars shuttle only needs a few grams of antimatter roundtrip, while the Centauri spacecraft will be consuming thousands of kilograms. We will also take you to the Centauri Trap and spacecraft in just a couple years, but it will be for real. Are you interested?"

"Am I interested!" Naos replied astonished. "Of course I'm interested." "How many kilograms of antimatter has the ISA saved up in the Centauri Trap?"

"Well you better study hard", Dr. Lin's transmission interrupted sternly. "We have pounds Naos and it's not all in one Penning trap. Let's just keep that information between you and me ok?"

At the age of fourteen Naos really couldn't understand what he had been chosen for. Not that he didn't understand his task, but that he didn't realize the significance of it. He had little exposure to history and what little he had was un-inspiring. But what he had embarked on in his two-day SOUND journey had been a baptism into an elite group of human explorers. They kept pace with his studies and gave constant training to his engineering and physics professors, as well as the constant mentoring needed to provide Naos with a contemporary education in the day-to-day processes of android facilitated engineering. Naos didn't have a chance to acquire a general education like most students and he certainly didn't have a chance to enjoy very much exposure to children his age. He just didn't have much time because he would be journeying on the longest voyage in mankind's history and to the farthest destination. All his expertise in engineering had to be complete by his 21<sup>st</sup> year on earth. "But did he really want to go?" That was the question everyone wanted to know. "Did any of them want to go?" Academics rushed into the world media with frantic, ushering recommendations to provide them with greater understanding of their significance to humankind and its history. "What good as a human was he if he didn't even know who and what humans really were?"

**GASTRONOMIC**  
**Jennifer Anne Cutting**  
 Australia

**END OF  
 UNIVERSE**  
 Fruit bat  
 Yo-wheat  
 porridge  
 Ass-teroid  
 Jelly ignite  
 Satellite dish  
 Melts  
 Gobble wobble  
 Magic black  
 pudding  
 Mud cake  
 Moon rock cake  
 Sn-cake  
 Pan snake  
 Cus-stud  
 Thong tongs  
**SIDE OF  
 UNIVERSE**  
 Damper sponge  
 Bun-yip  
 Sun buns  
 Great Australian Bite  
 Baked Ayred socks  
 Barbeque asteroid nuggets  
 Bread loaves of  
 Dividing Range  
 Meaty bites  
**START OF  
 UNIVERSE**  
 Cook roaches  
 Bee-ten  
 Foot in mouth  
 Mosquitoast  
 Kitchen stink  
 Avalanche dip  
 Blue vein  
 sprain cheese  
 Aspara-gas  
 Mega bites  
 Diet kilo-bites  
 Extra-terrestrial  
 chewing gum  
 Com-eats  
 Ayres rock bar  
 Martian bar  
 Puss platter  
 Big bang burger  
 Spaghetified

universe  
 Sun dried  
 tom-atoms  
 Bag worms  
 Stone mine slop  
 Dish water slop  
 Black hole slop  
 Flea pea slop  
 Swamp slop  
 Worm holes  
**LIQUID-ROGEN**  
 Bar-stud  
 Rocket fuel  
 Test tube  
 Flame thrower  
 Sm-egg  
 S-coffee  
 Slug jug  
 Red/white  
 dwarf wine  
 Gargle blaster  
 Croc-tails  
 Flying saucers  
 Sea sculls  
 ET eat tea  
 Milky-way shake  
 Oz-one  
 breathalyser  
 Nutria-genetic tiger  
 Flash flood  
 Horse power-aid  
 Whale nose bottle  
 Blue bottle  
 Budgerie gargle  
**PUB GRUB**  
 Seasonal roast:  
 road kill surprise!  
 Toad caning  
 Toad Kiev  
 Frog sprog  
 Crypto-mice  
 Rabbit-active waste  
 Horse-sausages  
 <horse sauce  
 /mustard>  
 Hot dogs  
 Kangeroast  
 Lizard gizzard  
 Electric croc  
 burgers  
 Mangoanna

Tortoislini  
 Eat carp  
 Salmonella  
 Blue fin chop  
 <dolphin>  
 Penne-guin fin  
 Sea gullible  
 Fish thumbs  
 Queen pawns  
 Red bellied steak  
 <well-done>  
 Baked snake  
 Possum pie  
 Wombattered  
 Flat bat  
 Patty bat  
 Frying bat  
 Wok-a-too  
 Big bang gang  
 Mag-pie  
 Fly pie  
 Mag-eroni  
 Kennel-oni noodles  
 Pluto-doe bird  
 Galahtic  
 Blander gander  
 Rose-fetta bird  
 Grinder glider  
 Emulette  
 Cook-aburra  
 Vel-crow  
 skewered  
 Battered  
 dingo-bats  
 Wing-dings  
 Ferrell cattitule  
 Beer battering  
 Meat sprog off  
 Babe-con  
**HERBIVORE**  
 Gross-eries  
 Saturn burger rings  
 Fast-a-pasta  
 Garlictic  
 Plutonic curry  
 Veggie-bites  
 <vegemite-arians>  
 Won-thongs  
 Tobacteri