

PROLOGUE

He awoke to the sight of a slender young woman kneeling by his right side, peering over him. The first thing he noticed was her fair blue skin, glistening with a light sprinkle of perspiration. She had close cropped brown hair in patchy tufts, somewhat moth eaten in appearance. She wore a dirty off white cotton frock which was crudely woven and gathered in at her waist with a frayed tie-band. On her feet were sandals made of animal skin.

She looked down at him, briefly startled at his revival, then regained her composure and turned her head. “The Stranger awakes!” she declared to companions nearby.

As he began to gather his wits he gradually became aware of his surroundings. It was uncomfortably hot and humid. He lay on his back on a dirt floor in what seemed to be some sort of small cavern, dimly lit by two flickering glass encased oil lamps placed on the ground. Grime and grit peppered the back of his sweat soaked shirt, adding to his discomfort. He also became aware of an intense pain in his left flank which throbbed and ached with a vengeance. A raging thirst pervaded his dry throat. He noticed in the background a soft constant rumbling, a low pitched vibration, only barely perceptible when he strained to listen.

“Welcome to Purgatory,” the blue skinned lass said.

WHAT FOOLS THESE IMMORTALS BE

Year 2028

In the year 2028 the metaphorical fountain of youth was finally discovered. It wasn't a single fountain, mind you, but more like a few different little wellsprings. Sips from each spring could pretty much ensure a healthy life lasting three centuries, probably more - no one really knew. Perhaps even eternal life, barring major trauma.

So what were these little springs? Firstly there was gene therapy to activate the enzyme telomerase to regenerate aging tissue. Secondly there was a combination potion to prevent heart attacks and strokes. Thirdly there was another combination elixir to prevent cancers.

Unfortunately these springs of youth were accessible to only the lucky few who could afford them. Needless to say, the dispensers of eternal life were keen to cash in on their discoveries. After decades of research, they had finally hit pay dirt. The jackpot. And so clients of immortality therapy were exclusively restricted to the very wealthy. Ordinary commonplace millionaires need not apply - only those with profligate, preposterous multi billionaire fortunes were considered. Hence naturally, the first customers for this prospect of life everlasting were the aging chairmen of the transnational corporations who were keen to maintain indefinite control over their business empires, who were keen to continue enjoying the benefits of their obscenely bloated bank balances forever and a day.

There was one unfortunate side effect however. Therapy resulted in global hair loss, *alopecia universalis*. Not just simple cranial baldness but complete depilation of the entire body - no eyebrows, no pubic hair, nothing. Thus, even though follicular auto transplantation could be used to treat baldness afflicting mere mortals, hair transplants were not possible among the spring sippers. They had no body hair anywhere to harvest for auto transplantation. The resultant appearance, following regression of their wrinkles, amounted to a shiny, smooth, textureless skin. One unkind observer, when watching such an individual sun baking and covered in tanning oil, likened his appearance to that of a slimy salamander.

Lack of eyebrows was an off putting feature to many onlookers, so some of the spring sippers took to pencilling in their eyebrows each morning, while others tattooed them in permanently. And of course, the application of tasteful toupees was *de rigueur*.

THERE'S NO FUEL LIKE AN OLD FUEL

Date: January 2030

Location: Headquarters of Energenron Corporation

Kenneth Michael Besler, Chief Executive Officer of Energenron, the largest energy corporation in the world, sat at his desk in his cavernous office.

“So where the hell is New Zealand anyway?” he asked Howard Lickspittle, his trusty henchman.

“It’s an island, or rather a couple of islands, tucked way down at the bottom of the South Pacific Ocean. About the size of Britain. Mostly occupied by sheep,” Lickspittle replied.

“And you say this guy figured things out all by himself in a wooden shack in the middle of nowhere?” Besler inquired further.

“He lives alone in a cottage near a town called Blenheim,” Lickspittle said. “And yes, he did most of his work at home. He worked as a government scientist for thirty years before that.”

“OK, show him in,” Besler instructed.

Lickspittle opened the door and summoned in Nigel Rutherford, a tall skinny fellow in his fifties who towered above Howard. He had thinning ginger blond hair on top and white wisps at the temples. He sported a scraggly gray beard and wire frame spectacles with round lenses, which conferred a learned appearance. He wore an uncoordinated ensemble of cargo pants, a flannel check shirt and a tweed jacket.

“How do you do, Mr Besler. Jolly decent of you to fly me to America and meet with me,” Rutherford said as he shook Besler’s hand. “I was pleasantly surprised to discover that access to you was much easier than I had anticipated. I could not get a foot in the door with the New Zealand energy companies. Kiwis tend to be dismissive of home grown talent. I am forced to seek recognition abroad before I can be accepted at home. It’s called the tall poppy syndrome – a peculiar Antipodean perversion.”

“Not a problem,” Besler said, gesturing for him to have a seat. “What is New Zealand’s loss is our gain. We’re always on the lookout for folks with bright new ideas. We get truckloads of junk email coming through all the time which we trash without a second thought. But I have good assistants who picked yours out as a gem.

We here at Energenron are committed to nurturing and encouraging innovation. So what can I do for you?"

"I have devised a process which promises to solve virtually all the world's sustainable energy problems," Rutherford began. "As the CEO of the world's largest energy corporation, I believe you are the best placed person to develop and promote this process to the rest of the world. Essentially, I have found a way to convert sunlight, water and carbon dioxide directly into hydrocarbons. Artificial photosynthesis. It's what plants have been doing for billions of years, but for some reason, no one has seriously bothered to look into it. Except me."

"Have you patented it?" Besler asked.

"I was badly burned by the patent process in previous ventures. I incurred heaps of payments but ended up with very little protection. Legal fees, international registration and ongoing costs are beyond my means at the moment. What I need is a major partner who can help smooth the way."

"Tell me more."

"Well, I reverse engineered the process by which plants perform photosynthesis and by trial and error substituted a few different enzymes of my own which I developed with biotechnology. The result is that I can produce most any sort of hydrocarbon from plain air and water, using light as an energy source. Sugars, alcohol, petrol, diesel – even polymers - can be produced on a mass scale."

"Petrol?" Besler inquired.

"That's their term for gasoline, Sir," Lickspittle commented.

Besler looked sceptical. "Let me play devil's advocate here. Those greenie loonies say we should stop burning gas and diesel. Too much pollution, global warming, all that baloney, you know? Whaddya say to that?"

"That's the beauty of it," Rutherford explained, "there will be no greenhouse gases and no significant pollution. It is true that burning photo fuels will release carbon dioxide into the air, but that carbon dioxide will have originally been extracted from the air in the making of those fuels in the first place. The net CO₂ gain by the atmosphere will be nil. As for noxious products, photo fuel emissions contain no sulphur and negligible PAH."

"Negligible what?" Besler looked quizzical.

“PAH - polycyclic aromatic hydrocarbons - cancer causing compounds,” Rutherford clarified.

“Yes, I knew that, I just didn’t hear you the first time,” Besler retorted irritably. “Your proposal sounds just like another solar energy scheme to me. Look, we can already turn sunlight into hydrogen using photovoltaic cells and the electrolysis of water. Hydrogen is the way of the future, that’s what all my scientists tell me.”

“I respectfully beg to differ, Mr Besler,” Rutherford said. “Unlike hydrogen, photo fuels can be transported, piped and used in exactly the same way that existing petroleum products are. Photo fuels can be used in the very same petrol or diesel engines or even jet engines that we have at present. There will be no need to create an entirely new infrastructure for the hydrogen economy. Furthermore hydrogen is more volatile, prone to spontaneous combustion and explosions and is thus potentially dangerous. Liquid hydrogen is very difficult to store and transport - cryogenic technology is required.”

Besler remained unmoved. “Our experts have said that solar energy is grossly inadequate to meet the needs of our power hungry industries.”

“Using solar panels to generate electricity, electrolyse water and then using more energy again to liquefy the hydrogen is less than three percent efficient,” Rutherford said. “Furthermore, another half of the liquid hydrogen produced is lost during distribution and storage due to leakage. My process is eight percent efficient in converting solar energy to oil, which is perfectly contained in pipes and tanks at room temperature. There are vast tracts of land worldwide that can be utilised for solar arrays: Outback Australia, Arizona, even deserts like the Sahara or Kalahari which are useless for agriculture. My calculations show that using a tiny proportion of those areas for my process will produce more than enough fuel for the entire world on a sustainable basis.”

“That’s all very interesting Dr Rutherford. Interesting food for thought,” Besler mused. “Listen, we’ll let you know of our decision in a month or two. Just make sure you don’t breathe a word about this to anyone else or you will violate that exclusivity clause you signed.”

Failing to get the hint that proceedings were now concluded, Rutherford continued his exposition. "There are many more implications of this process. For instance, my fuels are non-toxic and biodegradable. Hence oil spills..."

Besler cut him short. "That's all I have time for now, I'm afraid. Howard will continue discussions with you. Howard, I expect you have put up Dr Rutherford in the best hotel in town? And make sure his every whim is attended to, will you? Take him out to a nightclub tonight, and make sure he has a date, OK?"

"Yes Sir," Lickspittle responded.

Rutherford tried to hide his disappointment, having expected a longer meeting. "Is that it? All right then. Well, thank you for your time Mr Besler." He rose from his chair, shook Besler's hand again and left the room.

Lickspittle followed Rutherford close behind, but was stopped by Besler just as he was about to exit the door.

"Howard, just a couple of things before you head off..."

"Yes, Sir?" Lickspittle replied.

"Close the door first," Besler instructed and Lickspittle complied. "This guy Rutherford, is he kosher?"

"We had a couple of private investigators quietly check him out and then asked some scientists to look over the information we got," Lickspittle answered. "From what we can see, everything he claims is one hundred percent accurate."

"And does anyone else know of this?"

"He knows how valuable his process may be," replied Lickspittle. "Trillions, if it all works out. He kept everything very secret because he's had lucrative ideas stolen from him in the past. Not even his ex-wife and children know anything. Any backup information is kept at home - he doesn't even trust his lawyers to keep copies of his work."

"Then make the arrangements as we discussed before," Besler declared.

"Yes Sir," Lickspittle replied and left the room.

KILLED BY A HUMUNGOUS FART

Date: February 2030

Location: Headquarters of Energenron Corporation

Howard Lickspittle burst into the office excitedly, hyperventilating like a breathless teenage drama queen. “It’s a friggin’ disaster!” he exclaimed in a shrill voice, “a goddamn catastrophe! Have you seen the Newsmedia cable channel yet?”

Kenneth Michael Besler was perched forward over his desk, pocket mirror in one hand and makeup pencil in the other, touching up an eyebrow. “Ehh,” Besler blurted out, “wassup?”

“Dead,” Lickspittle declared, “thousands dead. Could spell big trouble for our subsidiary, the KleenKoalKorporation. Look boss, it’s on the breaking news.” He took a TV remote control from Besler’s desktop and pointed it at a screen on the wall, pressing a button.

A talking head appeared on the screen with a grave expression: “...dioxide acts almost immediately as a lethal knockdown agent. Most of the victims fell over in their tracks abruptly, not realising what hit them. The scene here is surreal, like a still photograph capturing a frozen moment in time. A silent Armageddon. Perfectly preserved bodies strewn about everywhere, unscarred, uninjured, lying eerily still, apparently sleeping quietly – but in fact stone cold dead.

Once again, we have breaking news of a horrific tragedy. More than two thousand residents near Lake Traf in Southern Queensland, Australia, have perished suddenly, along with all animal life in the vicinity. State emergency services were contacted by survivors and arrived within the hour. Wearing biohazard suits, they combed the area, obtaining air and water samples. Initial concerns of a nerve gas or industrial toxin have been excluded. We have Southeastern University Geophysicist Professor Andrew Spinifex on the line. Professor Spinifex, once again, can you explain to us how this tragedy came about?”

The face of a grey haired bespectacled scientist now filled the screen. “Well, Ron, we have solved the puzzle. The disaster response team found extremely high levels of carbon dioxide deep in the lake water. Furthermore, the pattern of deaths was very

striking. The trail of fatalities began from the lake edge and snaked down along the valley in the direction of the prevailing wind. These findings indicate that a cloud of carbon dioxide emerged from the lake, was blown along by the wind, engulfed the town and travelled down the valley before dissipating. This situation is similar to the 1986 Lake Nyos disaster in Cameroon, West Africa, when seventeen hundred people died after a massive cloud of carbon dioxide was expelled from the lake and flowed down the hillside, killing everyone in its path."

The reporter joined back in. *"Where did the carbon dioxide in Lake Traf come from Professor? My understanding is that Africa's Lake Nyos is a volcanic lake, but the stable continent of Australia has very few volcanic lakes and Lake Traf is certainly not one of them."*

"Australia's Lake Traf," the Professor answered, "has no known natural source of carbon dioxide which can account for this event. I believe there was chronic accumulation of CO₂ in the lake depths by leakage from a nearby underground carbon sequestration reservoir. Ten years ago, the Swandri coal fired power station started pumping pressurised carbon dioxide two kilometres underground, in an effort to reduce greenhouse gas emissions into the atmosphere. Experts hired by the coal company assured everyone then that CO₂ escape would not occur. They said that monitoring for leakage was not necessary, even if monitoring was possible. I believe that previously undetected gaps in the so called impermeable rock capping the underground reservoir enabled the carbon dioxide to track into the base of the lake, dissolving in supersaturated solution until a trigger such as an underwater landslide caused sudden release of a massive quantity of gaseous CO₂."

The TV picture changed back to the face of the reporter. *"That is a very serious assertion you make, Professor. If true, it could spark a flood of multimillion dollar lawsuits from relatives of the deceased. It could bankrupt the energy company. How can you be sure your theory is true?"*

The Professor's face filled the screen again. *"The evidence is undeniable, compelling and utterly consistent. This is the only plausible explanation. There is no other mechanism which could possibly explain the speed with which the victims died, the numbers*

in which they died and the geographic and temporal pattern in which they died.”

Kenneth Michael Besler turned the television off. “Hmm,” he said, “looks like our Australian counterparts are in a bit of a pickle.”

“Sir,” Lickspittle rejoined, “as you know, Energenron’s fully owned subsidiary, the American KleenKoalKorporation, has several coal fired power stations which have been pumping CO₂ underground for years. This tragedy could have terrible repercussions for us here in America. Our share price could go down the toilet. It’s a real worry.”

“Whaah, don’t you fret none, mah precious honeychile,” Besler lapsed into his native Southern accent, “behind every cloud there’s a silver lining. Even a cloud of carbon dioxide.”

“I don’t understand, boss,” Lickspittle looked perplexed, “I don’t see how this calamity can do us any good in any way.”

“Do I have to do *all* of the thinking *all* of the time?” Besler asked. “OK then, let me take you through things one step at a time. Let’s do a little exercise in strategic thinking. Tell me Howard, how would you respond to this situation if *you* were in charge?”

“Well if I was CEO of the Australian coal company,” Lickspittle answered, “I would first vigorously deny any responsibility. I would insist that it is impossible to conclusively prove that the CO₂ came from the power station, hence it is impossible to prove my liability. Step two of my usual S.O.P. is to discredit my critics. I would get investigators to dig up dirt about this Spinifex guy. Maybe he shoplifted as a kid. Maybe he used false I.D. to buy drinks as a teenager. Take out full page advertisements in the Newsmedia Company rags portraying him as a crook and a liar.”

“True to form as always, Howard,” Besler commented, “You are a nasty, small minded, mean spirited little shit. Good thing you’re on *my* side. Whereas deny and discredit may be what we *usually* do to manage public perception, in this case it just won’t wash. I’m pretty sure an independent inquiry will find the *Swandri* power station culpable. And you can be sued for libel for attacking that Spinifex guy in that way.” Besler concluded, “So you see, that Australian coal company is completely fucked.”

“As I said before Sir,” Lickspittle repeated, “I don’t see how this calamity can do us any good in any way,”

“That Australian company may be fucked, but it could be a *good* situation for our KleenKoalKorporation here in the States,” Besler said.

After a pregnant pause and blank stare from Lickspittle, Besler let out a sigh and clarified further. “*Number one*: CO₂ geosequestration, what I call *carbon burial*, was forced upon us years ago by those damn greenies who were scaremongering the public about global warming. Of all our options though, it was the best one: it allowed us to continue making money burning off our massive coal reserves and we didn’t have to spend time and money monitoring for CO₂ leaks because, well, it wasn’t *possible* to monitor for leaks. Hence we went along with it. But the large costs of carbon burial ate into our profits. *Number two*: Now we have a major catastrophe as a direct consequence of the greenie agenda. This is a golden opportunity for us to point the finger squarely back at them, to blame all those innocent deaths on those misguided Eco tree huggers. A great chance for us to resurrect our old argument that global warming is a myth. And even if it is real, I ain’t seen no one who’s died from global warming yet. Have you?”

“No Sir,” was Lickspittle’s reply.

“But here we have thousands who died as a direct result of those holier than thou do-gooders. There’s blood on their hands.” Besler smirked. “*Number three*,” he continued, “this tragedy gives us a reason to immediately stop all carbon burial at all our American power stations. We don’t want no Americans killed by some humongous fart from the bowels of the Earth, now do we?”

“No Siree,” Lickspittle responded.

“So we cut spending on carbon burial and straight away our profit margins go up,” Besler said, “now ain’t that a *good* thing?”

“Yes Sir,” replied Lickspittle.

“*Number four*,” Besler was on a roll, “let’s just say for argument’s sake that global warming *is* real and that it *is* a bad thing. Let’s be generous and concede some points to those greenie fuckwits, shall we? Well, scientists have shown that dispersed particulates increase cloud cover and cause global *cooling*.”

“Dispersed particulates?” Howard inquired.

“Smog, my boy, smog. Smog causes global dimming and thus counteracts global warming,” Besler explained, “yet another *good* thing. So we stop scrubbing our exhausts and let the smog out to counteract global warming and we save even *more* money. What do we have altogether? We discredit the greenies, we stop carbon burial and we stop scrubbing our exhausts. We cut costs on two fronts, we make obscene profits and we laugh all the way to the bank. Now ain’t that *all* good?”

“Yes Siree indeedee,” Lickspittle concurred.

DON'T MENTION THE HINDENBURG

Date: March 2030

Location: Executive Office of KleenKoalKorporation* power station (*wholly owned subsidiary of Energenron)

Kenneth Michael Besler sat in a plush high-backed leather chair behind a massive oak desk in an executive office of the KleenKoalKorporation. His face filled the video monitor of a television camera as he addressed the Newsmedia Company TV crew. "Keep the shot tight, get a close up zoom right over here, OK?" Besler ordered the cameraman, as he made a rectangle using the thumbs and index fingers of both hands, centred on his face.

"Hydrogen Economy Interview take three," said the television director in the background. "Three, two, one and action!" The director snapped his digital slateboard in front of the camera.

The disembodied voice of an off-camera interviewer addressed Besler. "Mr Besler, as CEO of Energenron and also of its subsidiary, the KleenKoalKorporation, tell us your thoughts about the future of energy."

"Hydrogen is the answer, the answer is hydrogen," Besler began. "We've been saying this for more than twenty years now. When you burn hydrogen, all you end up with is pure water. Imagine that, water fit to drink coming out of your exhaust pipes. No more poisonous fumes from cars and trucks."

"But we cannot use hydrogen with our existing vehicles," commented the disembodied voice.

"True. Therefore we will have to phase out all existing internal combustion engines and replace them with fuel cell powered engines or hydrogen combustion engines," Besler replied.

"And aircraft?"

"That goes without saying," Besler said. "Hydrogen jet engines will have to replace all existing jets. Everything will have to be replaced."

"What about hydrogen distribution?" asked the interviewer.

"Yes," Besler replied, "of course we will have to replace all existing oil tankers and oil containers with cryogenic pressurised tankers. And of course all existing gas stations will have to be changed. We're still grappling with liquid hydrogen pipelines after

the last few explosions and the problem of chronic leaks. But those are mere teething problems, that's all."

"Those are a lot of changes, Sir," the interviewer said. "Can the country afford it?"

"Well let me put it to you another way," Besler argued.

"Can we afford *not* to make these changes? We really don't have any choice, as we are fast running out of petroleum. The nation that is first off the mark with a hydrogen infrastructure will have an advantage over the rest of the world. In any case, we are already part way towards the hydrogen economy. As you know, we've been trying to phase things in slowly over the past ten years, unfortunately uptake has been poor so far. It's just a matter of converting the rest of the sceptical public."

"And how do we make this hydrogen?"

"Mainly by using electricity to split water, by electrolysis," Besler answered.

"And where will this electricity come from, now that oil is scarce and expensive?"

"There will be many sources of electricity depending on local circumstances," Besler said. "I put it to you however, that with the world's vast remaining untapped coal reserves, coal will be a major player this century. We can use coal to generate electricity to make hydrogen or we can use coal to produce hydrogen by gasification"

"But won't both methods using coal generate greenhouse gases and pollution? Won't that negate the environmental benefits of hydrogen?" inquired the interviewer.

"A mere technicality," Besler said dismissively. "You miss the point, young man, that burning hydrogen is clean and environmentally friendly. That is what you must focus on."

"Thank you for your time, Sir."

The camera zoomed out from Besler and the larger room came into view. Behind Besler was a bay window covered by curtains, above which were two signs. The top sign bore the words "KleenKoalKorporation - a subsidiary of Energenron" with its logo, an inverted cross. Under that were the words "New Hampshire #2b Coal fired power station". An assistant opened the curtains in an attempt to let the feeble daylight in. In days gone by the bay window

would have displayed a beautiful panorama of rolling green meadows. On this day the view was obscured by a forest of smokestacks belching out thick black acrid plumes into the air, creating a gray haze in the sky and blotting out the landscape.

“So how was that?” Besler asked the TV director.

“Very good, Sir,” was the reply.

“Jeez, those spotlights you use are fuckin’ hot. Starting to break out in a sweat here,” Besler complained. He pulled out a handkerchief and wiped his forehead, lifting up the front of his toupee to reveal a bald pate. As he pulled the cloth away he left a streak from his right brow extending around the side of his face, a smear derived from his pencilled eyebrow.

Just then, the TV interviewer lit up a cigarette.

“I’m afraid I don’t allow smoking in this office, Sonny,” Besler admonished. “Don’t you know that smoke will kill you? It’s such a goddamn foul habit. Smoke is nothing but pure poison. Lots of cancer causing PAHs, you know, polycyclic...er...aromatic hydrocarbons.”

“Sorry about that Mr Besler,” the interviewer said contritely and stubbed out his cigarette.

ANOTHER RAINBOW WARRIOR

Immediately after completion of the hydrogen commercial, Howard Lickspittle, loyal lapdog, approached his master.

“I have some confidential news for you Mr Besler. Perhaps we can adjourn to another room.”

The two of them proceeded to an adjacent office for a private conversation.

“By the way, Sir, there’s a smudge on your brow...”

Besler took out his pocket mirror (which he always carried with him), inspected his face and cursed profusely. “About goddamn time I tattooed my eyebrows, just like the others did.”

Lickspittle applied some licked spittle to his personal handkerchief and lovingly erased the smear from his master’s brow with soggy dabs. “Don’t worry, Sir,” Lickspittle reassured him, “you looked fine on TV.”

“So tell me, Howard,” said Besler, changing the subject, “is it done?”

“All sorted, Sir,” came the reply.

“All loose ends tied up?”

“They tried to find the records of his process but he had hidden them too well,” Lickspittle explained. “He surprised them by coming home early and he put up a struggle. So unfortunately they had to kill him before they could get anything out of him. They burned the house down to destroy any evidence - made it look like a fuel explosion - which shouldn’t be surprising, considering the amount of fuel he kept in storage.”

“It’s a shame we couldn’t get a hold of it,” Besler reflected. “Still, the most important thing was to stop his process ever seeing the light of day.”

“That we have done, Sir.”

“We’ve invested too much money and spent too much time on the new hydrogen infrastructure,” Besler said. “R & D on the new engines as well as storage and distribution technology has cost us dearly and we must ensure a financial return. We’re going to force the new hydrogen economy down the public’s throats whether they like it or not and nothing is going to stop us. I’ll be damned if I’m going to let some Limey hick ruin everything.”

“Kiwi,” Lickspittle said.

“What?”

“Kiwi hick, not Limey hick,” Lickspittle replied.

“Whatever.”

“One more thing Mr Besler,” Lickspittle added.

“Yes?”

“Vinnie the Blade, he stayed on in New Zealand for a few more days, chasing skirts. Got caught by the local cops and thrown in jail.”

“Goddammit,” Besler cursed, “you just can’t find good help anywhere these days.”

“Don’t worry Sir, there’s no way he can be traced back to you,” Lickspittle said. “We’ve covered all our tracks twice over. Actually, we also laid a false trail leading back to Roger Maloney, the Democratic Congressman who’s been a thorn in our side for the past few years.”

“Nice touch, but I still don’t want to take any chances,” Besler said. “I want you to bribe Vinnie out of jail or break him out of jail. Then waste him. Or you can waste him while he’s still in jail, I don’t care.”

“As you wish, Sir.”

“There’s a lesson to be learnt here Howard,” Besler added. “You know what I always say...” Besler paused, waiting for Lickspittle to complete his favourite maxim.

“Er...always wear clean underwear?” Lickspittle offered.

“Fucksake no!” Besler exclaimed. “The lesson is, never try to punch above your weight. That Rutherford guy, he was a flea. Darned arrogant to think he could deal with heavyweights like us.”

“Very true Sir, very true.”

THERE IS NO LIMIT TO THE EXTENT OF HUMAN STUPIDITY

“Only two things are infinite: the Universe and Human Stupidity. And I’m not sure about the Universe.” - A. Einstein.

Kenneth Michael Besler had been unanimously elected CEO of Energenron for life by his board of directors in the year 2041. In his acceptance speech he announced: “I am surprised and humbled by this thoroughly unexpected honour conferred upon my unworthy self by you good honest folks.”

Hefty payments flowed into the confidential Swiss Bank accounts of his supporters not long after.

Date: May 2041

Location: The White House, Washington D.C.

Besler was walking down a corridor in the White House with his assistant, Howard Lickspittle. “Howard, do you know the best strategy for evolutionary survival?”

Lickspittle had aged poorly over the past eleven years, now heavily lined by facial wrinkles and bald on top with white temples. His flamboyantly bushy eyebrows had however remained ever luxuriant and spilled over the top of his spectacles like unruly weeds over the edge of a pot. His protuberant lower lip continued to be an unmistakable hallmark. “What do you mean, Sir?” he asked.

Besler had not aged at all. He looked, if anything, even younger than before. “In the Darwinian sense. You know, survival of the fittest. Do you know what the best strategy is?”

“Er, I dunno. Speed and strength maybe?”

“Wrong,” Besler said with just a touch of smugness. “It’s adaptability. The dinosaurs perished because they could not adapt to rapidly changing circumstances. Small mammals survived because they could. And mammals went on to inherit the Earth.”

“Right.”

“And therefore,” Besler elaborated, “when we also begin to sense the winds of change, when we also realise there is an irreversible alteration of our environment, so must we too adapt accordingly.”

“You’re referring to our failure to sell the coal idea to the public?” Lickspittle asked.

“Well, we have to grant those environmental fuckwits a few small victories from time to time. So long as we stay ahead of the game in the big picture,” Besler said.

Howard inquired, “The big picture being...”

“Uranium,” was Besler’s answer, “that’s the go now. The public will swallow greenie propaganda only so far as it doesn’t cramp their lifestyle. Once they start to become inconvenienced, they won’t hesitate to throw their precious principles out the window to keep their appliances running at home and their cars on the road. We’ll win this time, together with our partners in the media. Lucky thing I hedged my bets and invested heavily in uranium assets.”

“Sir, do you ever think about that oddball guy from New Zealand?” Lickspittle asked. “That maybe if we had pursued his idea eleven years ago we could have developed a mature photo fuel industry by now?”

“Howard, Howard, Howard,” Besler intoned with disappointment. “You see, that’s the reason I’m the boss and you’re the assistant and always will be. Photo fuels would have given the old engines, pipelines and gas stations a new lease in life. They would have ruined the hydrogen economy. We had too much at stake, too much already invested in hydrogen engines, hydrogen transportation and the new infrastructure to allow that to happen. Uranium however is a source of electricity we can use to *make* hydrogen. Far from a threat, uranium complements the hydrogen economy perfectly. These are guys we can work with.”

“This is you, Sir,” Howard said as they arrived at a door with the sign: *FDR meeting room*. “I’ll wait outside for you till it’s finished.”

“OK, here we go,” Besler said as the Marine in ceremonial uniform saluted and opened the door for him.

It was a tastefully appointed room containing a large rectangular oak table with twenty surrounding armchairs. Two men were already seated at the table.

Inside the door, a smartly dressed young female White House staffer greeted Besler. “Good afternoon Mr Besler. You know Mr Chuck Daney, CEO of Hallitosis Nuclear Corporation and Mr Reuben Matlock, CEO of Newsmedia Company International?”

Daney and Matlock, like Besler, had smooth skinned faces, wore tasteful toupees and had tattooed eyebrows.

“Yes, of course. Good to see you Chuck and Rube, as always.”

“Likewise,” said Daney.

“Howdy Kenneth,” said Matlock.

Besler addressed the White House staffer. “Pardon me Miss, could you give us a moment alone please?”

“Yes, Sir. The President is expected in about five minutes,” she said.

“Sure thing,” said Besler.

The lass departed the meeting room.

Matlock opened proceedings. “Gimme a minute to do a bug scan.” He pulled out an electronic device from his pocket and walked around the room once, sweeping his arm back and forth.

“OK, all clear.”

“So what’s the new boy like?” Besler asked.

“I’ve known his father twelve years,” Matlock replied.

“Little Herbie himself was a bit wild in college - stoned out of his mind most of the time. But he’s finally come right. He knows which side his bread is buttered on. He knows how to play the game. He knows that the business of America is business. And he knows that what is good for Corporate America is good for America.”

“He’d damn well better know,” Besler exclaimed. “I put up thirty million in campaign contributions and I expect to see some gratitude, some payback.”

“Yeah, twenty eight million in my case,” Daney added.

“But from all reports, I don’t think there’ll be any problem. He’ll toe the line.”

“He’s well aware that we made him and we can break him,” Matlock said. “Apart from that he’s not exactly the sharpest knife in the drawer, if you know what I mean. Scooped out from the shallow end of the gene pool. He barely has room temperature IQ.”

“I hope you’re talking degrees Fahrenheit, not degrees Centigrade,” Daney voiced concern.

“Adequate is how I would describe him,” Matlock clarified, “which is exactly what we need. He can read a teleprompter and

look good on TV. We don't want no greenie Nobel prize winning economist President with uppity ideas."

"Shit no," Besler remarked. "What a nightmare *that* would be."

"Still," Daney cautioned, "we don't want a guy who comes across as obviously dumb."

"We limit any unscripted contact with the Press," Matlock continued. "He has learned how to repeat what he is told like a parrot, which gives the audience the illusion he has understood the issues. He's really quite adept at it by now. It's all done with smoke and mirrors."

Just then, the White House staffer opened the door.

"Gentlemen, please be upstanding for the President of the United States of America, President Herbert Shrub."

The President was known as "Herb" Shrub to his friends. He was called "the Vegetable" by his enemies.

President Shrub walked in the room, followed by Ronald Bumstead, Foreign Secretary; Ebenezer ("Scroogeface") Bryce, Director of the Central Intelligence Agency and Dr Katherine Kelly, newly appointed Scientific and Cultural Adviser to the White House. Dr Kelly was formerly of UNESCO and a Harvard academic.

A secretary also tagged along and sat discreetly in a corner with an audio recorder and notepad.

Transcript of the meeting:

President Herb Shrub: Sit, sit please, gentlemen. If you don't already know them, let me introduce to you Ronald Bumstead, Foreign Secretary; Ebenezer Bryce, Director of the Central Intelligence Agency and Dr Katie Kelly who I just met myself today, our new Scientific and Cultural Adviser.

Dr Kelly (Scientific adviser): Katherine

President Herb Shrub: What?

Dr Kelly (Scientific adviser): It's Katherine, Sir, not Katie

President Herb Shrub (slightly irritated): I stand corrected. OK, so what's on the agenda today?

Kenneth M. Besler (Energenron): As you know, Mr President, the world has pretty much run out of oil. At this point in time, I think we have no option but to increase our energy output from nuclear fission, to build more breeder reactors. We need a clean source of energy for our final conversion to the hydrogen economy. People are revolting against the fumes from the coal stations and the anti global warming lobby have been publishing more and more damning data against us.

President Herb Shrub: More nukular reactors. I'm not enthused with the idea. Those anti-nukular groups have been badmouthing nukular energy for decades now. Dr Kelly, you previously mentioned lots of problems with that approach.

Dr Kelly (Scientific adviser): Sir, it would mean more uranium and plutonium being shipped about all over the place. More opportunities for terrorist acquisition. And problems with radioactive waste disposal. And risk of more disasters like Three Mile Island, Chernobyl and Fukushima.

Chuck Daney (Hallitosis Nuclear): Mr President, those incidents were a long time ago. Our safety and anti proliferation measures for the management of radioactive materials these days are pretty much foolproof.

Dr Kelly (Scientific adviser): I would definitely say that power from nuclear *fusion* is the way to go. Clean, cheap, limitless electricity to make hydrogen. I am sure we are just about five years away from a major breakthrough. Just another twenty or thirty billion dollars would make the crucial difference...

Chuck Daney (Hallitosis Nuclear): You science guys said you were five years away from a major fusion breakthrough fifty years ago. You keep asking the tax payers to throw good money after bad. We need something that will deliver lots of clean cheap electricity right now. Without energy, industries will fail, jobs will be lost, people

will go hungry and cold...there'll be riots. Not to mention probably losing your next election campaign, Mr President, if you wish to run for another term.

Reuben Matlock (Newsmedia Company International): We can offer the public a fresh new paradigm Mr President, hype up the clean aspects of nuclear fission and downplay or better still, ignore any negatives.

Kenneth M. Besler (Energenron): As I see it, it's a matter of choosing the least bad option at this time. The rest of the world has already come to the same conclusion, particularly Europe and Asia. We've been putting things off till now because of our Middle East oil supply, but even that has run dry. We need to be more forward thinking at this time, to plan beyond the next election. We need to secure the world's supplies of uranium.

Chuck Daney (Hallitosis Nuclear): Our survey teams have recently discovered huge deposits in Burkina Faso.

President Herb Shrub: Bikini Fatso? Where the hell is that?

Ebenezer Bryce (CIA): If I may, Sir, Burkina Faso is a landlocked West African country, slightly larger than Colorado, with a population of thirteen million and dirt poor. Exports till now have been mostly livestock, millet and sweet potatoes. AIDS, TB and malaria have kept a check on the population for the past four decades and life expectancy is now about thirty six years with sixty five percent of the population under the age of sixteen years old.

Ronald Bumstead (Foreign Secretary): It's run by a military strongman, a dictator, Pierre Ngomo.

President Herb Shrub: Sounds to me like they could do with a good dose of democracy.

Dr Kelly (Scientific adviser): I hope I'm not speaking out of turn here Mr President, but my understanding is that President Ngomo

won office last year in elections that were supervised and endorsed by the UN.

Kenneth M. Besler (Energenron): But he governs with an iron fist as a pitiless dictator nevertheless. He refuses to consider our very reasonable offers.

Chuck Daney (Hallitosis Nuclear): He's expelled all foreigners from his country and will not sign any uranium contracts with us except on his own terms. Holding out for the highest bidder. Blatant extortion. If we're not careful it could all go to the Chinks or Ruskies. Unfortunately the good Lord didn't see fit to put uranium only where there are democratic regimes friendly to the United States.

Ronald Bumstead (Foreign Secretary): In a way, Sir, you could say that he is holding the world to ransom. Another worry is that with their vast reserves of uranium, they now have at their disposal the raw materials to build nuclear bombs.

President Herb Shrub: So they have the ability to manufacture weapons of mass destruction?

Dr Kelly (Scientific adviser): Actually Sir, Burkina Faso has no nuclear scientists, no nuclear power stations, no industrial infrastructure and no money to build anything. They are the second poorest country in the world. All they can do is sell raw yellow cake.

President Herb Shrub: Well I don't see how they can be a danger by selling cakes.

Dr Kelly (Scientific adviser): Sir, yellow cake is the term for a type of uranium ore.

Ronald Bumstead (Foreign Secretary): Dr Kelly, you miss the point. This is a brutal dictator who is holding the world to ransom. Once he gets some money from selling a little uranium, he *could* develop the potential to make unlimited weapons of mass destruction.

Chuck Daney (Hallitosis Nuclear): Thousands of bombs and missiles. He could be a real threat to world peace.

President Herb Shrub: I hear you guys. A brutal dictator who is holding the world to ransom. Potential to make WMDs. A threat to world peace. Surely it is our duty, the duty of America, the last best hope of the world, to face up to this threat.

Ronald Bumstead (Foreign Secretary): Just think, Sir, if they built thousands of nuclear missiles which could be on forty five minute alert pointed directly at America.

President Herb Shrub: I can see it would be irresponsible for us to stand idly by and do nothing. If we don't act quickly, the first sign of trouble could take the form of a mushroom cloud.

Ronald Bumstead (Foreign Secretary): By my reckoning we could liberate that country in a lightning military campaign over a couple of weeks and we'd only need to leave fifty thousand troops on the ground to maintain control after that.

Chuck Daney (Hallitosis Nuclear): And ensure America's energy security...

Dr Kelly (Scientific adviser): I can't believe what I'm hearing. It all reminds me of September 11.

Ebenezer Bryce (CIA): September 11? Bah, humbug! It's got nothing whatsoever to do with September 11.

Dr Kelly (Scientific adviser): I'm talking about September 11, 1973. I'm talking about the CIA backed coup to depose the democratically elected President Allende of Chile. I'm talking about you guys installing the murderous General Pinochet who went on to kill thousands of innocent people.

Ebenezer Bryce (CIA): America reserves the right to bring about regime change as it sees fit.

Dr Kelly (Scientific adviser): Well I don't think the United Nations or most other countries will be happy to go along with your scheme.

Ronald Bumstead (Foreign Secretary): Now you *are* talking out of turn, young lady. Look, the UN is an old world relic. America still has the world's strongest armed forces by far and we can pretty much do whatever we like. After all, what's the point of having the strongest military if we don't use it?

Dr Kelly (Scientific adviser), astonished: Um, ah, I'm not sure how to respond to that incredible statement you just made. Whatever happened to respect for sovereignty and a nation's right to self determination?

Ebenezer Bryce (CIA): Any country is entitled to rule itself so long as they do so according to America's best interests.

Dr Kelly (Scientific adviser): That's the stupidest thing I've ever heard. It contradicts the very meaning of the term "self rule". This whole invasion is based on unknown assertions.

Ronald Bumstead (Foreign Secretary): Well, there are assertions which we know that we know. And those we know that we don't know. And those we don't know that we know. Apart from those we don't know that we don't know. Our preemptive policy justifies action on the basis of assertions which we don't know that we don't know.

Ebenezer Bryce (CIA): Absolutely right. I couldn't have put it better myself.

Dr Kelly (Scientific adviser): It's impenetrable obfuscation. Newspeak and Doublethink. This whole scheme doesn't sound right to me and I don't think it will to the rest of the world.

Reuben Matlock (Newsmedia Company International): Look, I am sure we can get the rest of the world, or at least the rest of the free world, or at least all the right thinking nations of the world, on board with us. Persuasion is all about packaging and repetition. Repeat a

lie often enough and people will eventually swallow it. Saturation messaging, that's my speciality. It also helps to attack any opposing views and call them biased and un-American. The fact that I own so many different news vehicles gives people the impression that they are receiving information from lots of independent sources - it makes the message more convincing. Anyway, most people don't give a rat's ass about anything, so long as it doesn't affect them personally. Invading a small country in Africa won't raise much protest.

Dr Kelly (Scientific adviser): What about the civilian casualties?

Ebenezer Bryce (CIA): Our proactive mission statement for this strategic initiative precludes the factoring of collateral incidentals as non-essential considerations, especially when extrapolating the negatory consequences which may ensue from populist perceptions.

Dr Kelly (Scientific adviser): Huh?

Ronald Bumstead (Foreign Secretary): Counting civilian deaths brings us bad publicity. We don't do it.

Dr Kelly (Scientific adviser): How can you fool people into thinking that what is right is wrong and what is wrong is right?

Reuben Matlock (Newsmedia Company International): Listen to me, young lady, if there's only one thing I've learned in my long life, it's this: *there is no limit to the extent of human stupidity*. Ninety percent of people are too damn lazy to think for themselves and are only too happy to be led by the nose. So we'll do them a favour and we'll do their thinking for them.

President Herb Shrub: Well I for one am convinced it is our duty to liberate this Bikini Fatso place for the sake of world peace. It is our God given duty as the champion of freedom in the world. I'll have a meeting with the Defence Secretary and Chiefs of Staff and sort out the details. This meeting is concluded.

Kenneth M. Besler (Energenron): Thank you, Mr President. And may I say that from today's proceedings I was very impressed by your quick grasp of issues and I look forward to working with you in the interests of America for many years to come.

President Herb Shrub: Thank you for your kind words, Ken.

- End of Transcript -

The meeting concluded, the participants stood up and milled out the door, however President Shrub asked Bumstead and Bryce to stay back awhile. They closed the door, excluding all others and spoke in confidence.

"I was uneasy about that science woman Kelly from the moment I met her," Shrub said, a little agitated. "Fucking bleeding heart leftie. I don't like her attitude. She's not a team player. She could be a security risk or she could leak out sensitive information to the press. Hell, maybe even turn traitor. People are either with us or against us in this crusade, it's as simple as that. I don't want to see her around here no more."

Bryce reassured the President. "No problem, Sir, leave it to us. Come to think of it, I seem to recall rumours that she's prone to depression." Bryce turned to Bumstead and winked.

"Um, er..." Bumstead responded with initial hesitancy. He then picked up momentum. "Actually, I may have heard rumours about her depression too. Yes, I'm sure that's right."

"Absolutely," Bryce continued, "great fits of depression is what I've heard. She practically belongs in an asylum. She could even be suicidal for all we know. The more I think about it now, the more I'm sure she's definitely suicidal. No Sir, I don't think we'll be hearing from her any more, you can count on that, Sir."

Shrub seemed pacified for the time being. "Very well. You know what to do, gentlemen."

ONE DAMNED THING AFTER ANOTHER

Date: Year 2042

Location: Premier Lin's office, The Great Hall of the People, Beijing

Premier Lin's office in the Great Hall of the People was unnecessarily capacious, outrageously voluminous. The intentional extravagance of space and excessive height of the ceilings were designed to impress, to emphasise the insignificance of all who entered the room. Lining the walls were glass covered book cases which, however, were not just for show. Lin's books spanned a myriad of topics which barely managed to slake his unquenchable thirst for knowledge. His reputation for eclectic scholarship was well justified.

He sat, not at his enormous desk, but on the edge of a sofa in the middle of the room. On the coffee table before him was a large scale model of an ocean going sailing ship of traditional Chinese design.

Poised on an armchair at right angles to the Premier was the Japanese Ambassador, Shigeru Watanabe.

"Are you a student of history, Shigeru?" Premier Lin asked. "History is the best device to teach us the lessons of human folly. Or it can be a powerful propaganda tool to shape the young minds of a nation. Take Francis Bacon for instance. As you know, Francis Bacon was a seventeenth century imperialistic British philosopher. He wrote that of all the great inventions, three in particular enabled the rise of Europe to dominate the world: gunpowder, the magnetic compass and printing. What he either did not know or he chose not to mention, was that all three were invented in China, centuries before Europe had any inkling of them. Of course, printing is useless without paper, another Chinese invention. To that list of world dominating innovations I would add ocean going ships. Most Westerners do not realise or choose not to admit that China built ocean going junks weighing hundreds of tonnes each, which made successful voyages over thousands of miles, at a time when the West was still struggling with ten tonne leaky rafts. More than a century before Columbus.

“Indeed Premier Lin,” Watanabe said, “I am aware of the Ming dynasty voyages from 1405 onwards, which crossed vast oceans to distant lands such as South Africa.”

“Hundreds of ships on many expeditions, Shigeru. Unfortunately our ancient leaders destroyed the records, which was a grave and foolish mistake. If history is not properly documented, events may as well not have occurred.”

“And how did they manage such long voyages so long ago?” Watanabe asked.

“There were three things in particular which made these huge junks supremely seaworthy, and they were all Chinese innovations,” Premier Lin began, pointing to various parts of the model ship with a pen. “The bulkheads which stiffened the ship and divided it into separate watertight compartments, the stern rudder for effective steering and the junk sail. The junk sail was the most efficient rig for sailing upwind before the invention of the Bermudan rig. Furthermore, the bamboo battens enabled quick reefing in storms and were easily repaired.”

Watanabe nodded his head. “As usual, Sir, your encyclopaedic knowledge continues to dazzle me. But please enlighten me, if these were all Chinese inventions, why did China not proceed to dominate the world? To colonise the Americas and Australia?”

Lin answered reflectively. “It is true that gunpowder, the compass, printing and ocean going ships enabled Europe’s success. What Bacon also omitted to mention were the other ingredients necessary to pursue world domination: overbearing aggression, insufferable arrogance and an overweening sense of entitlement. A belief in one’s God given right to subjugate other people in pursuit of one’s own self interest. To seize foreign lands as one’s own. Disdain for native people, treating them with duplicity and cheating them of their birthright. These were characteristics the Chinese lacked.”

“Westerners accuse China of the very same behaviour in Tibet,” commented Watanabe.

Lin became annoyed. “Tibet is contiguous territory with China, not thousands of miles away and certainly not on a different continent, unlike the European colonies,” Lin replied. “Tibet has been an integral part of China since the thirteenth century, again well

before Columbus. We treat Tibetan dissenters no worse than we treat Han Chinese dissenters. We are equal opportunity oppressors.”

Watanabe tried to appease the Premier. “I intended no offence, Sir. I merely mentioned criticism voiced by others.”

“Ignorant criticism from sanctimonious hypocrites,” Lin exclaimed. “We did not embark on campaigns of systematic genocide against indigenous peoples the way Westerners did. History recalls how the Spanish brutally tortured and massacred native tribes, how the British treated Australian aborigines worse than dogs, shooting them on sight. How the US General Amherst ordered Native Americans be given blankets from smallpox victims. They exterminated the original populations so that they could seize their land. If they now ask us to grant Tibet independence, so be it. I will make them this offer. We will be happy to relinquish Tibet if all descendants of Europeans first relinquish their American, Australian and African colonies and return to Europe.”

“You know that will never happen Sir,” Watanabe remarked. “But tell me Premier Lin, are you disappointed that the Chinese did not pursue the same course of colonisation of foreign shores?”

Lin answered his question with another question. “Just because you are *able* do something, does it mean that you *should* do it? In any case, it has never been the nature of the Chinese people to invade distant lands. It has always been our history to secure only adjacent territory, to defend our borders, to look inwards, to build walls around us, to be smug within our own culture and within our own boundaries - these traits which led to our stagnation, complacency and weakness. These traits which were our own undoing. Napoleon understood the potential of the Chinese empire. He cautioned the world to beware the sleeping dragon, for should they disturb it, its rising will shake the very foundations of the world. The Chinese people had slept for far too long. Unlike the Japanese who responded to their wake up call much earlier.”

“Our Meiji restoration,” Watanabe nodded. “We saw the ways of the West and could accept nothing less than to also become a first rate power. Unfortunately we responded *to* aggression *with* aggression in ways which were regretful.”

“Your expression of regret surprises me, Shigeru. I find that strident Nationalism still runs strong in the blood of many

Japanese. Most Japanese make no apologies. Some have even tried to rewrite history, unlike the Germans.”

“The Germans have been relentlessly harangued and condemned by the Jews, constantly reminded of their acts of genocide a hundred years ago,” said Watanabe. “An example of the power of history yet again - in this case the power to instil an abiding sense of guilt into a national consciousness. Probably appropriate in the case of the Holocaust. For unclear reasons, the Chinese have not besieged us with similar reminders.”

Lin reflected. “It is a matter of shame to us that we, a great people, were so easily overrun by you at the time. A reminder of our own historical weakness. A situation we prefer to put behind us.”

“We Japanese saw no other way to respond to the threat of Western imperialism,” Watanabe continued. “After Admiral Perry’s bullyboy tactics, his so-called gunboat ‘diplomacy’, we were determined never again to be humiliated. The lesson we learned was that our only way forward was to match their power with our own industrialisation, militarisation and colonial expansion. To achieve this we had to secure a resource base. To secure a source of raw materials.”

“Manchuria,” said Lin, knowingly.

“Yes. And our victory over the Russians in 1905 seemed to vindicate that approach.”

“Until your crushing defeat in World War Two,” added Lin.

“And how were we defeated?” Watanabe asked rhetorically. “By a larger nation with more resources and a bigger industrial base. The lesson was repeated. Power and resources are what count.”

“Power and resources enable victory,” Lin agreed. “And it is the victors who write history to their own advantage.”

“Very true,” Watanabe said. “American schoolchildren are taught that the Japanese were sneaky and deceitful to launch a surprise attack on Pearl Harbour. That attack was however morally no worse than America’s own history of aggressive behaviour towards Japan, which they in fact began with violent blackmail using Perry’s gunboats. Pearl Harbour was Japan’s response to America’s threat to cut off our oil supplies.”

“Energy is indispensable to any modern nation,” Lin remarked.

“We are poised once again at a mighty crossroads,” Watanabe commented. “China’s development has been exponential over the past seventy years, now with a mature infrastructure and advanced industrial base, with sophisticated, confident and demanding citizens.”

“But we are crying out for energy in a world depleted of petroleum,” Lin said. “There is little oil to be found anywhere. Burning more coal has suffocated our cities. With no energy to feed our industries will everything collapse? Unemployment, starvation, riots, chaos. We will lose our mandate to rule this country. Loss of political power, loss of international influence. I cannot accept that.”

“The promise of controlled nuclear fusion has proved to be a false dream, an illusion,” said Watanabe. “Korea and France have shown foresight in their development of nuclear fission - more than ninety percent of their electricity is now from fission. Wind, hydro, solar, geothermal - those are feasible in only a few locations and cannot contribute much in most countries.”

“The uranium producing countries have taken the place of the former oil nations in controlling an essential commodity,” added Lin. “The sums demanded are now exorbitant and many of those countries are unstable. America’s recent actions show their determination to control the flow and price of world uranium, just as they had done for oil.”

“Early reports suggest that there may be another source,” Watanabe added, enigmatically.

“A source of uranium which we would do well to conceal from America for as long as we possibly can,” Lin rejoined.

“America’s greed is insatiable. America’s desire to control all global strategic assets remains without limit,” Watanabe remarked.

“It is true that those who do not study the lessons of history are condemned to repeat the mistakes of the past,” observed Lin. “We stand once more at the threshold of greatness and we cannot allow it to slip from our grasp once again. It is time to put old rivalries behind us and work together to secure a future for our nations.”

“Indeed.”

PURGATORY: CONFUSION

He awoke to the sight of a slender young woman kneeling by his right side, peering over him. The first thing he noticed was her fair blue skin, glistening with a light sprinkle of perspiration. She had close cropped brown hair in patchy tufts, somewhat moth eaten in appearance. She wore a dirty off white cotton frock which was crudely woven and gathered in at her waist with a frayed tie-band. On her feet were sandals made of animal skin.

She looked down at him, briefly startled at his revival, then regained her composure and turned her head. "The Stranger awakes!" she declared to companions nearby.

As he began to gather his wits he gradually became aware of his surroundings. It was uncomfortably hot and humid. He lay on his back on a dirt floor in what seemed to be some sort of small cavern, dimly lit by two flickering glass encased oil lamps placed on the ground. Grime and grit peppered the back of his sweat soaked shirt, adding to his discomfort. He also became aware of an intense pain in his left flank which throbbed and ached with a vengeance. A raging thirst pervaded his dry throat. He noticed in the background a soft constant rumbling, a low pitched vibration, only barely perceptible when he strained to listen.

"Welcome to Purgatory," the blue skinned lass said.

"Purgatory? This place is Purgatory?" the Stranger asked. "Am I dead? I don't feel dead."

"They say that death is not something you feel, it is a journey you take," the blue girl replied. "It is also said that we have all died and were born again into this place."

This muggy confined space did not seem supernatural or mystical in any way he imagined the afterlife might be. He breathed fairly ordinary albeit stale air, he felt the damp heat and the sticky dirt on his skin, he saw and heard his surroundings in the same way he was sure he had always done before.

An unshaven blue skinned man strode up to the Stranger, knelt on one knee and placed a firm hand on his left arm. "Who are you? Where are you from? How did you get here?"

"Too many questions Elnath," the blue girl said. "Stranger, are you all right?"

"Water," said the Stranger in a hoarse barely audible voice.

He pointed to his parched cracked lips, raised his head slightly then dropped it back onto his folded jacket - which had been placed behind his head to serve as a makeshift pillow. He winced. It was then he realised that the back of his head also hurt like the blazes.

Gradually he began to take note of the others in the cave: the one called Elnath whose hand, ravaged by old scars, gripped his arm like a talon. Standing a few feet back in the gloom, another man and a woman focused their attention on him. All were dressed in the same dirty coarse woven fabric and wore footwear roughly hewn from animal skins. All had blue skin.

The blue girl beside him raised her right arm and snapped her fingers, "Alhena, bring water."

The other lass named Alhena brought a leather canteen to them. "Here you go, Sophie," Alhena said.

Sophie took it and placed it to his lips. The water was lukewarm and faintly tasted of urea and salt, with the wispy trace odour of hydrogen sulphide. Indeed, it was even a little fetid, causing him to choke. "Pttah!" the Stranger spat it out, spraying Elnath and Sophie, who each turned their heads away momentarily to avoid the droplets.

"Well what do you think, Sophie?" said Elnath. "He intrudes upon us, drinks our best water, then spits in our face."

"More," said the Stranger weakly.

Sophie pressed the bottle to his lips again.

This time the Stranger kept the mouthful down, his intense thirst overcoming the foul taste of the fluid. Three more mouthfuls and he felt his voice start to return.

"I am Sophie," said the blue skinned girl at his side. "Tell us your name".

"Aargh," he groaned. Just as his thirst was slaked, the pain in his flank started to fill his consciousness.

"It is a moderate bruise," Sophie said, "but nothing serious from the look of it."

"Time is short and we must move soon," said Elnath. "We've already lingered too long waiting for him to wake up."

As if to confirm this statement, faint shouts and a soft shrill whine reverberated down one of the tunnels leading into the cavern. The group turned towards the sounds, with looks of consternation.

"Can you run?" asked Sophie.

“I think so,” replied the Stranger.

“Let’s put it this way,” said Elnath in a forceful whisper, sliding his right arm under the Stranger’s left and hauling him up to a seated position. “MOVE!”

He gave the Stranger barely enough time to don his jacket.

The next few minutes were a blur. Sophie grabbed his right arm. They placed his arms over their shoulders and dragged him onto his feet. He felt himself moving along rapidly, one foot after the other, light headed with the sudden upheaval.

The other two in the group picked up the lamps and made up the front guard, lighting the way ahead, down another tunnel in a direction away from the shouting.

Most remarkable was the speed and silence with which they moved, their padded sandals helping to dampen their footfalls. The loudest sounds made were the breathless pants and grunts of pain emanating from the Stranger.

“Keep your screaming down to a quiet roar if you wish to stay alive,” whispered Elnath. “I’ll shove this cloth down your mouth if I have to,” he indicated a dirty rag tucked in his cloth belt.

For an interminable exhausting time they raced down the winding tunnels, taking turns at bewildering forks and intersections.

Abruptly they stopped.

Elnath pointed down and to their left, indicating the entrance to a tiny side tunnel, easily missed, if one were not already aware of its existence. It was just over two feet high and blocked by a grille with vertical bars. He took out a knife, hunched down and dug around the edges of the grille then pulled it free. He motioned the others to get in. They consecutively squeezed into this side tunnel, moved along for about ten metres then stopped. There was barely room to turn around. Elnath climbed in last, replaced the grille behind him then joined them. Sophie turned to the Stranger and placed her index finger against her lips, urging him to keep quiet. They extinguished their lamps, hunched down and waited.

Once more there was silence save for the low rumbling vibration. Out of that silence emerged the sound of distant voices again, accompanied by a soft high pitched wailing noise. This eerie screech, like the continuous cry of a banshee, began growing in intensity to reach a sickening peak, creating a sense of visceral dread in their guts. From deep within the side tunnel the blue skinned

fugitives watched legs go by in the main passageway. Their pursuers were men with normal flesh coloured skin, bearing oil lamps and carrying swords, and in their midst, two tall hooded figures in black shrouds each carrying razor sharp scythes with long shafts. These two Grim Reapers hovered six inches above the ground and glided smoothly along, legs unmoving. That is, if they had legs at all under those robes. The nauseating continuous screaming sound seemed to emanate from them. The screech gradually faded away as this peculiar party moved on.

The blue skinned fugitives and the Stranger continued to sit silently in the side tunnel for what seemed an eternity, but in truth was perhaps just another half hour.

Elnath then crawled up to the entrance grill of the side tunnel and peered out into the darkness, squinting towards the left then right. He turned his head back and spoke under his breath. "Lights on, Markab."

The other man lit the lamps using flint and dry tinder he carried in a pouch.

Elnath removed the grill. "Exit," he instructed. They streamed out of the side tunnel.

The group started navigating again within the main labyrinth, this time at a more reasonable pace. The Stranger was now able to walk unsupported but had considerable difficulty keeping up with his new acquaintances. He continued to wince from his aches and pains every now and then.

Making way through one tunnel they encountered a bizarre sight. On the ground were the flattened desiccated remains of a man, brains squashed out of his skull and entrails squeezed out of his abdomen. Dried remnants, which had been compressed flat like a pancake, which appeared months, if not years old. The Stranger looked up at the ceiling of the tunnel and saw a mirror image imprint of the corpse staining the roof.

"What the hell is this?" asked the Stranger.

"Roadkill," said Sophie as they walked past.

"Alas, poor Warwick," said Elnath, "I knew him well."

They finally came to a stop. They had reached a ladder. Actually, not so much a ladder as a set of rungs embedded in the wall of a vertical flue leading upwards. They climbed the rungs. Reaching the top, Markab, the point man, pulled a lever opening the

cover, letting in a rush of cool air. One by one they clambered out. They set foot onto moist grass. It was night. All was quiet except for the raspy sound of a few crickets.

Overhead it was deep dark blue with a faint diffuse background glow, reminiscent of the sky at night in high latitudes during summer.

The Stranger felt a steady slow drizzle from above. The droplets, combined with sweat, made a slurry with the dirt in his hair which was now a matted tangle on his scalp. Beads of water trickled down his neck inside his collar.

The air, although cool, gave off a faint putrid aroma - almost like rotting flesh.

He surveyed the surrounding landscape and saw flat terrain with a few low undulations. The ground curved gradually to the sides, giving him the impression that they were in a wide valley. Directly above, low clouds patchily covered half the sky, but looking horizontally the clouds overlapped and merged, completely obscuring any horizon. Fields were laid out in rectangles separated by narrow lanes. There was a copse of trees fifty metres to the left. Scattered about were clusters of low shacks at regular intervals. None had any lights on, suggesting the occupants were either asleep or absent.

They took the Stranger through the field of crops on their left. The plants almost reached shoulder height. As they entered the field, Markab placed a hand on the Stranger's head and pushed him down. "Keep your head low and move along quietly," he ordered.

As they progressed, the Stranger noted the vegetation - leaves mottled with fungus, riddled with holes. Many of the plants were wilting. And so they continued, hunched down, trudging through wet vegetation. They reached, then walked through the copse of trees, eventually emerging at the other end to find a run down isolated hut. They furtively bundled him into the hovel, which was nearly pitch black inside, save for the dim blue background glimmer coming through the windows. Markab pulled the ragged curtains across the windows, Alhena and Sophie set the lamps on the ground and kept the lights low. Elnath bolted the door behind them. The half light cast long shadows in the main room - a wooden table with chairs, a couple of cots, a basin and a primitive wood burning stove.

Conversation with the Stranger

The four blue skinned people and the Stranger had taken refuge in a shack at night.

“Let’s start again,” said Elnath. “Who are you and where are you from?”

“I would tell you if I could,” answered the Stranger, rubbing the back of his head and wincing, “but I can’t remember how I got here. I can’t remember anything. What is this place, anyway?”

“It must have been the blow to his head,” Markab said.

“Or he is faking,” said Elnath.

“This is Purgatory,” Alhena commented. “You are not of this place. Your clothes, they are so beautifully made, the fabric is so fine.”

The Stranger wore a light silvery jacket over a simple collared red T shirt and black polyester pants. His shoes were regular sneakers. Nothing special at all, he thought. “Purgatory? Is that just the name you gave this place or do you literally mean that this is some sort of limbo between heaven and hell?”

“Purgatory is the way station to our final destiny,” Alhena answered, “which may be eternal salvation or perpetual damnation. It is where we face the tribulations which will determine our ultimate fate. We were born here, or I should say, re-born here. We grew up here and will die here.”

“I don’t belong here, that much I’m sure,” the Stranger said. “But I can’t remember anything before waking in the cavern. How did I get there?”

Sophie answered this time. “We don’t know how you entered Purgatory. We hoped *you* could tell us. We heard a commotion, a loud skirmish from the sound of things, at the North forbidden zone. And then, emerging from that zone, it was you: a man not of this place, a thing unheard of in all our lives. We had to see more. We hid in shrubs a distance from the road. We watched you being marched down the forest avenue by the guards, probably being taken to see the Overlord. As you passed by, your party was hit by a roadbump, a big one, it uprooted a few trees.”

“Roadbump?” asked the Stranger.

“When the ground suddenly rises from beneath your feet,”

Sophie explained. "Roadbumps happen without warning, mostly small ones which cause no harm. Some say they are caused by the violent spasms of huge underground monsters. Others blame pockets of exploding gas underfoot. We don't really know what causes them. That roadbump threw you and the guards up fifteen feet into the air. One guard broke his neck in the fall and died. Another was knocked out, like you. The others lay dazed for a few minutes, their weapons scattered. We seized the opportunity to grab you and spirit you away into the tunnels."

"I've never seen people with blue skin before," the Stranger remarked.

"It is our mark as outcasts," Sophie said. "Those of us banished from the graces of the Overlord are inflicted with this colour. I was banished just two months ago. As blueskins we are shunned. We cannot work or trade and we must beg or steal to survive. If we go above ground in the day we are attacked. We can only wander in the open at night and even then risk being pelted. A wretched existence. But we live in hope of salvation. Some say an outlander will come to deliver us from our misery."

"Those letters N.O.E. on your clothes," Alhena interjected, "what does that mean? Is that your name?"

"I have no idea," he said.

"Tell us, Stranger, are you the One?" Alhena asked.

"The One? What One?"

"The Chosen One, our Messiah."

"You think I'm some kind of saviour? Look at me, I'm a mess," he said.

"Your clothes are of shimmering and coloured fabric, with strange symbols and attachments. What is this?" Alhena pointed to the middle of his jacket.

"Haven't you seen a zip before?" he asked. "It opens and closes the jacket." He moved the catch of the zip up and down, to Alhena's utter fascination. "I don't mean to be rude, but your clothes look pretty shabby by contrast," he observed.

"Raw cotton and raw wool are all we have in Purgatory. And animal skins of course," Sophie said. "Nothing as beautiful as what you wear, except for similar material I have seen worn by the Overlord. Perhaps we are mistaken, perhaps you are here to join the Overlord in his oppression against us."

“I don’t think so, at least I hope not,” said the Stranger, “but I don’t know you and you don’t know me, so I guess it’s hard for us to trust each other.” He paused a while. “Those two guys in black robes in the tunnel, floating above the ground and that god awful screeching sound, what was that all about?” the Stranger inquired.

“Dubhe and Merak, The Angels of Vengeance, instruments of the Overlord,” Markab explained. “They deal out death by His orders. Those who die by their hand are certain to go to Hell, so it is said.”

“Holy shit!” the Stranger said. “This is one scary weird place.”

“It is all we know,” Alhena said.

They sat in silence for a while.

“Do you have any food?” the Stranger asked.

“Of course, you must be hungry,” Sophie said. She went over to a cabinet and opened it, taking out some items wrapped in cloth and brought it to him.

“Thank you,” said the Stranger. He opened the cloth to find small pieces of dried salted preserved meat and half a loaf of stale bread. At first he very tentatively tasted the morsels. Finding them only mildly unpleasant, he then gratefully scoffed the lot. He washed it down with more of the fetid water from the leather flask.

Sophie turned to Elnath. “So what do we do now?”

“I don’t know about you guys but I could do with some rest,” the Stranger interjected.

“Very well,” Elnath said, “but we must leave before first light. I’ll take the first watch.”

The rest of them slept.

Praise the Lord – He needs reassurance

The little girl was about eight years old. She walked through the market place holding her father’s hand. They ambled from stall to stall, examining the wares, turning over a pot here and a trinket there, enjoying the sights and smells.

Suddenly there was a commotion. An emaciated bearded unwashed man with blue skin wearing rags ran through the crowd.

“Stop that blueskin!” a voice called from the distance.

The blue man stumbled, tripped and fell over. The food scraps he was carrying spilled onto the ground, directly in front of the girl.

The little girl recognised him. "It's Eridanus, the carpenter. Mr Eridanus, what happened to you? You've got so thin and your skin has turned all blue..."

"Young Sophie, don't look at me, please. I'm so ashamed..." Eridanus said.

Vulpecula, the hefty grizzled butcher caught up to them. "There's that miserable thieving turd. Pilfer food from an honest working man, will you? I'll teach you a lesson you won't forget in a hurry..."

Sophie's father, Sabik, stepped in. "Vulpecula, I know this man - you know him also. He was our village carpenter - he was banished for heresy, but I believe he was a good man. Let me pay you for what food he may have taken..."

"Banished blueskins have no rights - the Overlord has proclaimed it," Vulpecula said. "Eridanus is an atheist, an adulterer and a thief. Normal folk wronged by blueskins can punish them as we see fit with impunity. Eridanus had an affair with my wife and now he steals from me. I'll give him a few cuts to remember me by..."

Vulpecula drew his butcher's blade and raised his arm to slice at Eridanus.

Sabik stepped between them and seized the butcher's arm. "This is not the way Vulpecula, give him a chance."

"I have no quarrel with you, Sabik," Vulpecula shouted, "so back off! I demand satisfaction. Now that Eridanus has been banished for displeasing the Overlord, I can take my revenge!"

Vulpecula struggled with Sabik, who tried to pry the knife from his hands. As they grappled they lost balance and fell to the ground, the big framed Vulpecula on top of Sabik. Sabik let out a yell, with a surprised expression on his face.

"Oh my, oh my," Vulpecula said, as he rolled off Sabik.

The knife was buried to the hilt, deep within Sabik's chest. Sophie let out a piercing scream. "Daddy!! Daddy!!..."

The market scene dissolved into a puddle of water, revealing Sophie, now age twelve, sitting at her desk in a small

classroom.

The teacher was a small benign looking grey haired woman with librarian spectacles, wearing a scarf on her head. “Well, children,” she said, “I hope you’ve done your homework. Let’s go over lesson one again. Mirzam, tell me who the Overlord is.”

“The Overlord is the avatar of God our creator, the physical incarnation of God,” a spotty faced little boy said.

“And how do we know the Overlord is God?”

“First because he is immortal, second because he is all powerful, third because he is all knowing,” Mirzam answered.

“Correct! Now Hamal, tell me the paths to salvation,” the teacher asked.

“The paths to salvation: First, never ending praise of the Overlord. Second, belief without question. Third, obedience without argument. Fourth, work without complaint. Fifth, avoidance of the forbidden zones,” another little boy said.

“Very good, Hamal. Now Aludra, tell me of the forbidden zones”.

This time a little girl answered. “The forbidden zones: First, seek not to climb up the pylons to heaven. Second, seek not to descend down the bowels of earth. Third, seek not to enter the end zones.”

“Excellent, Aludra. It seems you’ve all studied hard. Do you have any questions?”

Sophie raised her hand. “I’m confused about some things Ma’am. During the last lesson you said that nothing can exist without a creator. We know that God exists. Therefore surely God must also have a creator. So who created God?”

The teacher smiled. “I can see that you need a special lesson, Sophie.” The teacher slowly walked up to Sophie, pulled out a wooden ruler then abruptly smacked Sophie on the wrist, causing the little girl to jerk away with a start. “Blasphemy! Are you some sort of atheist? If you were not an ignorant little child, you would surely be banished for such sacrilege!”

Sophie tried to explain herself as tears welled up in her eyes. “I’m sorry Ma’am, I’m only trying to understand things. For example, we are told the first path to salvation is never ending praise of the Overlord. But if the Overlord is all wise and all powerful, why should he need praise from insignificant creatures like us? Surely an

almighty creator would be above the need for such vain ego boosting?"

"Vain ego boosting? My God, Sophie!" the teacher exclaimed. "How dare you question the divine doctrines!" She grabbed Sophie by the front of her frock, pulled her off her seat and started slapping her across her face. "How dare you hold such evil thoughts and say such evil things! Any more of this heresy and you will surely go to hell! Go to hell! Go to hell! Go to hell!..." the teacher's voice reverberated, as she continued to slap Sophie repeatedly across her face...

Sophie woke with a start. "Stop! Stop!" she yelled, waking all the others in the shack as well. It was still early hours of the morning, still dark.

"What's wrong?" the Stranger asked sleepily.

"Just a bad dream," Sophie replied, "sorry".

Elnath sat on a chair by a window, fingers lifting the side of the curtain and peering out. "Go back to sleep," he said.

Sophie tried. She lay quietly for a while, then tossed and turned in an attempt to get comfortable, but could not return to sleep. She pulled something out of her pocket, looked at it and put it back. "Listen, Elnath, I can't sleep. I may as well start my watch now."

"As you wish," Elnath said.

The Stranger spoke next. "Sorry to trouble you folks, but I need to use the toilet."

"I'll show you where it is," Sophie volunteered.

"Take Markab with you," Elnath said, at the same time getting up and handing her the knife, "and take this with you as well, just in case."

"Where are we going? I saw a toilet just over there," the Stranger pointed to an adjoining room, the door slightly ajar.

"That's nothing," Alhena said, "just useless old artefacts."

The Stranger got up, walked to the door and opened it. It was an old washroom, no longer usable. The porcelain bowl was cracked and full of stones and dirt, as was the sink. He turned the taps but no water came forth.

"Outside," said Sophie, opening the main door. She brought a lamp along but kept the flame dim. Sophie and Markab

led the Stranger out of the shack to a small rickety outhouse erected around a pit in the ground. Water for washing came from a tank fed by rainwater collected from the roof gutters. The Stranger seemed surprised by the arrangements. Sophie and Markab waited by the outhouse for the Stranger.

Just then, they heard loud shots and screams coming from the shack and saw bursts of red light from within, flashing through the windows of the shack.

Sophie banged on the outhouse door. "Get out! Get out now!" she urged.

The Stranger did not need further inducement, he immediately bolted out and fled with them. Sophie led the way, followed by the Stranger, with Markab guarding the rear. They ran toward another field of crops.

A sonorous booming voice called out to them from the door of the shack. "Halt or feel the wrath of the Overlord!" It was a hooded figure in a black robe, one of the Grim Reapers. He pointed the lower end of the staff of his scythe at them and multiple consecutive bursts of red light shot out from it, streaking toward the trio, one which struck Markab in the back, felling him immediately. Sophie and the Stranger halted abruptly, backtracked a few paces to try to help Markab, who had a gaping hole in his chest and was obviously dead. More red lightning bolts shot towards them, missing by inches.

"Come on," Sophie grabbed the Stranger's arm and pulled him away, leading him into the vegetation. Once again they hunched down and raced between the tall plants, brushing against wet leaves. By luck and local knowledge they were able to outdistance and elude Death and his entourage. They came upon another vertical flue, three feet high and three feet in diameter. Sophie opened the top cover. "Get in!" she urged and the Stranger promptly complied. Sophie followed suit and shut the lid behind her.

Sophie had somehow managed to hold on to the lamp during their flight and now turned up the flame for illumination. Yet again they wandered through the labyrinth for an interminable time and came to another cavern where they stopped to rest.

"Is it safe now?" the Stranger asked.

"Shhh..." Sophie cautioned, and they maintained silence for a while. "We're probably safe for the time being," she offered.

The Overlord is outraged

The palace of the Overlord was not terribly large nor ostentatious as palaces go, but then again, the inhabitants of Purgatory had no experience of any other palace. It was constructed with forty foot high ceilings and a long approach hallway leading up to the Overlord's throne on a raised dais, all intended to inspire "shock and awe" in those who were fortunate or unfortunate enough to be summoned before him. Coloured glass and polished metal fittings abounded in the hall, considered rare and valuable materials in Purgatory, trappings befitting one so exalted. Sufficient to impress simple folk used mostly to roughly hewn wooden goods.

The Overlord sat on his throne, clad in his silky iridescent blue robes. His shiny bald pate reflected light from the electric lamps overhead. "So you lost him again."

Menkalinan, Captain of the Guard, knelt before the Overlord at the base of the steps to the dais, trunk bent forward in supplication, head bowed and arms spread wide. "My lord, we had him the first time and were bringing him to you, but we were unexpectedly hit by a roadbump. In the confusion some blueskins stole him away. We searched the tunnels but couldn't find him."

"And the second time?"

"He wasn't in the hut with the others. We saw him outside and gave chase but he eluded us."

Just then, the two Angels of Vengeance entered the chamber and came floating down the hallway, accompanied by the nerve jarring high pitched screeching sound so often associated with them.

"For fuck sake, turn off that god damned racket!" the Overlord yelled.

"Sorry my Lord," one of the Angels replied. Both Grim Reapers reached down under their black shrouds and fiddled about. Abruptly the screeching stopped and both of them dropped six inches onto the ground. They each picked up a chunky board measuring one foot by three feet which they held under one arm, held their scythes in the other arm and walked down the rest of the hallway towards the dais.

"Dubhe and Merak! Did you ever stop to think that maybe that infernal noise could alert others of your approach? Have you

ever heard of stealth and surprise?” the Overlord admonished.

“Yes, my Lord, I turned mine off when I approached the shack, but we still missed apprehending the Stranger there,” the one named Merak said.

“So anyway, what do you two geniuses have to offer me?” the Overlord said, with a dismissive flick of his wrist at the Angels.

“Just a matter of time before we find him my Lord,” said the one named Dubhe. “We already killed three of the blueskins who helped him, just one more to go. And the Stranger himself, of course”

“Listen to me, you ham fisted twits,” the Overlord blurted out. “For once, why don’t you consider capturing people alive? Or is that simple concept beyond the understanding of your tiny little brains? Your orders were simple - just bring the Outsiders to me. Instead, you slaughtered all the Strangers but one. And you allowed the blueskins to steal that last one away.”

No answer was forthcoming.

“My lord,” Merak broke the silence, “the Outsiders were not as cooperative as the subjects we usually deal with. They either tried to flee or to fight. It appeared that the only language they understood was violence.”

“Perhaps it is you who only speaks the language of violence,” the Overlord remarked.

“Sire, I swear we will have him within a day, two at the most...” Menkalinan, the Captain of the Guards tried to appease him.

“You have forty eight hours,” the Overlord retorted.

“My lord is most generous and merciful,” Menkalinan said.

“Failing which we’ll cut off your balls and feed them to the pigs,” threatened the Overlord.

Conversation with Sophie

Three blueskins, Elnath, Alhena and Markab, had been killed by Merak, one of the Angels of Vengeance. Sophie and the Stranger managed to escape and they once again found refuge in the underground tunnels.

“We’re probably safe for the time being,” Sophie offered.

“This is one miserable shit hole of a place,” the Stranger complained. “Tell me more about Purgatory.”

“I hate it here,” she said. “We are taught that our suffering occurs because of our sins from a past life - it is our Karma - and we must pay penance and fulfil our duties to achieve redemption.”

“What duties?”

“To praise and serve the Overlord.”

“And do you believe that?”

“I don’t know what to believe,” Sophie said, “it’s all so confusing. We are told that those who question the doctrines are damned. Only those who have faith in the divine mysteries will be saved. Anyway, ultimately we have to do what we are told or we are banished. Asking questions is dangerous. So most people just accept things and go with the flow.”

“And what about you?”

“As a small child I accepted things,” she said. “My father died when I was eight. Nothing made sense to me after that. From around age twelve I started to ask difficult questions. I was shouted down and ridiculed by the religious teachers every time. Struggling against the current was emotionally draining and I felt isolated. The other kids considered me a misfit and a troublemaker. I considered them brainless sheep. After a while I stopped asking questions aloud, but the questions still remained, nagging inside me. The alternative was to conform, to try to belong, which I did for a long time. But running with the herd felt so self alienating, like I was betraying myself. Gave me a sick feeling in my stomach.”

“And were you banished as a disbeliever?” the Stranger asked.

“No. Because of something else,” Sophie said. “I was chosen as a concubine for the Overlord, a great honour, they said. I was washed, perfumed, clad in fine muslin and taken to his bedchamber. Without his fancy robes on, he looked like a disgusting freak. Not a single hair on his body from head to toe, not even eyebrows. He looked...so...so...I don’t know how to describe it...slimy. I couldn’t bear to let him touch me. He wouldn’t stand for my rejection and he beat me unconscious. Then he banished me.”

“That Overlord sounds like a real shit. Not like any merciful God that I know. But how did you get your blue skin?”

“They injected something into my veins. In the space of a week my skin gradually turned blue. They cut my hair off and at the next Proclamation Day they announced my banishment in front of

everyone.”

“How did you meet the other blueskins?”

“I was cast out of my abode and had to sleep in the open, in the rain that night. The other blueskins found me. They explained how we had to hide in the tunnels in the day or risk being beaten or even killed. We could only roam about above ground at night, and even then we had to avoid common folk. Sometimes kind people would leave food for us on their doorstep, but we stopped eating those offerings after some of us got poisoned.”

“Hiding underground. Like Morlocks,” the Stranger commented.

“Like what?”

“I don’t know, it’s just a word that popped into my head,” the Stranger said.

“So things are a lot harder now,” Sophie said, “but at least I don’t have to pretend any more that I believe their teachings. The sick feeling in my stomach has gone. It’s been replaced by hunger now.”

“One thing I’m pretty sure of,” the Stranger said, “is that this place is not a staging post to a better life. There are millions of places beyond Purgatory that you can hardly begin to imagine. We just need to figure out a way to get out of here.”

“How do you know that?”

“I just know.”

“Is your memory returning?”

“I think it must be, gradually.”

“You found your way here from someplace else,” Sophie said, “so there must be a way out.”

“We just have to find out how,” the Stranger agreed.

The Stranger felt a wave of fatigue come over him. The night’s exertions had taken their toll and the little sleep he had managed to snatch earlier had not refreshed him at all. “I could do with some more rest,” he said.

Sophie rummaged in a pocket and pulled out a digital watch with a broken wrist strap, which had the logo *Chronos* inscribed on it. “It will be light by now on the surface,” she said, “so we can’t do anything till next nightfall anyway.”

The Stranger found it surprisingly incongruous that she had in her possession this electronic device, when everything else about

these people seemed so backward. “How did you get that watch?” he asked.

“One of the few working magical artefacts from olden times,” she said. “This timepiece belonged to my father who inherited it from his father. It is strictly forbidden to keep artefacts, but I made a secret pocket for it in my clothes and managed to hide it from the Overlord’s guards.”

“It’s not magical,” the Stranger said, “it’s technology.”

“Technology?” Sophie asked, “what does that mean?”

The Stranger explained about machinery and constructions based on science, another word she had not heard before. All extremely odd, he thought.

They rested.

STEALING THE MARCH

“Mars-Earth opposition occurs Saturday June 3, 2048. A mission to Mars planned around that event will need to launch early to mid February 2048 in order to arrive mid to late September 2048” - NASA advisory document.

Lance Boyle was his name. He somehow managed to win the office of the President of the United States of America in January 2045 despite the pustular connotation of his moniker. Indeed, pre election surveys among supermarket shoppers showed that the irony of his name was lost to ninety percent of the general population:

“Lance, yeah, I think it’s a cool name, kind of biff sounding...”

“Boyle - good old solid Anglosaxon surname...”

“Lance - reminds me of Lancelot - makes me think of the glories of Camelot...” And so forth.

Such blissful ignorance must surely have been shared by his parents. The only other explanation was that his parents had a particularly cruel sense of humour.

The spin doctors did have a contingency plan however, should his name bring about ridicule. They would turn it around. Slogans included, “He’s the man to slice out the pus from the infections plaguing America”. And so on.

In disposition and physical stature President Boyle was probably best described by that famous Hobbesian phrase, albeit applied in a different context: he was nasty, brutish and short. Had he lived eighty five years earlier, he could have easily been mistaken for an American version of Khrushchev - bald and bellicose as he was.

It was true that his appearance and character ran contrary to the usual tall, folksy affable types traditionally elected to the office of President. He suffered from small man syndrome and felt a huge need to overcompensate. His great talent was the ability to demolish, humiliate, befuddle and ridicule his opponents in debate. It was this skill which, widely demonstrated on nationwide television, convinced the American people, sick of the blandness of previous party front men, to send him to the White House.

Boyle ranted and raved so often, so hard and so long, that his voice now permanently acquired a gravelly quality. To help alleviate his hoarseness, he always kept a drink at hand. Holding a cup or glass also served as a form of nervous displacement activity, a way of occupying his hands ever since he gave up smoking.

His physically compact and menacing appearance brought about the myth of a pugilist past and he did nothing to discourage such rumours. Indeed his not infrequent allusions to his “days of college boxing” or “when I used to box in college” actively promoted this misconception. However, investigative reporting by intrepid journalists poring over old records revealed a different story. Rather than a “has been”, he turned out to be a “never was”. The only boxing he had ever done was packing boxes in his college mail room to earn extra money. Therefore, technically speaking, he had not really been lying about his college boxing after all.

***Date:* June 2046**

***Location:* The Oval Office, The White House, Washington D.C.**

Present:

- **Lance Boyle, President of the United States**
- **Peter Dogowitz, Director of the Central Intelligence Agency**
- **Anthony Manetti, Director of the National Aeronautic and Space Administration**

Lance Boyle barked loudly at his staff, thumping his right fist on his desk. “Goddammit, why didn’t we know about it? I wanna know why we didn’t see this coming. We’ve been blind-sided. The Chinese have been planning this for four years you say?”

Peter Dogowitz, Director of the CIA, attempted to appease the President. “I assure you, Sir, that heads will roll.”

Boyle’s complexion was an odd purple pink. “I heard you found out from the Europeans – that they knew a year ago but didn’t tell us till now.”

“They didn’t intend to tell us at all. However the Belgian ambassador got drunk at a dinner function and let it slip,” Dogowitz explained. “He said the Chinese had deliberately downplayed their capabilities. He said he couldn’t believe we swallowed the Chinese line that they were building orbiting space stations, when it was obvious they were planning interplanetary travel.”

“OK, so what do you smart asses reckon we should do?” asked Boyle, inviting suggestions.

Dogowitz started to reply. “Just because they’ve stolen the march on us...”

“You could say, the Long March...” interrupted Anthony Manetti, Director of NASA.

Dogowitz glared icily at Manetti and cut him off. “Just because they’ve stolen the march on us doesn’t mean we can’t catch up.”

“Long March - that’s the name of their rockets, right? I know that much,” Boyle remarked, pleased at his own erudition.

“Yes Sir,” Dogowitz said, “presently the Long March Generation 25 - they haven’t had a lot of imagination with new names...”

“Whatever,” said Boyle dismissively. “So when do they plan to launch their Mars mission?”

Manetti called upon his background as a NASA scientist. “Launch windows occur once every twenty six months or so, when Earth and Mars are approaching opposition, their closest point. The last launch window was December 2045, seven months ago. The next launch window will be about twenty months from now, around early to mid February 2048, to enable scheduled landing in mid to late September 2048.”

Boyle’s previous eruption had settled down to a low simmer. “Look, we’ve got to show the world that America is still Number One. That we don’t take no shit from nobody.”

“We could’ve completed a Mars mission by now if NASA’s funding hadn’t been cut in 2010,” Manetti commented.

“Could’ve, would’ve, should’ve,” Boyle sneered. “Afghanistan and Iraq were just too costly. We couldn’t get the Afghan pipelines or Iraqi oil wells to flow properly as we planned - mostly went up in smoke - all those damned terrorists. Our economy was bleeding dry propping up those puppet regimes and fighting the saboteurs. We had to cut costs somehow, so NASA was the first victim.”

“Mr President, surely this calls for urgent action to restore our national prestige,” Manetti pleaded NASA’s case.

“I agree,” said Boyle. “I feel like goddamn Eisenhower when he found out about Sputnik back in 1957. Shown up by those

damn Russians. Spewing bricks. And then Gagarin happened. Another slap in the face. Caught us on the back foot. So we had to show the world then that we were better than those damned Ruskiies, we had to overcompensate by landing a man on the moon. The most expensive damn fool program ever at the time. It seemed dumb to spend more money on sending a man to Mars until now. Until now. OK. How soon can we get a project going?"

"It'll take more than two years to put together a proper program," Manetti offered.

"Two years!" Boyle's veins started to bulge on his forehead again. "Dammit, I want it done sooner! What about the next launch window, twenty months, you say?"

"Well Sir," Manetti said, "much of the planning and some construction was done decades ago, which saves us a lot of time, but it will still be a rush job. The trip to Mars takes about seven months when the planets approach their closest. We'll have to launch two or three unmanned advance supply modules. They'll be lined up along the route to Mars. The manned ship will meet up with the modules on the way there as well as on the return leg to replenish food, water and some air. The manned ship will also discharge waste en route. We must also launch an unmanned module to land on the Martian surface to provide supplies, shelter and a ground vehicle for the landing crew. This advance lander will also manufacture fuel on Mars which will be used to return the ground crew back to the orbiting mother ship."

Boyle's attention had lapsed, eyes glazing over momentarily. "Sounds pretty complicated. Tell me, what the hell happened to the huge lead we had in space?"

Dogowitz now jumped in. "Once the Chinese, Japanese and Koreans put aside their differences and got together ten years ago, the North East Asian Trade Organisation focused their attention on one thing: the search for new resources, especially new energy sources to replace fossil fuels. I don't have to remind you, Sir, we've just about run out of petroleum at this time."

"Yes," said Manetti, "I believe the NEATOs were looking specifically for rich deposits of uranium and it seems they found it. That's why they are going to Mars - for uranium."

Boyle continued to fume. "North East Asian Trade Organisation. I hate that name, NEATO. I swear they chose it

because it sounds kind of cool. Or like some kind of breakfast cereal. NEATO. Sounds a bit like our old NATO, but that fizzled out twelve years ago when Europe split from us and teamed up with Russia. Damned traitors. So NEATO can't be confused with NATO now. Much better if we could use a sinister title for them. A name that puts dread into the hearts of all God fearing Americans. I liked the old term yellow peril myself. Maybe we can call them red commie bastards or something like that..."

"Politically Sir that would be a little hard," Dogowitz advised. "Anyway, they're probably more capitalist than even we are these days..."

Boyle was losing patience. "OK, OK. Here's the thing. I want you to send off a Mars expedition next window period, twenty months from now. Round up ten thousand engineers or however many you need. They'll have to drop whatever they're doing and get on to Project Mars right now. Starting today. Work round the clock. I don't care what it costs, whatever it takes. Use those fucking Europeans as well if you have to."

President Boyle picked up a glass of water and took a few sips to ease his hoarse throat.

"Sir," Manetti cautioned, "if we run a joint program with the Europeans, they will demand equal property rights over everything we find. Also we just found out they are already well into construction and planning of a Mars expedition of their own ..."

Boyle abruptly choked, then spluttered, expelling a spray of droplets into Dogowitz and Manetti's faces. "What? Has the goddamn CIA been goddamn comatose? How come we didn't know about that? OK, OK. Then don't use the goddamn Europeans. But you have twenty months, goddammit."

"Yes Mr President," said Dogowitz and Manetti simultaneously, wiping Boyle's saliva from their faces.

VICTORY FOR AMERICA

20 + 7 months later: September 25, 2048

There were two reasons why extra altitude was called for. First, without the added height, all the audience could see was what appeared to be a shiny pink bowling ball bobbing up and down behind the lectern. Second, he needed greater elevation to see above the edge in order to read the teleprompter.

Lance Boyle stood on a soap box as he delivered his extraordinary State of the Nation address on live television:

“Mah fellow 'Mericans, I stand before you today to announce a supreme historic 'Merican achievement. You will be aware that over the last couple of years there has been an intense race between the great nations of the world to land a man on Mars. I take great pleasure in declarin' to you today that 'Merica has won that race. Coming from behind, good old 'Merican ingenuity has once again triumphed over immense obstacles to wield the flamin' torch of victory. As many of you have already seen by now from the television broadcast, at 0543 hours Eastern Standard time today, the landing craft George Bush Jr, carryin' three of our brave astronauts landed safely on Meridiani Planum, a plain on the equator of the Red planet...”

And so he continued to wax lyrical for another ten minutes.

After completion of the speech there followed an orgy of congratulations, backslapping and handshakes.

Anthony Manetti, Director of NASA, pumped hands vigorously with the President. “Sir, I would like to thank you for allowing us to name the orbiting and landing ships after the two great Presidents who first promoted the idea of a Mars mission. It was a fitting tribute, almost poetic in a way.”

“Hell,” Boyle replied, “you could have named them Heckle and Jeckle for all I cared. The important thing is that we pulled it off.”

Peter Dogowitz, CIA Director, also approached Boyle, respectfully requesting an audience. “Mr President, may we have a private word with you please?”

“Of course, of course, Pete, Tony, come join me in a glass of champagne,” Boyle said, taking them to one side. “It’s a great day in the mornin’, guys, a great day indeed. Makes me swell with pride to be an American. First men on Mars! We did it with the Moon, now we’ve done it with Mars! Think of that! We beat those goddamn Chinks and those Japs and those Ruskiies and those Krauts. We’re still the best and don’t let anyone tell you any different!”

“Absolutely Sir. The best, that’s what we are Sir,”

Dogowitz agreed. “Begging your pardon Mr President, but I’m here to let you know about some new information which has just come to light. Do you remember how the NEATO ship reached Mars first, but just orbited around without landing any crew?”

“Do I ever, beat us there by a week! Damn lucky for us they had problems with their landing craft. Actually, no, it wasn’t luck. Just another example of our superior technology, made in the good old US of A. You can’t beat that, I always say.”

“Well, Sir,” Dogowitz added, “it turns out they never had a landing craft. They never actually intended to land.”

“What? That’s crazy. Why send a ship to Mars and just go round in circles? How are they going to mine Mars for uranium?”

Manetti joined in. “It appears Mr President, that they never intended to mine Mars for uranium. Calculations have shown that the known Martian surface deposits of uranium are very sparse, very difficult to reach and very costly to extract. Added to the energy needed to launch material off the planet, to reach escape velocity, to send it to Earth, all that would cost more than the energy value of the Martian uranium itself.”

Lance Boyle pondered in silence awhile. “OK, so the trip didn’t make economic sense,” he then remarked. “Maybe that don’t really matter anyhow. We got terrific political capital being the first men on Mars. What the hell do I care if those goddamn commies acted crazy?”

Boyle was momentarily distracted, responding to a cheer from a well wisher in the distance and raising his glass of champagne in a toast, taking another sip.

Manetti nodded agreeably. “Good point Sir. One more thing though. It seems the uranium they were interested in mining was not on Mars. Six years ago one of their unmanned probes discovered massive uranium deposits in the asteroid belt, more than

enough to supply the whole world for the next five thousand years. The uranium in the asteroids is easier to extract and costs next to nothing to send back to Earth, just a nudge in the right direction. We think they plan to use Mars orbit as a staging post, to send mining missions into the asteroid belt.”

Boyle choked and spluttered, spitting champagne in their faces. “Goddammit! You so called intelligence experts have been goddamn comatose again! Fuckin’ hell, you guys better get us on to mining those asteroids as well! We can’t let those commies have free reign! Get onto it!”

“Yes Mr President,” said Dogowitz and Manetti simultaneously, wiping Boyle’s saliva from their faces.

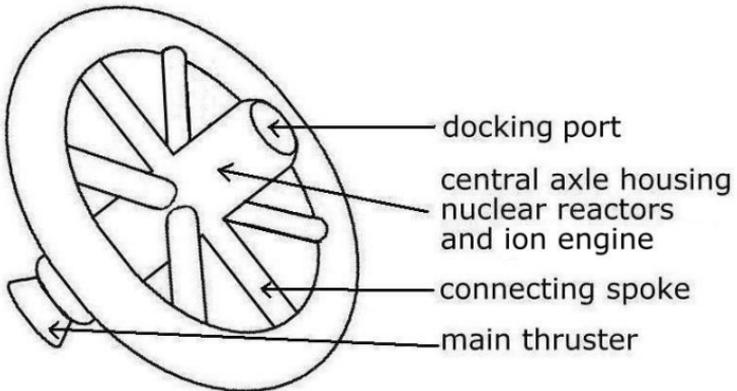
CRISIS IN MARS ORBIT

Date: January 2049 (three and a half months after arrival at Mars)

The NEATO vessel in orbit around Mars went by the name of the *Tsushima*. It had a “wheel and axle” configuration, spinning on its axis to create gravity in the rim.

Crew consisted of:

- Liu Zhang, Commander and Aerospace/Nuclear engineer
- Su-Lin Yang, Electronics/Nuclear engineer
- Akira Hasegawa, Bioecologist (Botanist)
- Jong-Sul Park, Bioecologist (Veterinarian/Zoologist) and
- Michiko Saito, Mining/Mineral Specialist and Medical officer

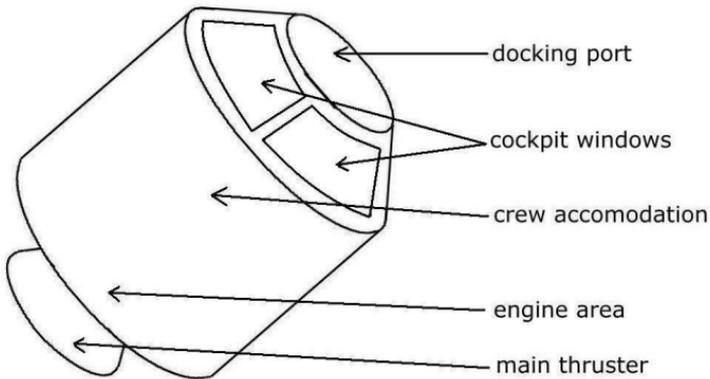


Tsushima: axle & wheel configuration

Also in Mars orbit at the same time was the American mother ship named the *USS George Bush Sr*. Its design was that of a conventional space capsule.

On board were:

- Maria Alvarez, Deputy Mission Commander and Computer/Nuclear Engineer,
- Kenichiro Musashi, Pilot/Navigator and Aerospace Engineer and
- Ross Anderson, Communications Specialist and Ecosystems Engineer.

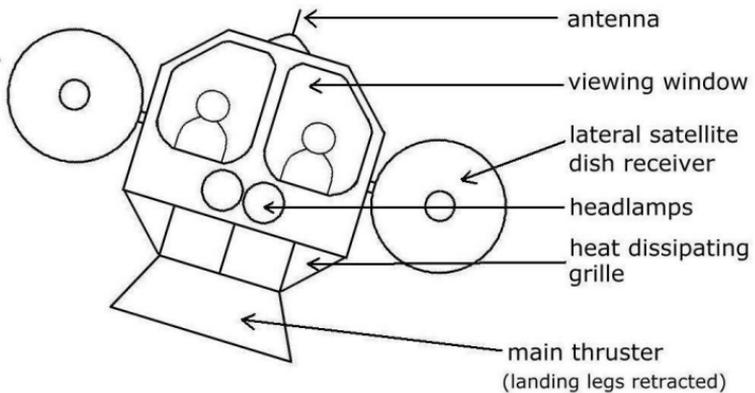


George Bush Sr: conventional capsule

The American Mars landing module was called the *USS George Bush Jr*, also known as the “Bushbaby”; a bushbaby being, of course, a small primitive monkey-like creature. This was quite an apt nickname because from the front, the landing module appeared somewhat simian faced. The two main viewing windows looked like huge saucer eyes and the lateral satellite dishes looked like large ears.

The crew of the Bushbaby comprised:

- Scott McIntyre, Mission Commander, Pilot and Ecosystems Engineer
- Leroy Johnson, Geologist and
- Penelope Armitage, Medical officer / Exobiologist



George Bush Jr. AKA Bushbaby:
the face of a primitive monkey

Date: Jan 9, 2049

Location: Mars orbit

Event: Meeting on the *George Bush Sr*

Present: Liu Zhang, Maria Alvarez, Kenichiro Musashi, Ross Anderson

A major systems failure had occurred on board the *Tsushima*. The captain of the ship, Liu Zhang, radioed the *USS George Bush Sr* about the problem, then flew across in his shuttle vehicle to the American mother ship for a crisis meeting.

Ross Anderson opened the hatch and Liu Zhang poked his head into the cabin. Also meeting with Liu were the other two American crew members, Maria Alvarez and Kenichiro Musashi.

“Hello. Hi there. I’m Liu. May I speak to the officer in charge please?” he inquired. He placed his hands on the rim of the hatch and pulled his body into the cabin, floating inwards.

“That’s me, Maria Alvarez. We spoke on the videocom earlier,” the dark haired young woman replied.

“Thank you for meeting with me,” said Liu.

“It’s the least we could do,” Maria replied.

Liu got right to business. “As you know, we’ve had a major power failure - both our primary and backup nuclear reactors have shut down. We’re running on batteries and reserve oxygen tanks now. We’ve been working non stop to restore power for the past thirty six hours. Without light in the hydroponic chambers, we’ll run out of oxygen and suffocate within the next eight hours. Unfortunately it will probably take us at least another twelve to sixteen hours to restore power, if we are able to at all.”

“And you want oxygen from us,” Maria said.

“Only a little. Just enough for eight hours,” said Liu.

“Well, I’ve looked at our inventory and I don’t think we have enough reserves to spare you any oxygen,” Maria replied.

Liu tried to hide his obvious scepticism. “But we’ve seen the plans of your ship on the Internet, including the oxygen stores. By our estimation you have enough to last you more than a week in excess of your expected requirements.”

Maria became a little annoyed. “Look, I’ll be the one to tell you how much oxygen we have, not you.”

“Yes, of course,” said Liu, “forgive my rudeness. It’s just that this is a life and death matter for us. I beg you to take another look at your oxygen stores, perhaps you may have a little more than you thought. Perhaps you can do with a little less reserve supply.”

Maria intended to remain in firm control of the situation. “Understand this. Ever since America established bases in Antarctica, it has been US policy not to assist others who run into trouble with their own expeditions. Just because you happen to be near an American facility does *not* entitle you to anything from us. We’re not some kind of convenience shop that gives away free handouts. Each of us should be responsible for our own safety. *We* launched three advance supply modules to support our mission. *You* didn’t launch any. That sounds damned irresponsible to me.”

“I am aware of your policies,” Liu replied, “written by your bureaucrats in Washington. However, by tradition, explorers have always helped each other in times of need. I appeal to you on behalf of my colleagues and myself, as fellow human beings who face death in a matter of hours. You have the power to save us. Or you can watch us die.”

Just then, a beeping sound was heard in the background.

“Maria, transmission coming through from Houston,” Ross said.

Maria turned to Liu. “Look, I’ll see what I can do. I’m not promising you anything though, so don’t hold your breath.”

Ross sniggered. “Hah! Don’t hold your breath! Good one Maria, I like that!”

Maria did a slight double take, suddenly realising the irony of her last comment, but maintained her grim expression. “Ken, Ross, watch him while I’m away,” she instructed.

“Sure thing, Boss Lady,” Ken replied.

Maria departed the cabin via a passage leading to the communications chamber, closing the hatch behind her.

Maria Teresa Colleen Alvarez was the youngest deputy mission commander in the history of NASA. She was a striking natural beauty. She had pale creamy-alabaster skin which she inherited from her Irish mother, along with a sometimes fiery temperament. This contrasted with her jet black hair and dark eyes which she inherited from her father, who was of Cuban descent.

However, rather than use her looks to her advantage, she actively downplayed her appearance. She never wore makeup and preferred to hide her firm healthy figure behind shapeless clothes. She had no time for fancy hairdos and wore her shoulder length hair simply: tied back and out of the way. She belied the stereotype of the lazy Latino or the dumb Irish. Growing up, she had rebelled against her mother's housewifely contentment and found a role model in an aunt, whose strong feminist ideals had profoundly shaped her attitudes, beliefs and behaviour. Maria had an unstoppable determination to gain recognition only through her ability and achievement. She vigorously derided anyone who had the temerity to treat her dismissively as a sexual object, counter-attacking them with scorn and ridicule. This resulted in her often appearing rather diffident towards the opposite sex, thus gaining a reputation for being something of a cold fish. This was however unfair. She readily warmed up to others, so long as they respected her as a person, acknowledging her intelligence and competence.

Kenichiro Musashi had been a college jock, a former All-State quarterback who almost did not qualify for astronaut selection. Ergonomic limitations of spacecraft usually excluded crew above six feet two inches tall, however an exception had been made for him at six foot three, some say because of his outstanding piloting skills, others say because his uncle happened to be deputy director of NASA. He prided himself in his athletic skills, strength and solid heavy set physique. Ten months of physical inactivity in space combined with boredom and an unending supply of food had however caused him to pile on considerable excess weight, though not quite yet to sumo proportions. But chubby nonetheless.

Ross Anderson was a good old Southern boy who, like Ken, had taken the path to NASA via air force fighter pilot training. He and Ken had been frat boys in college together as well as top athletes: Ross in track and field, Ken in gridiron.

Liu Zhang was wiry and taut limbed. At an unimpressive five foot nine, he was not physically imposing by any means. He too had been a pilot, but of transport planes, not fighter jets. He trained in the part time air force reserve, not the regular force. He qualified as a nuclear engineer and most of his energies had been directed towards addressing the scientific issues of the Chinese space

projects. He thought of himself as a scientist first, an engineer second and a pilot last of all. And certainly not an athlete.

While waiting, Liu tried to alleviate the stony silence. He addressed Ken. "Looks like they've been feeding you well on the trip."

"Yeah," said Ken, "we've got boxes of food coming out of our ears, Man. But none for you though."

"Naturally," said Liu, "I would expect nothing less." He paused a while then added: "You know, we have a couple of Japanese crew members on our mission..."

"That don't mean jack shit to me, Man," exclaimed Ken. "Listen, I'm a third generation American and proud of it. If Uncle Sam tells me to protect our supplies and watch you guys die, then that's what I'm going to do."

"Tough guy," said Liu.

"You better believe it," Ken replied.

Maria floated into the communications chamber and seated herself at the video terminal. She pressed a button, calling up the message from the Director of NASA, Dr Manetti. The monitor lit up with the words "*decrypting confidential transmission*" which flashed for a few seconds, following which the leathery face of a bespectacled white haired man appeared on screen:

"Dr Alvarez, further to your previous communication, I have explicit instructions from the Central Intelligence Agency which have been endorsed by the President of the United States. We understand that the situation on the NEATO ship is critical. Nevertheless you are NOT under ANY circumstances, repeat under ANY circumstances, to aid their mission in any way. This decision is final, is not open to discussion and must be complied with immediately. You mentioned in your last transmission that you were allowing their Captain aboard your ship to discuss the issue. We consider that decision to be an ill judged mistake. You are to ensure that he leaves your ship empty handed, repeat, empty handed.

You will recall there is a firearm in the electronic safe, for use in emergencies should any crew member become violently disruptive, endangering others. I will now give you the code to open the safe: TNY43B. You are to use any and all means, whether

persuasion, physical restraint or even termination with extreme prejudice to remove the NEATO Captain from your ship. This transmission is ended."

The screen went blank.

Maria returned to her crew from the communications chamber. She took Ross and Ken aside and whispered confidentially with them. She then addressed Liu. "Captain Zhang, I'm afraid I have bad news. There will be no oxygen made available to you and we must ask you to leave our ship at once."

Liu's was visibly disappointed. "I see," he said, "but I'm afraid I find your answer unacceptable. I'm sure we can come to some sort of arrangement. Perhaps if I have a look at your oxygen reserves..."

Ross interrupted abruptly. "Hey, buster, what part of 'NO' don't you understand? You heard the lady, time to leave."

Liu appealed again. "Look, if it's some sort of bargain you wish to strike, you clearly have us over a barrel. Name anything you want from our ship and it's yours..."

Maria interrupted. "That's not the way it works. You have to go now." Grim faced, she instructed her crew. "Ross, Ken, see Captain Zhang to the door will you?"

"Time to exit stage right, mister," Ken said, moving his hand in a sweeping gesture, motioning Liu back towards the exit hatch.

Liu looked dismayed, unsure of himself, but froze in position. He literally had his back to the wall.

"We can do this the easy way or the hard way," Ken declared. "Looks like you've chosen the hard way." He signalled to Ross.

Ross and Ken pushed off the side walls and floated towards Liu. Ross confronted Liu first, accosting him. Liu faced Ross squarely and they struggled. "Get your hands off me!" Liu shouted, giving Ross a sudden forceful shove, flinging Ross towards the opposite wall where he struck the back of his head, stunning him.

Ken then grabbed Liu, slipped behind him and put him in a hammerlock, arms round Liu's neck, choking him. Desperate for breath, Liu lashed out with a mighty kick, smashing his steel heeled boot against Ken's left shin, snapping the bone. Ken yelled out

loudly in pain and let go. Liu then grabbed Ken's right hand, slipped out of his clutches and swivelled around, twisting Ken's arm and dislocating his shoulder. Ken screamed again.

Meanwhile, Maria had sneaked up behind Liu. She wrapped her left arm around his neck and held the revolver to his right temple. "All right, asshole, stop right now or I swear I'll blow your head off."

Liu grimaced. His face bore a stern, strained expression. His frown however very gradually gave way to a smile and then he started to laugh. "You've got a *gun* on your ship! How American!"

Maria remained deadly serious. "Just for emergencies. In case anyone goes stir crazy. Or for visitors who overstay their welcome."

Liu decided to call her bluff. "OK then. You know what? Why don't you go ahead and shoot. If we don't get oxygen I'm going to die anyway. I'd rather face a quick death now than slow suffocation later, so you'll be doing me a favour. Just remember to tell my wife and children about it after you've shot me, will you?"

There was a silent pause.

"Well? what are you waiting for?" he asked.

Ken cringed in a corner and exclaimed in agony. "Shoot the fucker. He broke my leg and popped my shoulder."

Maria was perplexed and uncertain. She held her breath for about ten seconds, then exhaled with a sigh. "Damn you..." She pushed Liu aside roughly. "All right, forget about Houston. I'll give you six hours of oxygen on one condition. You must let me inspect your reactors and your ship. I may be able to help. I worked for three years trouble shooting nuclear reactors back home."

Ken protested, "Maria, you can't do that!"

Maria sheathed the pistol and turned to Ken. "Yeah, well what are you going to do about it, Ken? Break your *other* leg against his boot?"

She went up to Ross and checked to see that he was all right - he had just been dazed, nothing more. She told Ross to look after Ken's injuries then gestured to Liu. "Right then, come on, no time to waste. Follow me."

Maria led Liu to the storage compartment where they pulled out the oxygen tanks.

“That’s plenty, that ought to do it,” said Liu, gathering four tanks, two under each arm.

“Lets get them over to your shuttle craft,” Maria said, carrying her own complement of oxygen canisters.

They loaded the shuttle with the oxygen tanks, disengaged from the *George Bush Sr* and headed off for the NEATO ship.

On the *Tsushima*

The half hour trip back to the *Tsushima* was endured in brutal silence by Liu and Maria. As the shuttle approached the docking port, Liu fired the retrorockets causing the shuttle to spin and match the rotation of the doughnut shaped mother ship. Liu connected with flawless precision to the hub of the *Tsushima*. They opened the hatch and handed the tanks through to the four waiting crew who then connected the oxygen to their ship’s system. Only the bunk room and the livestock compartment were to have oxygen piped in. A carbon dioxide scrubber had also been connected to the piping of this limited circuit. They electronically sealed off the other cabins of the ship. Everything was bathed in dim red light as they were on emergency backup battery power only, adding an ominous feel to the whole situation.

“Su-Lin Yang and I are the nuclear engineers on this ship,” Liu said to Maria. “She’s been working non stop to restore our power system for the past ten hours and needs a break. There’s only enough space for two people at a time to access the reactor chamber.”

“Let Su-Lin rest,” said Maria. “Tell me about your reactor system - I’ll help you fix it,” she added, confidently.

Liu brought her up to date. He described the workings of the two pressurised light-water nuclear reactors. The main water pump of the primary reactor had seized up. Due to a software glitch, instead of the backup reactor kicking in properly, a cascade of failures resulted in the pump of the secondary reactor malfunctioning as well. Overheating had caused automatic shutdown of one reactor then the other, but not before more damage had occurred. They had decided to focus on repairing the backup reactor which appeared to have fewer hardware faults. They had already manually drained the radioactive water from the primary loop of the

backup reactor into a sump, disassembled the pump, fitted a new impeller and reassembled it and then flushed the system. But things were still not working.

Liu ordered his crew to retire to the bunk room to minimise oxygen consumption. There was nothing more they could do now.

Liu and Maria donned their radiation suits, put on respirators and made their way to the weightless power chamber in the hub of the ship. As before, they concentrated only on the secondary reactor, severing its computer link from the primary reactor from whence the problem appeared to originate. They decided to start from square one and work through the entire process of power generation from beginning to end, trying to figure out where faults may lie each step of the way. Not only did they have to run through the software diagnostic algorithms by computer but they also had to inspect each physical component of the system, whether in person or using the miniature floating remote control video camera. Maria brought a fresh perspective and made several corrective suggestions that Liu would never have thought of. After six hours, much sooner than they had anticipated, it began to appear as though all the issues had been addressed. The time had now come to test the system.

After one final computer diagnostic run, everything seemed in order. They retreated from the reactor chamber into the access tunnel which housed the main circuit breaker.

Liu flipped the final throw switch. "That ought to do it. We shouldn't need these respirators now, there's enough remaining oxygen in the surrounding air for the time being."

They also shed their radiation overalls. To avoid floating about, they braced their backs against the wall of the narrow tunnel, feet propped against the opposite wall. They faced each other, bathed in the dim red light.

"So what do we do now?" asked Maria.

"We wait and keep our fingers crossed. If it's worked, the reactor should heat up enough in about fifteen minutes and the electricity should kick in..."

They sat in silence for a while.

“You speak English very well.” Maria decided that they may as well pass the time with small talk.

“My father was a career diplomat who was posted to Washington when I was a kid,” said Liu. “I went to school in the US between the ages of six and ten. Even after returning home, I’m ashamed to admit that I grew up on a diet of Hollywood movies. And much later on, I returned to do my Phd in Stanford.”

“Cool,” Maria said, “I went to Princeton.”

“Smart cookie,” Liu commented. “Here’s another reason,” he added. “There are two Chinese, two Japanese and one Korean on this ship and we don’t speak each other’s languages. But we all learned English as a second language in school, so that’s how we communicate on board. I hear it’s the same for the Europeans on their ship.”

“So I’ve heard,” Maria noted. “I know lots of Chinese who stayed on in the States after they completed their Phds,” she continued. “I guess you’re one of those who returned to the Motherland to do his patriotic duty.”

“Patriotic duty? God, no! I am a much shallower person than you give me credit for,” was Liu’s unexpected reply. “The truth is, there were more economic and academic opportunities for me back home in China. Whatever you do, Maria,” he added, “please don’t mistake me for a Chinese Patriot. Someone once said that patriotism is the last refuge of a scoundrel.”

“It was Samuel Johnson,” Maria offered, “and I think it was Ambrose Bierce who said that patriotism is the *first* refuge of a scoundrel,” she added.

Ordinarily, if Maria had demonstrated such scholarly knowledge in front of Ross and Ken on board her own ship, she would have been condemned and belittled as a “smarty-pants know-it-all” and been given the cold shoulder.

The depth and breadth of Maria’s intellect had quite the opposite effect on Liu. Her physical beauty had not gone unnoticed before, however this sudden display of her profound erudition instantly rendered her ten times more attractive to him. He felt as though he had been struck by a bolt of lightning.

“Exactly my view,” he concurred, trying to appear outwardly unmoved. “The idea of blind Nationalism - ‘*my country right or wrong*’ - is a foul obscenity to me. Fascist regimes use

Nationalism to enforce conformity: they accuse those who question them of being traitors to their country and they hold up blindly obedient followers as beacons of virtue. That was how the Nazis inflicted a collective madness on the German people in World War Two. They regarded soldiers who murdered Jewish women and children as patriots. To me, the true German patriots of that time were the ones who had the courage to stand up to Hitler. Loyalty to a ruling regime and loyalty to your country are two completely different things. The true patriot will do his best to reform or replace a corrupt regime, not to support them, even as that regime tries to label him a traitor.”

“Gosh, Liu, you’re pretty passionate in your views,” Maria remarked. “But I don’t disagree with you. Back in 2003, our Republican Neoconservatives invaded Iraq on a tissue of lies. History proved they were morally bankrupt thugs. They passed the so-called *USA ‘Patriot’ Act*, which had nothing to do with patriotism and everything to do with totalitarian control and invasion of privacy. They too tried to portray their critics as unpatriotic, whereas the truth was the exact opposite. The Americans who opposed the Neocons’ greed and duplicity were the real patriots. Trouble is, most citizens need a flag to rally behind. If you can’t believe in your country, what can you believe in?”

“I believe in finding out the Truth and doing the Right Thing,” Liu said. “And if the leaders of my country order me to do otherwise, then I would say it is time to change the leaders.”

The conversation was getting a little heavy. Maria could not help but think that Liu might have had a run in with his authorities in the past. She decided to change tack.

“So how many kids do you have then?” she asked.

“Actually, none,” he replied. “I just thought you’d be less likely to shoot me if I said I had some pathetic children back home crying over their poor old daddy.”

“What a liar!” Maria remarked. “You realise of course, I couldn’t have shot you anyway. I don’t have it in me.”

“That was a fair bet,” said Liu.

“So I guess there’s no wife either then?”

“There is. Was. Is,” Liu replied with uncertainty.

“Make up your mind, will you?”

“My parents married me off to this totally neurotic girl at a young age,” Liu explained. “For them, it was a business arrangement between two families. We had nothing in common. We grew even further apart when I went to do my doctorate in the US - she stayed at home to take care of her sick parents, at least that’s the excuse she gave me. Returning to China was like returning to a stranger. Frankly, having a busy job at the time and then leaving for outer space was quite a relief to me. The nagging wears you down after a while. I asked for a divorce but she likes the prestige and perks of being an astronaut’s wife. Look, I don’t want to bore you with the sordid details.” Liu paused. “So what’s *your* story, anyway?” He then asked.

“Not much to tell,” said Maria. “I was a total nerd at school, so naturally I didn’t register at all on any known popularity scale. Always had lunch at the social outcasts’ table. I couldn’t relate with any of those fashion crazed bimbos in their flashy sports cars - girls who got by in life using manipulation and gossip. My folks weren’t exactly well off. Bit of a whiz kid - I got into Princeton at the age of sixteen. Work has been all consuming, no personal life to speak of. I have an old cat with arthritis that’s afraid of mice. Pretty sad, huh?”

“Not at all,” Liu commented. “A conscientious, smart, accomplished young woman. Not your typical Latino. You would be highly regarded in my society.”

“Hey, not all Hispanics are salsa dancers and crack dealers, you know. That’s an insulting stereotype,” she remarked.

“You’re right, you’re right, it’s a stupid stereotype,” he agreed.

“One stereotype that does seem true to me though,” Maria continued, “is that scholarship and wisdom are greatly valued in Chinese culture.”

“Our leader, Premier Lin, certainly likes to portray Chinese Civilisation as superior because we uphold such Noble Virtues,” Liu replied. “But I would regard another Chinese trait as the major driving force of our society,” he added.

“What’s that?” Maria asked, fully expecting him to cite yet another Noble Virtue of the Chinese.

“The desire to become filthy rich. Crass materialism. Simple greed. I think that’s what motivates most Chinese,” Liu commented.

Maria chuckled. “Present company excepted, of course. To be fair, though,” she added, “the quest for material gain is common to many societies.” She continued, “You know, Liu, you’re not at all what I imagined you would be like when I first spoke with you over the videocom.”

“Well I hope you think slightly better of me now compared to your impression,” Liu remarked.

“Hugely better,” Maria declared.

Liu responded with a smile.

The conversation petered out.

Liu began again, “So Houston ordered you to deny us the oxygen?”

Maria explained, “It was in our standing orders to deny you any and all resources should the situation arise. But I honestly thought they would make an exception here. Believe me, I pleaded your case as strongly as I could as soon as you radioed us, before you came over to our ship. I immediately sent a message to them about the urgency of your situation. You were right about our oxygen supply - we had more than enough reserves to offer you. Due to the radio transmission time delays and the time they took to compose their answer, we had to wait forty minutes for their reply. But they dug in their heels. Wouldn’t budge.”

“Failure of our mission would be a huge blow to our country,” Liu said. “It would set back our space program many years. A lot of your guys would be pleased if that happened.”

“Goes against basic human decency if you ask me,” Maria said. “Of course that’s not how they would spin it to the media, though. They’d probably report that we tried everything possible to help you out but it was too late and that you guys messed up big time and there was nothing we could have done. Really twist things around to suit themselves.”

“Masters of *S cubed*,” Liu commented enigmatically.

“*Icecubes*?” asked Maria. “What do you mean?”

“*S cubed*,” Liu said. “S to the power of three. It stands for S.S.S. - Self Serving Statements. Masters of Self Serving Statements.”

Maria chuckled. “What a funny mind you have, Liu. I’ll remember that. *S cubed*.”

“Actually Maria,” said Liu, “I prefer your term - ‘*icecubes*’ - that could be a code word for self serving statements.”

“Yeah,” Maria said, “I guess you could use it in sentences like ‘*an endless stream of icecubes poured out of his mouth*’.”

“Right,” Liu agreed. “Or something like, ‘*his argument was completely based on icecubes*’.”

“Hah,” Maria snickered, “makes perfect sense to *me*.”

Silence again.

“So how did you do it?” Maria asked. “How did you guys make it all the way to Mars in one ship over seven months without any resupply modules?”

“The keys were environmental sustainability and recycling,” Liu explained. “It took us decades to solve the problems. After countless failed experiments we finally came up with a few different micro ecosystems of plants, animals and people that could live in a completely sealed enclosed capsule for years at a time. It requires continuous monitoring and adjustment - air and water quality, plant and animal health - all have to be regularly checked. Hence the need for our two ecobiologists on board, Akira Hasegawa and Jong-Sul Park. The plants produce oxygen and remove carbon dioxide and provide us with cereals, vegetables and condiments for our diet. Some said the animals were a dietary luxury but we found that most people developed an intense craving for meat after more than a year. Furthermore, plants do not provide all the essential amino acids.”

Maria described her own experiences. “We ran several biosustainability projects ourselves which we should have followed up, but this Mars trip of ours was a real rush job, that’s why we had to resort to resupply modules. And we will have to leave when our eighteen months around Mars is up, or we’ll run out of food. We have hydroponic plants for oxygen production and carbon dioxide removal and we recycle most of our water including urine. We distil

the urine before watering the plants, then distil it again before it's drinkable. Some water is lost when faeces is expelled into space, hence we need resupply of a little water and all our food."

"To us, human waste is a valuable commodity which we can't afford to lose," Liu said. "Treated waste is an excellent plant fertiliser. It's essential we don't lose any water at all. Even a few drops a day would amount to great loss after a year or two."

Maria chortled. "You know how our guys amused themselves on the trip over? Early in the journey we would look at that awesome view of the Earth every chance we got. Trouble is, once the Earth became just a tiny speck, there was nothing much to see out the portholes. You may remember the story of an early astronaut, I think it was John Glenn - when he was asked what the most beautiful thing in space was that he had ever seen, he said it was a urine dump at sunset. He was fascinated by the crystalline patterns formed by flash frozen urine. Well, our ship has a holding tank which stores up to twelve litres of excreta which is expelled every other day. Our guys developed a regular ritual by which they would view the shit on video monitor through the rear telescope after each dump. It even turned into a competition to see which shit 'sculpture' was the most artistic and they had a scoring system. Pretty juvenile really."

"Well that adds new meaning to the phrase '*having a shit load of fun*'," Liu commented.

"Yeah," Maria added, "and if there was a particularly good one, they'd say they'd been '*shitting pretty*' that day."

They chuckled at the thought.

Just then, the power came on and normal lighting was restored.

"Yay! Power at last!" Liu exclaimed.

"Yeeha! Let there be light!" Maria added.

Spontaneously, they hugged each other with delight.

"Maria, we owe you our lives," said Liu. "I am in your debt forever. Name anything you want and I'll do my best to get it for you or do it for you."

"Let me think," said Maria. "OK, how about this...when the time comes, you can sacrifice your first born child to me on a pagan altar...No, only kidding. A tour of your ship would be good."

"You got it."

A guided tour

The NEATO ship had been assembled in Earth orbit. It had not been launched all at once from the surface of the Earth, as the US ship had been. In volume it was four times as large as the US mother ship and very different in many ways. It was designed to support five crew indefinitely, unlike the US ship which carried six personnel only for a limited time. The US ship was a conventional space capsule with large areas dedicated to crew activities.

The NEATO ship was shaped like a wheel with six spokes leading to a central tubular axle. This cigar shaped axle comprised a docking port at one end, the main ion engine thrusters at the other end and the nuclear reactors housed in the middle. The ship spun on its axis to provide artificial gravity to the living and working areas of the rim.

Half of the rim was reserved for intensive plant cultivation in multi tiered hydroponic trays. One sixth was for livestock production and the remaining one third was for the crew. The crew areas consisted of the bunk room, two toilets/washrooms, gymnasium, workshop, command/communications centre and kitchen/diner/recreational theatre.

Liu and Maria made their way from the weightless hub, climbing backwards down ladder rungs within one of the “spokes”, into the rim area where “normal” gravity of one G was experienced. He led her through each of the areas of the ship, stopping now and then to explain one feature or another.

Maria seemed impressed by most of what she saw but was rather disapproving of the battery farming of poultry and pigs. Each pig was kept in a tiny enclosure with its own individual treadmill machine to exercise the animal and keep the meat lean. Animals were bred by artificial insemination.

“They’re genetically engineered pigs,” Liu commented, “they eat pretty much any old scraps, grow very rapidly but only reach a small size when fully mature. We haven’t decided on a name for the breed yet. ‘*Piglets*’ would not be appropriate because they are little adults, not baby pigs.”

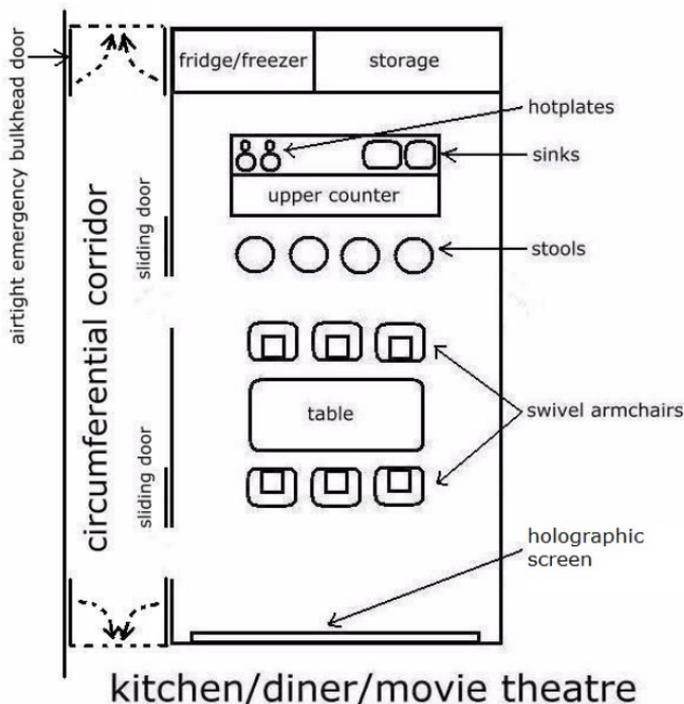
“Hmm,” Maria pondered, “I’ve got a suggestion for you.”

“Yes?”

“You could call them ‘*Hamlets*’,” she said.

Liu laughed. “Brilliant name. I like it.”

Finally they came to a rectangular room. It contained a dining table with six swivel armchairs around it. One wall was almost entirely taken up by a massive ultra high definition holographic screen, presently blank. Against the opposite wall was a twin door stainless steel fridge/freezer and a large storage cupboard. There was a rectangular double level counter set back three feet from and parallel to that wall. The lower level of the counter had electric hot plates and a double steel sink on top, with an oven and dish washer under. The upper level of the counter was used to serve food and drinks to people sitting on the bar stools behind the counter. The layout was such that the cook could prepare food while talking to his guests sitting on the bar stools facing him.



“This is our kitchen, dining and entertainment room,” Liu explained.

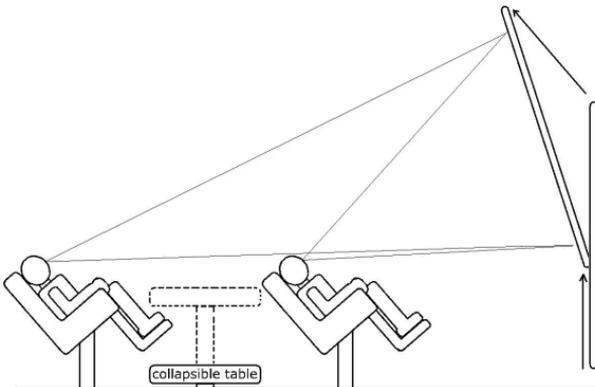
“Wow, it’s just like being in a kitchen diner at home,” Maria commented. “But isn’t it a bit extravagant to have a special eating room on a ship where space is limited?”

“You don’t know the Chinese,” Liu said. “To us, the preparation and consumption of food are obsessions. That’s one thing we won’t compromise on. This chamber also doubles as a movie theatre. Tell me, Maria, what sort of scenery do you like? We’ve got lakes and mountains, forests, fields, even the Serengeti plains with animals running around.”

“Lakes and mountains sound good,” Maria said.

“Right.” He flipped a switch, made a selection from an on screen menu and a living landscape appeared on the ultra high definition holographic screen. It was a view of a pristine lake with snowcapped mountains in the far background. Waves were lapping against the near tree-lined shore which appeared to be just on the other side of the kitchen wall. Gulls were flying overhead. The soft sounds of the waves splashing, trees rustling and the gulls screeching pervaded the room through hidden surround sound speakers. The set-up seemed so realistic you could imagine yourself stepping through the screen onto the beach fronting the lake.

“You may consider all this a bit unnecessary, but we find it tremendously relaxing after a long working shift. It’s good for our mental health. The screen also rides up on rails and tilts forwards if a few of us want to watch a movie,” Liu said.



Movie mode: seats recline and screen slides up on rails, tilting forwards

“I think it’s a terrific idea,” Maria remarked.

“Take a seat at the bar counter please, Maria. You are my guest of honour. Are you hungry?”

“Famished,” was the reply.

He walked round the counter and fixed her a drink first.

Liu rummaged in the cupboards, pulling out his utensils, then grabbed various ingredients from the refrigerator. Using wheat flour, water and eggs, he started to make noodles from scratch. Hand making noodles was one of his special talents.

“That’s quite a skill you have,” Maria said.

“I find it therapeutic,” Liu replied. “My grandfather taught me when I was a kid in Sichuan. He ran a noodle shop - he did well enough to put my father through college...” Liu stretched out the dough into separate strands in mid air. “Eet eeez aaall in ze fingerzzz.”

Maria was mildly amused. “Just what we need, a Chinese chef with a French accent.”

“As they say, variety is the spice of life,” Liu replied.

“Now, voila! The noodles go in the colander and into the boiling water. Give the soup a little stir now...”

“Wow, that smells really good,” Maria commented. “Can’t wait to taste it. You know, I’m really enjoying this. It’s great to be able to experience normal gravity again after ten months of weightlessness. Right now I can almost imagine that I’m back home on Earth, sitting in a lake front diner.”

When the meal was cooked he brought the dishes on a tray across to the dining table where they sat down.

“You only have five crew, so what’s with the sixth seat at your table?” Maria asked.

“The designers chose to add an extra seat, purely for the sake of symmetry, I think. So how is it?” Liu gestured to her meal.

Maria closed her eyes, paused, inhaled deeply of the steamy savoury aroma wafting up to her nostrils and took a tentative sip. “Mmm, mmm, heavenly! God, maybe I’ve been deprived for too long but this has to be one of the best meals I’ve ever tasted in my life. Fresh noodles, fresh veggies, fresh meat... what a change from the rehydrated reconstituted crap we’ve been force feeding ourselves the past ten months. Looks like you guys have been eating in style all along...I envy you.”

Liu feigned modesty. “Aw shucks, it’s nothing at all, Ma’am. Just a simple chicken noodle soup I threw together.”

“Well it’s quite a lovely dish!” Maria said, preoccupied, enjoying the meal.

Liu gazed admiringly at Maria’s angelic face and sighed. “Yes...quite a lovely dish indeed...”

Maria was oblivious to his appreciative glances. “You know, I can’t cook to save my life. You’ve got a real knack there Liu. Mom tried to teach me but eventually gave me up as a hopeless cause. She always used to say...(Maria adopted a high pitched squeaky voice)... *‘the way to a man’s heart is through his stomach’*.” She let out a little laugh. “Come to think of it, maybe that’s the way to a woman’s heart as well.”

She paused awkwardly, with the uncomfortable feeling that she had said something inappropriate. She coughed nervously and quickly changed the subject, adopting a more serious expression. “You dislocated big Ken’s shoulder and broke his leg. You’re either incredibly strong or you must have some fancy martial arts training.”

“You guessed it, Maria,” said Liu. “I’m a top grade black belt Kung Fu grand master. There was this one time I was walking in downtown South Central LA and a gang of ten guys with knives tried to mug me. I put them all in hospital.”

“Wow, I’m really impressed,” Maria said.

Liu backpedaled. “No, no, I’m just kidding, I made that all up. It’s such a stereotype, isn’t it? That all Chinamen are supposed to know martial arts? *My* usual approach to fighting is to run like hell in the opposite direction. Personally, I wouldn’t know a karate chop from a lamb chop. Here’s the explanation: it’s because of the zero gravity in your ship, that’s the problem. Ken’s muscles have all gone flabby and his bones have become brittle, worse than an old woman’s. Makes a big difference after ten months. He couldn’t beat Su-Lin in an arm wrestling contest now.”

Maria agreed. “Yeah, those guys got really lazy with their exercise regimes after the first month. Didn’t need it, they said. They used to make fun of obsessive little me, diligently running on the vacuum treadmill for an hour twice a day.”

“That’s why you didn’t find walking about on our ship too difficult.”

“Yeah, exercise kept my muscles and bones strong. Goes to show I was right and they were wrong. Again. They hate me, you know, they call me ‘*little Miss Right*’ behind my back. They think I’m uncool for following rules and doing the proper thing all the time.”

Liu sympathised. “I can see there’s a good reason you were put in charge of those dick heads. Well, fuck them. *I* like you anyway. But as for following rules... young lady, you just snubbed your rule makers big time today.”

“Yeah,” said Maria, “It’ll be interesting to see how Houston responds to what I’ve done...”

And so the conversation went on.

Before they knew it, the meal was over.

“Look, it’s late,” Maria said, “I’d better get going.”

“OK. I’ll fly you back home in our shuttle,” Liu said.

Back on the *George Bush Sr*

The journey back to the *USS George Bush Sr* was again conducted in silence, but this time it was a comfortable, satisfied silence, unlike the grim silence they had endured on the way over.

Once again, Liu executed a flawless docking manoeuvre.

Just before Liu opened the hatch, Maria made a parting comment. “Liu, going over to your ship today, even though it was, you know, a serious life threatening crisis, it was also kind of fun. Thank you for the grand tour and the delicious meal.”

“Thank *you* for saving our lives, Maria,” Liu shook her right hand gently. He then took it in both his hands and kissed it.

Back in her own ship, Maria found Ken with his left leg encased in plaster and his right arm in a sling.

“So how did it go?” Ken asked Maria.

“We fixed it,” was her reply.

“Whaaat a hero! Maria saves the day yet again!” Ross interjected.

“You’re going to be in deep shit with Houston, Maria,” Ken remarked.

Maria was defiant. “Whatever. *I* know I did the right thing. If they want to screw me over I’ll tell the press how mean spirited Houston was, how they ordered us to just let them die. That transmission they sent us would make really good media copy. Incredibly negative publicity, the last thing they need. And it would all be true. Much better for them to take things as they are now - put a positive spin on it - ‘*small American slip of a girl saves the bacon of the NEATO crew*’ - something like that. They can bask in the reflected glory, take all the credit, say it was their idea - I don’t care.”

“Speaking of bacon,” said Ken, “you said those guys have actually been rearing animals on board? That’s crazy Man!”

“Quite a setup,” replied Maria, “they recycle everything, grow everything they need. That’s why they didn’t need resupply modules. After we fixed the reactor, Liu cooked me a fantastic meal with fresh ingredients.”

“Oh yeah?” Ross asked.

“It was just awesome, delicious. I hadn’t realised how much I missed fresh food. The taste - God it was sheer heaven ...”

“You make it sound almost as though you were having sex with him,” Ross said.

Maria took great offence at Ross’ comment and glared at him. “Jesus, you really are a total jerk, do you know that?”

“Yeah, well...I’ve been called a jerk before,” Ross sniggered, “but no one’s ever called me ‘*Jesus*’ before though.” He broke out in a loud laugh.

Ken joined in the laughter and did a high five with Ross. “Right on, Man!”

“You know,” Ken added quietly under his breath to Ross, “you do sort of look like Jesus Christ. Take a few pounds off, grow a beard, lose the glasses...dead ringer...”

“To hell with you both.” Maria glared at them and pushed off.

VIDEOCOM TRANSCRIPTS OF CONVERSATIONS

The *George Bush Sr* and the *Tsushima* were both in Mars synchronous equatorial orbit, meaning that they both had twenty five hour days equally divided into light and dark periods. They ran on the same clock (“Mars UTC”) with a three hour light phase difference between them. The two ships remained at the same fixed distance from each other at all times.

The day after the power crisis, Liu Zhang called Maria Alvarez on the videocom to again express his thanks and to inquire after Ken’s injuries. A rapport was gradually established and Liu and Maria eventually fell into a pattern of regular video communication most evenings at the same time. Maria had the luxury of a private cabin to herself. She normally shared this cabin with Penny Armitage who was at the time with the ground team down on the surface of Mars. On the *Tsushima*, all ship areas were common areas, shared by all five crew. When the time came for the videocom calls, Liu retired to the shuttle craft using the excuse that he had to perform a daily systems check.

WENT TO MARS AND COULDN’T FIND ANY MARS BARS

Date: Jan 10, 2049

Location: Mars orbit

Event: Transcript of videocom conversation between Liu Zhang and Maria Alvarez

Liu Zhang (sitting in shuttle craft seat, activating videocom): Hey Maria.

Maria Alvarez (huddled in bunk, knees up to her chest, answering portable videocom): Hey Liu.

Liu Zhang: How are Ken’s injuries?

Maria Alvarez: His shoulder’s OK and his leg’s set in a cast. I think you hurt his ego more than anything else, an ex-quarterback beaten up by a scrawny guy like you.

Liu Zhang: Did you tell him I was really, really sorry, like I said?

Maria Alvarez: Actually I told him that you were a Kung Fu master who once beat up ten knife wielding muggers in LA.

Liu Zhang: Why'd you do that? I told you I made that up.

Maria Alvarez: I figured he wouldn't mind so much if he thought he was beaten up by a martial arts expert, rather than by some geek who didn't know a karate chop from a lamb chop.

Liu Zhang: OK.

Maria Alvarez: OK.

Liu Zhang: So how's your ground team doing down on Mars?

Maria Alvarez: Having a whole lot more fun than I am up here in the mother ship, that's for sure.

Liu Zhang: Two big guys and one small gal on a ship. Do you ever feel intimidated? You know, like they might try something funny with you?

Maria Alvarez: The mutual loathing's enough to turn them off, I think. I keep my distance. At least, as far as I am able to in this tin can. Anyway, I'm the one with the gun, remember?

Liu Zhang: Right.

silence

Liu Zhang: So here's the deal. As you know, we never intended to land on Mars. Our real aims were to establish the L points, to do some prospecting and practice mining on the moons Phobos and Deimos - which are after all nothing more than captured asteroids orbiting Mars. Then we'll zip off into the asteroid belt for some actual mining before heading home.

Maria Alvarez: Are you sure you should be telling me all this?

Liu Zhang: I'm sick and tired of all this secrecy bullshit. I don't see the point. Personally, I think cooperation is a much stronger force than competition. Anyway I figure I owe you for saving our lives. Maybe if you gave your bosses information which your so called intelligence agencies can't find out, then maybe they won't be so hard on you for disobeying orders.

Maria Alvarez: But won't you get in trouble?

Liu Zhang: Don't worry about me, I'll be fine. Not a problem.

Maria Alvarez: OK, but only if you're sure about it...I must confess I'm fascinated by your mission and with your ship. So how long will you be away?

Liu Zhang: Five years. Seven months to get here, eighteen months around Mars, then off to the asteroid belt to fossick around, then back to Earth.

Maria Alvarez: Wow, that's a long time away.

Liu Zhang: Not that long compared to the early voyages of seafarers on Earth all those centuries ago. And much more comfortable.

Maria Alvarez: Our mission is half as long at thirty months. I figured that was plenty long enough for me.

Liu Zhang: You don't have the supplies to sustain you any longer.

Maria Alvarez: No.

silence

Liu Zhang: Hey, guess what?

Maria Alvarez: What?

Liu Zhang: Wanna hear a poem I wrote? It doesn't rhyme, it's one of those prose things.

Maria Alvarez: I had no idea you were one of those arty farty types.

Liu Zhang: What can I say. I'm a man with many hidden talents. But I need help to finish it. Are you any good at geography?

Maria Alvarez: Are you kidding? I aced geography in school. Geography is my name and geography is my game.

Liu Zhang: Well, here goes. I call my poem "*The Disappointed Traveller*":

Went to Turkey and couldn't find any turkeys

Went to Chile and couldn't find any chillies

Went to Delhi and couldn't find a deli

Went to Hungary and couldn't get food

Get the idea? Why don't you give it a go?

Maria Alvarez: OK. Well, let me think. OK. How about... "went to China and couldn't buy any china". You know, china plates.

Liu Zhang: Promising, but could be funnier. Keep trying.

Maria Alvarez: Um, well, does it have to be food related?

Liu Zhang: Not at all.

Maria Alvarez: OK. Lets see... "went to Germany and came down with germs".

Liu Zhang (chortles): That's good. I think I'll use it.

Maria Alvarez: It's hard to think them up on the spot. Don't you have any more yourself?

Liu Zhang: Right then... How about, "went to Greece and couldn't find any lubricants"?

Maria Alvarez: Ugh. That sounds mildly disgusting.

Liu Zhang: Rubbish, you've just got a dirty mind.

Maria Alvarez: Hey, I'm not the one looking for lubricants...

silence

Liu Zhang: "Went to Crete and met lots of Cretins"...well...maybe not, that might offend some people.

Maria Alvarez (ponders, then suddenly inspired says): I know! I know! How about this one? "Went to Tanzania and met lots of tanned and zany people".

Liu Zhang (laughs): That proves it, now I know you're officially completely nuts.

Maria Alvarez: Said the pot to the kettle.

silence

Liu Zhang: Maria, I'd better go now, got a big day ahead. Talk to you tomorrow same time, OK?

Maria Alvarez: OK. Goodnight.

Liu Zhang: 'Night

COSMIC PRIME REAL ESTATE

Date: January 12, 2049

Location: The White House

Event: Anthony Manetti, Director of NASA and Peter Dogowitz, Director of the CIA meet with President Boyle

Anthony Manetti, Director of NASA, expressed his anxiety to Peter Dogowitz, Director of the CIA. "They asked me to brief him. I'm not looking forward to this."

Dogowitz felt likewise. "Me neither. Here, take this." He handed Manetti a clipboard file.

"That's so Middle Ages, Peter," Manetti remarked. "I don't use files or paper any more. See this watch?" He gestured to a small device strapped onto his left wrist with the logo *Chronos* inscribed on it. "It's my cellphone, PDA, computer, Internet access, GPS and personal TV and movie theatre. Oh, and it tells time too. It has a wireless link to my spectacles which activates a heads up display on the inside. Here, try them on..."

Dogowitz donned the spectacles and saw a full colour computer screen before his eyes. Manetti pressed buttons on his watch and the opacity of the display waxed and waned, from completely opaque to fully transparent in order to see through the lenses. Each lens displayed the image from a slightly different angle, resulting in true three dimensional virtual reality rendering.

Manetti could scarcely contain his enthusiasm. "If I need to make a phone call, there's a microphone in this retainer which sits on the front of your throat and there are stereo speakers in the arms of the spectacle frames which conduct sound through the mastoid bones. If I don't want anyone to hear my voice commands when I'm using the computer, I can bring up a virtual keyboard on screen, put on these gloves with fingertip sensors and use any surface to type. The gloves also have a wireless link to the visual display. Everything is powered by bioenergy - no need to recharge batteries. Pretty neat, huh? Makes you wonder what those Japanese will think of next..."

Dogowitz took off the spectacles, somewhat disinterested. "Yeah, whatever, but take the file anyway, I think you'll need it. Just follow my lead..."

They knocked on the door and both entered the Oval Office.

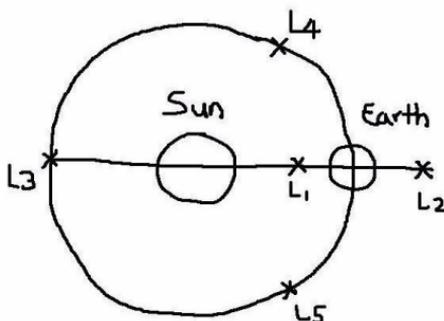
“Good morning Mr President,” they both said.

“Howdy boys, what do you have for me today?” Boyle asked, between sips of his morning coffee.

“An information update on the Mars mission, Sir,” Manetti began.

“Go ahead.”

“Some background details first, Sir. About Lagrange points.” Manetti opened the file, pulled out a sheet of paper and said under his breath to Dogowitz: “I guess I’ll have to use your file after all...” then to the President: “Please bear with me, Sir, it’s much easier to explain with a diagram.” Manetti scribbled a rough picture. “For any two revolving bodies of unequal size linked by gravity, there are five orbitally stable locations called Lagrange points, named after the eighteenth century mathematician Josef Lagrange.”



“Whoa, hey, wait a minute, hold on,” Boyle implored. “Before you start your science lecture, tell me what you think about what the Europeans have done.”

“Well, Sir,” Dogowitz answered, “the Europeans also aimed their ship at Mars but now we know that going to Mars wasn’t their intention either.”

“No, Mr President,” Manetti continued, “they swung around Mars and used the gravitational acceleration as a springboard to launch themselves into the Asteroid belt. Looks like they’ve got the advantage over the NEATOs and us now. They’re going straight for the money.”

“Hurmph,” Boyle humphed, “well at least it wasn’t those tricky Chinks who got the lead. You can never tell what they are up

to, so damned secretive. Right, you were saying something about Lag-ronj points...”

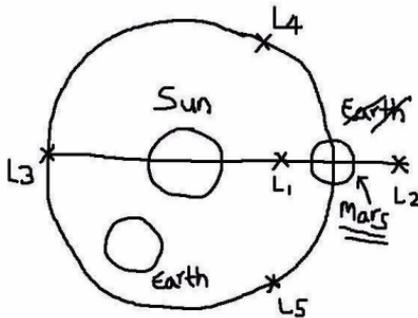
“Yes, five Lagrange points, orbitally stable locations. Let’s consider the Sun-Earth system.” Manetti pointed to the diagram.

“Locations L4 and L5 are the most gravitationally stable but are not immediately useful, being millions of miles away. L3 is even further away. Locations L1 and L2 however are immensely important. For any space faring nation, they are the equivalent of cosmic prime real estate. Or perhaps strategic high ground is a better analogy. They could even be of military importance in the future.”

“Go on,” Boyle encouraged.

“Being orbitally stable and in a constant position with respect to the Sun and Earth has many advantages. They are ideally suited for locating communications stations, observatories and perhaps even human space habitats. The Sun-Earth L1 and L2 points pretty much belong to us, to America. We were the first to establish satellites there as a fait accompli. It’s our turf and no one has ever challenged us. As they say, possession is nine tenths of the law.”

“Right,” Manetti continued, “let’s say this planet is now Mars. Let’s put Earth, say, here.” He altered the diagram:



“The Sun-Mars L1 and L2 points also represent vital strategic high ground, crucial territory. L1 always faces the sun and a solar array positioned there will never run out of power. It is never in the shadow of Mars and thus radiocommunications from a station there to Earth will never be interrupted. Compare that with the situation of our present mother ship who we lose contact with whenever their orbit takes them to the far side of Mars. The L2 point on the other hand is always on the side of Mars away from the Sun. This makes it ideal for locating long term human space habitats as it

is largely shielded from dangerous, even lethal radiation from solar flares, being perpetually in the shadow of the Red Planet.”

“I can see where this is going,” Boyle anticipated, sagely. “You want me to approve a NASA program to put probes at the Sun-Mars L1 and L2 points, to stake a claim on that valuable space turf. Good idea. You have my go ahead.” He took another sip of his coffee.

Dogowitz nudged Manetti and raised his file up, urging him to do likewise.

“Actually, Sir,” Manetti continued, “I came here today to inform you that the NEATOs have already put probes there, staking *their* claims. Apparently it was one of the main objectives of their present mission.”

Boyle gagged violently, letting loose a wide spray of coffee in their direction, which splattered against the files shielding their faces.

“Goddamn it, why the fuck can’t you shit heads ever bring me good news? So what the hell are we supposed to do now?”

Dogowitz replied, “I don’t know that we *can* do much, Sir. We could try to dispute their possession at the World Court in the Hague, but that could backfire on us. It might encourage other countries to dispute our possession of the Sun-Earth L1 and L2 points.”

“You know, I’ve just about had it with you incompetent assholes,” Boyle ejaculated. “You make me sick. Just get out of my sight.”

“Yes, Sir,” the two replied and exited the room.

“So that went pretty well, don’t you think?” Dogowitz commented to Manetti as they walked down the corridor.

Manetti wiped his file on his trouser leg and handed it back to Dogowitz. “You were right, the file did come in useful.”

PURGATORY: REVELATION

Two days and nights had passed since the Stranger first entered Purgatory. Sophie and the Stranger took refuge underground and continued to elude the minions of the Overlord. They had fallen asleep in a tunnel. They were woken abruptly by a sudden thump which lifted them a foot off the ground, falling onto their backs again with a rude shock.

“Whaa...?” the Stranger exclaimed.

“Small roadbump,” Sophie said.

Only now did the Stranger take notice of the criss cross ribbing reinforcing the walls of the tunnel which flexed when the ground moved, only to spring back into shape, propping the tunnel open again. Somewhat like the wire framework of a non-collapsible plastic hose. He also now understood how a person lying in a tunnel could be completely squashed flat like a pancake if a severe ‘roadbump’ hit them.

As his foggy head started to clear, he came to a realisation. “I remember now!” he declared.

“What do you remember?”

“Everything!”

“Then tell me please!” Sophie requested.

“I don’t know where or how to begin. There’s so much to explain. It would be best for me to show you first,” he replied.

“Show me what?”

The Stranger pondered a while. “Sophie, in your travels through the tunnels, have you ever come across doors with this symbol?” He drew something in the dust on the ground with his right index finger.

“Yes, many times,” she said, “but we’ve never been able to open them.”

“Take me to one,” he urged.

“If you insist,” Sophie said, perplexed.

She again led the Stranger through the maze of tunnels and within ten minutes they came upon one such door with the symbol the Stranger had indicated. He waved his forearm over a sensor by the door and two beeping sounds were heard but nothing else happened. He tried again, with the same non-result. The Stranger

pinched up the front of his shirt, bent forwards and rubbed the sensor with his shirt material, adding a little spit for good measure. He straightened up, waved his forearm again in front of the sensor and this time there was a single beep and a side panel slid open revealing a keypad with buttons. He punched some buttons and the door slid open. Blinding lights came on, revealing a gleaming corridor with rows of doors on either side. Sophie was awestruck. They entered the passageway, breathing in musty air.

They chose one door at random. The Stranger again punched buttons on a keypad and the door partly slid open then jammed. They looked inside to see a small enclosure containing four rows of seats. Scattered about were crushed and broken panels, shattered glass and instruments with loose wires dangling about. The Stranger moved on, selected another door further down the corridor and opened it to enter another similar enclosure, this time with all the fittings intact. There were four rows of three padded seats each, facing two large glass windows looking out to a dark blank wall. The Stranger sat in one of the front seats and motioned Sophie to sit next to him and strap in. He showed her how the buckles fastened together.

“Brace yourself now,” he said. He saw her knuckles go white as she gripped the armrests. He pressed a few buttons and a voice emanated from the panel. “*Bay doors open*,” the voice declared.

Sophie suddenly felt a sick feeling in her gut, as though her stomach was rising up into her gullet. She felt her whole body rise off the seat, staying put only because of the body harness she had on.

“What’s happening? What’s happening?” she asked, alarmed.

All of a sudden, the forward windows revealed a panorama of pitch black darkness dotted with tiny white points of light too numerous to count.

“Listen to me very carefully Sophie,” the Stranger intoned. “Your home, the place you call Purgatory, is an enclosed spinning cylinder floating in space. It is one of many such habitats.”

“What sort of space is it floating in? Is it floating in water?” Sophie asked.

“No, when I say space, I mean outer space - the term we use for the vast empty void which comprises most of the universe.

We are now sitting in a small escape pod which was flung out of Purgatory by centrifugal force when the bay doors opened. Space is what you now see all around you. There is no air or water in outer space. If you left this vessel unprotected, your lungs would explode and your blood would boil - you would die instantly. Space is also incredibly cold. Furthermore, there is no gravity in space. When we ejected from Purgatory you would have felt as though you were falling.”

“I still feel as though I am falling, it hasn’t stopped yet, it’s really very peculiar,” she said, anxiously.

“That’s why we call this sensation free fall. You are now weightless, and so is everything else in this cabin. Take your watch out of your pocket.”

Sophie did as instructed.

“Now hold it up and let go.”

She complied and was astounded to see the watch suspended in mid air before her. She touched a finger to it, and pushed it one way then another, watching it drift freely to and fro.

“Put it back in your pocket now.”

The Stranger then moved a joystick on the front panel and Sophie felt a weird sideways movement. He had turned the pod around. He pointed out the window. “Look back there, that is where we just came from, that is your home.”

Diminishing into the distance, Sophie saw for the first time Purgatory from the outside: a huge silvery cylinder, slowly rotating on its axis. She saw the honeycomb pattern of plates which comprised the outer skin, pockmarked by numerous dents on the surface. She stared out the window with a glazed expression, lost for words.

“Sophie, you must have known that Purgatory was a self contained environment of limited size. You could walk from one end to the other or walk round the circumference in about an hour. You must have known it was cylindrical in shape,” the Stranger said.

“Yes, we did. But we could not imagine what might be outside, or even if there *was* an outside. Our teachers said that Purgatory comprised our entire universe which looped around on itself. The only way to leave Purgatory, to enter another dimension, was by death.”

“I know this must come as a shock to you, but Purgatory is

nothing more than a human construction, an air filled tube. It was built about a hundred and fifty years ago from raw materials floating in space, from asteroids. It was meant to join a network of similar habitats around a planet called Mars, but immediately after being built it was hijacked by the man you call the Overlord, who was helped by his followers.”

“What’s asteroid? What’s planet?” Sophie asked.

“Right. This is going to be more difficult to explain than I thought. OK. First, you have to know that the universe is unbelievably big, so big that for practical purposes we may as well call it infinite. Most of the universe consists of empty space, airless vacuum, but here and there, scattered about in space are different types of matter. Some types of matter are incredibly massive fireballs - we call them stars - they are the points of light you can see through the portholes,” he gestured out the window. “Those stars look tiny because they are so far away, but the average star is trillions of times larger than your habitat, Purgatory. And there are billions and billions of stars in the universe. Some of these stars have huge round balls of rock or gas revolving round them called planets. Right now we are in a star system called the solar system which consists of a star called the Sun and eight planets revolving around it. You and I, our ancestors - came from the third planet, called the Earth. Mars is the fourth planet.”

“Earth, that’s another word for soil, isn’t it?”

“Yes, and also the name of our mother planet. Now asteroids are just rocks revolving around the sun in a wide ring called the asteroid belt, which lies outside the orbit of Mars. That’s where we are now.”

“This is overwhelming. It’s too much to take in,” Sophie said. “I wouldn’t have believed you if I hadn’t seen it all for myself. Or experienced being weightless. Or seen my watch float in the air.”

“That’s why I felt I had to show you before I could tell you.”

“You said Purgatory was built a hundred and fifty years ago and was then hijacked by the Overlord,” Sophie said. “He does not look old at all. The rest of us grow old and die by the age of fifty or sixty. Does that mean he really is immortal, that he really is the avatar of God?”

“There is a complicated explanation to that one, Sophie,

but let me assure you, the man you call the Overlord is every bit as human as you and I. He can definitely be killed. There is nothing divine at all about him, and nothing special about him apart from his monstrous delusions of grandeur. He is an evil man who is keeping all of you in slavery. We have to do something about that.”

“Perhaps then at least one of the olden legends is true,” Sophie reflected. “Blueskin legend that is. That one day a Messiah will come to liberate us.”

“Maybe there is something to your myths after all,” the Stranger agreed. “Perhaps it’s not all wishful thinking. I am after all an outsider who brings knowledge to your people which may liberate them.” The Stranger was beginning to feel that he could well be an instrument of destiny.

A history of the space colonies

It was clear that Sophie needed many more explanations and much more time to take things in. The Stranger tried to enlighten her as much as he could. He outlined the history of humanity for the past three hundred years since the Great Armageddon and tried to orient Sophie in person, time and place. He explained that human beings were but one species of many millions that had evolved on planet Earth, albeit the only species with the ability and the stupidity to destroy the entire world, which they did in the year zero AV, also known as the year 2068 CE.

Humanity managed to survive only by dumb luck because a handful of space explorers had built a few sustainable habitats from asteroid material not long before the Global Mass Extinction. This was the first space colony. In the year zero AV, the number of surviving human beings within the asteroid colony was a mere forty eight souls. There were thirty people in vessels in orbit around the Earth, most of whom would later join the asteroid colony. In total only seventy eight human survivors out of nine billion.

Foresight on the part of the Grand Saviour of Mankind had enabled a programme of human reproduction to take place by means of artificial insemination. Just before Armageddon, the Grand Saviour had ensured that the frozen sperm of ten thousand highly selected Earth donors - the seed of healthy, talented and accomplished artists, architects, engineers, writers, musicians and

scientists - were sent to the space colonies. The one who took charge of reproductive affairs, revered as the Cosmic Mother of Humanity was named Maria Alvarez. She was also remembered as the Fierce Protector of the first generation of young mothers. To maximise human reproduction, the biotechnologists employed gender selection to ensure that the first three generations of offspring were all female. Within sixty years there were approximately six thousand space colonists, virtually all female except for a few aging men and one prisoner. This prisoner was the man who later became the Overlord of Purgatory. As a prisoner he was denied any reproductive rights, not that it would have mattered as he had been rendered sterile after decades of low intensity cosmic radiation.

The danger of human extinction had passed. A vigorous debate was then held to determine whether it was possible and desirable to maintain humanity as a single sex species and to discard the “useless” male sex altogether. The arguments were complicated, wide ranging, emotional as well as practical. The decision was made that after this generation, gender selection would be abolished. Ultimately however, they really had no choice as the supply of frozen sperm was decades old and they were now obliged to use some specimens twice, which was unacceptable according to the doctrine of maximum genetic diversity. The offspring of generation four thus consisted of equal numbers of males and females and artificial insemination was no longer practised subsequently.

Nevertheless, the human population continued to double each forty year period such that by the year 220 AV there were approximately one hundred thousand human souls in the space colonies.

The one who later came to be known as the Overlord of Purgatory was a political tyrant from Earth originally named Xiao-Pian Lin, the son of Premier Lin of the New Chinese Empire. Xiao-Pian Lin had escaped Armageddon with two of his armed bodyguards into a space station orbiting the Earth. Their demands for a vessel with interplanetary capability to take them to the asteroid belt colony were ignored by the asteroid colonists, to Lin’s great rage. He used the scientists in his space station to modify his orbital craft to eventually make way there himself. In the year 4 AV he arrived at the asteroid colony and subjugated one of the habitats using armed force with some loss of life. He was however eventually

overpowered and imprisoned. He had been the last recipient of the latest form of “immortality” therapy and did not require ongoing medication to avoid deterioration of his body tissues. He would not die naturally and could only be terminated by violent means or poison, which the colonists could not bring themselves to do as they chose to have no death penalty. Hence he was imprisoned “indefinitely”, a fate which further unbalanced his already deranged mind.

The L2 Mars mega habitats were the idea of a scientist named Liu Zhang, although he did not live to see their construction. Despite their huge size, being 6.3 kilometres long and 2 kilometres in diameter, construction proved easier and occurred sooner than anticipated. The asteroid colonists automated the mining, smelting and component manufacturing processes. They used little machines to build bigger machines which built bigger machines still, which produced the building blocks of the habitats. In year 65 AV, the first mega habitat was completed, just the right time to house the increasing space population.

By then, Xiao-Pian Lin was in minimum security custody. He was released shortly after, as it was felt he had been adequately rehabilitated after decades of incarceration.

Unfortunately Lin’s basic character had remained unchanged. Despite superficial gestures to convince others he was a reformed individual, deep down he maintained the view that had the divine right to take charge, to control others, and that he had been cheated of his destiny. Lin used manipulation and deceit to win over disaffected and impressionable young people with exaggerated promises. He established a cult following. With brutal violence against a people who had only known peace, they seized control of mega habitat 3 in the year 150 AV. They destroyed the locator beacon and activated the manoeuvring rockets, moving the habitat away from the asteroid colony, to be lost to the greater fold of humanity forever, so it seemed. They then went on to create their own little world which they called Purgatory.

By the year 300 AV, the present time, there were eighteen mega habitats orbiting around the L2 point of Mars. This was the largest single concentration of human beings in one location, in one colony. Within the asteroid belt there were three separate widely spaced asteroid mining colonies consisting of three mega habitats

each. Travel between mega habitats within colonies was by means of small shuttle craft with non sustainable internal environments. Travel between the widely dispersed colonies was a lengthy affair which took months and was undertaken in medium sized “wheel and axle” craft with sustainable mini ecosystems.

The Earth was still uninhabitable due to runaway global warming.

The Stranger’s story

The Stranger described to Sophie how he came to arrive at Purgatory. There were five crew on their spacecraft on a routine six month trip between asteroid colonies. Two months into their trip they were sideswiped by a meteor and lost their navigation and long distance communication capabilities. They drifted along for four weeks, trying to repair their equipment, until they accidentally came across Purgatory. They had all vaguely heard of stories of a lost renegade habitat in their childhood but did not realise exactly what they had stumbled upon at the time.

They manoeuvred towards the North entry bay and used their short range VHF radio to announce their arrival and ask for permission to enter. With no reply, three of them decided to take a shuttle craft across and try to enter the habitat. The two who remained behind on the mother ship used proximity radar to lock their position onto the habitat so that the mother ship would drift along on automatic pilot, in tandem with Purgatory.

The Stranger and his two colleagues in the shuttle craft used their short distance radio to transmit the standard VHF entry code to open the doors of the North docking bay. They manoeuvred the shuttle into the bay and docked at one of the ports. Their sensors indicated that there was breathable air in the habitat, hence they opened the hatch and entered. They took the elevator down from the weightless central hub to the normal gravity of the rim, reaching the area known as the North forbidden zone.

Soon after they emerged from the elevator, before they could get their bearings, they heard threatening shouts. It was Dubhe and Merak, the so called Angels of Vengeance, accompanied by a group of the Overlord’s guards, who had come to intercept them. The Stranger froze in his tracks but in the confusion his two friends

tried to run back to the elevator. They came under fire with tracer bullets and were mowed down in seconds. The Stranger's two companions were killed and the Stranger himself was captured. Dubhe and Merak stayed back in the North forbidden zone and instructed the guards to escort the Stranger to the palace of the Overlord.

As the Stranger was being frogmarched down the forest avenue, the party was hit by a roadbump.

SPACE COLONIES

Date: Jan 14, 2049

Location: Mars orbit

Event: Transcript of videocom conversation between Liu Zhang and Maria Alvarez

Maria Alvarez (calls up on videocom): Hey.

Liu Zhang (sitting in the shuttle craft, listening to an instrumental rendition of "Maria" from West Side Story - hastily turns down the music): Hey.

Maria Alvarez: What's that you're listening to?

Liu Zhang: Oh, nothing, just some old time music I downloaded today, er, a while ago... (*turns off audio player and changes the subject*). Here's our latest news. Akira, Michiko and I are off to Phobos tomorrow in the shuttle.

Maria Alvarez: Cool.

Liu Zhang: Trying to figure out methods for approaching and landing on asteroids, practice some mining techniques, that sort of thing.

Maria Alvarez: Sounds like fun.

Liu Zhang: Yeah, the work's interesting but the company's pretty boring. I mean, they're good people: reliable, trustworthy, hard working and all that - but they are no fun whatsoever. I call them mud sticks.

Maria Alvarez: Mud sticks?

Liu Zhang: You know, sticks in the mud. Sometimes I try to bait them just for the heck of it but I never get any response - just blank stares. For instance, you know how cramped our quarters are - getting into our bunks we almost have to climb over one another,

especially with our normal gravity on board. The first time we saw the tiny bunk cabin I said very politely to Akira: “As your Captain, I’m taking the top bunk. I’m sure you won’t mind if I step on your face to get up there”. He just stared at me looking puzzled and said: “Yes Sir, whatever you say, Sir.”

Maria Alvarez: Hmm. You know what *I* would have said?

Liu Zhang: No, what?

Maria Alvarez: I would have said very politely back to you: you’re welcome to step on my face if you don’t mind having a bloody stump where your foot once was.

Liu Zhang: Ouch. A woman not to be trifled with.

Maria Alvarez: Yeah, but soft as putty if you know how to treat her right.

Liu Zhang: Speaking of putty...I learned this one in Stanford...did you hear the one about the guy who couldn’t tell window putty from porridge?

Maria Alvarez: Hmm...couldn’t tell window putty from porridge... let me guess...he put the putty in his mouth, glued his jaws shut and was never heard from again.

Liu Zhang: I was going to say that all his windows fell out, but I think *your* answer’s even better.

Maria Alvarez: So you learned that one in Stanford, huh? Well *that* was an education well spent.

pause

Liu Zhang: Hey Maria, do you want to hear my ideas about space colonisation?

Maria Alvarez: Go on.

Liu Zhang: Ever since I was a kid I thought how great it would be to explore outer space, you know, the excitement, thrills, adventure. I guess most young boys have that dream.

Maria Alvarez: And some young girls.

Liu Zhang: Unfortunately, harsh reality destroyed my childhood fantasies. My first trip into space was pretty miserable. I mean, the ship was cramped, the air was dry and stale, I couldn't get clean, the packaged food was crap and the novelty of weightlessness soon wore off and became a real pain. The fact was, space travel was far from glamorous, was very uncomfortable and extremely dangerous. But my interest in space outweighed the drawbacks so I stuck with it. But then I thought, wouldn't it be great if we could overcome all those problems - if we could have normal gravity, if we could go to the bathroom and toilet normally, if we could eat fresh food - and still experience the adventure of space exploration. I worked hard with like-minded scientists to tackle those issues.

Maria Alvarez: Well you seem to have worked them out. As I said when I visited your ship before, I could almost imagine myself being back on Earth.

Liu Zhang: Exactly. I believe that's exactly what we ultimately *all* want. For us to live indefinitely in space, the ideal thing would be to recreate an environment as close to that of the Earth as possible. That is what human beings have evolved to suit. If we could construct an environment which could fool our senses into thinking we *were* on Earth, all the better. I don't know about you, but I could live in such a situation forever.

Maria Alvarez: I think I know what you mean.

Liu Zhang: So tell me, Maria, what would *you* like to have in your ideal environment?

Maria Alvarez: Let's see...comfortable climate, normal gravity - you already have those on your ship...wide open spaces - I don't fancy being cooped up in a confined area. Blue skies. Some nature -

grass underfoot, trees, birds flying around. And water. Definitely water features in the form of lakes, swimming holes, flowing streams. That's the sort of situation I could live in forever.

Liu Zhang: Well I believe it is possible to create that sort of environment outside the Earth.

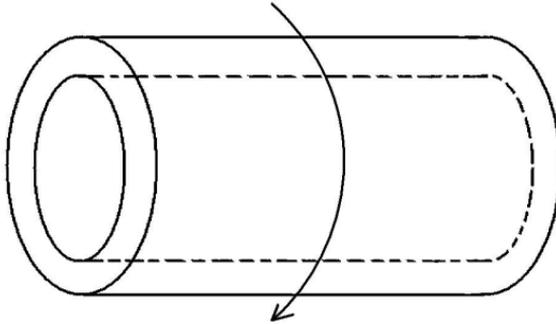
Maria Alvarez: How so? If we set up bases on Mars we could create some of those things, but the gravity would still be little more than a third that of Earth.

Liu Zhang: Yes, the only way to ensure normal gravity would be to base such an environment in a rotating vessel in space. Imagine a massive spinning cylinder maybe 2 kilometres in diameter and 6.3 kilometres long. We would line the inside surface with gravel and soil on which crops, grass and trees would grow. And lakes could be created as well. Add a few animals and birds and you have a pretty good simulation of Earth.

Maria Alvarez: I dunno. It would be kind of weird, looking overhead to the opposite side and seeing people standing upside down above you.

Liu Zhang: We could block the view of the "ground above" if we placed a wide tube along the central axis of the cylinder. If the distance between the outside surface of the central tube and the inside surface of the cylinder was, say three or four hundred metres, that would be the height of the "sky". Colour the tube light blue and that would be the colour of the "sky". Add a few fog generators and you would create clouds overhead. Looking horizontally, the clouds would hide the line of the 'horizon'. If the central tube was translucent and high intensity lamps were placed inside it, you could shine diffuse light down from the "sky" above. And right in the centre would sit the nuclear reactors which would power everything. The reactors would be held in position by flexible pylons which would also carry pipes and wires and allow access to the core. Let me draw you a diagram:

(The screen goes white and a diagram appears line by line, drawn by Liu using a stylus and a graphics program):



Maria Alvarez (switches back to videocom mode): Sounds pretty neat. But wouldn't it take enormous amounts of material to construct such a huge vessel? I imagine the cost of launching the construction materials into space from Earth would be prohibitive.

Liu Zhang: You're right. It would be crazy to source construction materials from Earth or even from Mars for that matter. Just takes too much energy and expense to launch them from the bottom of a gravity well out into space.

Maria Alvarez: So that's the end of *that* idea then. Nice dream though.

Liu Zhang: But Maria, there already exist massive amounts of raw building material floating about in space, just waiting for us to harvest.

Maria Alvarez: Oh yes, I forgot, the asteroid belt.

Liu Zhang: For our purposes, virtually an unlimited supply of metal ore, carbon, silicon and other minerals. Even water-ice and nitrogen, sulphur and phosphorus compounds as well.

Maria Alvarez: Is that part of your long term plan then? To make giant permanent space colonies?

Liu Zhang: My personal long term dream, yes, but not that of my bosses. All they are interested in is that we send back as much uranium and precious metals to them as soon as possible.

Maria Alvarez: Shame. Would be great to live in a space habitat like that.

Liu Zhang: Yup...anyway...about our Phobos trip - it'll take about three weeks. Probably best I don't speak to you from the shuttle. The others are bound to overhear and wouldn't understand. Things might get a bit tricky, you know, sharing sensitive information with the so called enemy, that kind of crap.

Maria Alvarez: Be careful Liu, please don't get into any trouble on my account.

Liu Zhang: Don't worry about it, Maria, it's not an issue.

LIFE WITH CLENCHED BUTTOCKS

Date: Feb 6, 2049

Location: Mars orbit

Event: Transcript of videocom conversation between Liu Zhang and Maria Alvarez

Liu Zhang: Hey Maria, just got back from Phobos

Maria Alvarez: Hey Liu. So how was the prospecting? Strike any gold?

Liu Zhang: 'Fraid not. The outing was thrilling for some though, at least for Michiko who was over the moon about being there.

Maria Alvarez: Over the moon, very punny.

Liu Zhang: I guess she was bored and felt left out on the long journey over here from Earth - she didn't have many jobs to do then. But minerals and ores though, that's her thing - she was like a kid in a candy store. She was trained as a medical doctor, but mineralogy was always her great hobby - a magnificent obsession. She had just the right combination of skills for our mission and she took another degree in mining technology before joining. Personally I find it hard to get excited about a bunch of rocks. We did get to do some drilling and dynamiting though. That's always fun - blowing things up.

Maria Alvarez: You're an anarchist at heart, Liu.

Liu Zhang: Those are my great hobbies in life: cooking, poetry and blowing things up. Maybe if I write my autobiography I could call it "*Poetic cooking with explosives*".

Maria Alvarez: Great title. You are a good cook Liu, but as your friend I have to be honest and tell you that as a poet you're pretty hopeless.

Liu Zhang: Shatter my dreams, why don't you? So I guess I shouldn't make any sudden career changes.

Maria Alvarez: I guess not. Strange you should mention autobiographies. It just so happens I was thinking about a title for my own.

Liu Zhang: Oh yes?

Maria Alvarez: You know how the others always accuse me of being so anal retentive? I was thinking about calling my book “*Life with clenched buttocks*”.

Liu Zhang (chuckles): Funny girl. You know, I love your self deprecatory humour Maria, but sometimes I wish you wouldn't put yourself down like that. I don't think you're anal retentive at all. I think you're just a keen young woman trying to be the best that you can be. I admire that.

Maria Alvarez: Thanks Liu. Hey, I've been thinking a lot about your idea of those giant space habitats, those spinning cylinders.

Liu Zhang: Yeah?

Maria Alvarez: They would be the largest structures ever built by Man. I think the limiting factor for size would be the strength of the walls of the cylinder. You'd have to contend with the pressure of the internal atmosphere, as well as the outward centrifugal force acting on the cylinder walls and all the structures inside the wall: water, soil, trees, people, everything. One big worry would be meteor strikes. Even a paint fleck in space travelling at high velocity can hit a surface with the force of a bullet. Larger rocks would be lots worse. Hull breach would be catastrophic.

Liu Zhang: Yes, my idea is not to make the walls out of rigid panels riveted together like our spaceships, but to make them out of individual steel plates articulated together, hinged together, to give the wall flexibility. I would imagine the wall consisting of, say, six overlapping layers of articulated steel plates and sandwiched between the plates would be thick impermeable spongy material, sort of like foam rubber. The foam would make good insulation, be air and water tight and pliant. And if there was a small breach, the

foam would be self sealing. If a larger rock impacted the wall, the energy would be dissipated by the flexible laminated wall springing inwards and also by the whole habitat moving away a little. The internal air pressure would then force the wall out again to its former shape. Imagine trying to puncture an inflatable beach ball by throwing stones at it - impossible.

Maria Alvarez: Sounds good. But I wouldn't like to be standing on the inside of an impact area though. I imagine I'd be flung upwards then fall back with a splat.

Liu Zhang: Yes, I've wondered what that would be like. Sort of like sitting in a speeding car which suddenly goes over a roadbump and being thrown up from your seat.

Maria Alvarez: Yeah, a huge roadbump.

Liu Zhang: Even though the habitats would be constructed in the asteroid belt; the final location, the permanent address for most of the habitats really should be somewhere else - the best way to avoid rock strikes is to stay away from the rocks.

Maria Alvarez: Last century a scientist named O'Neill from Princeton, my old college, suggested that the Lagrange L4 or L5 points of the Earth-Moon system would make ideal locations for space colonies.

Liu Zhang: Yes, L4 and L5 points are the most orbitally stable. But maybe the L2 point of the Sun-Mars system will be a better location, as that may confer some shelter from solar flares from the Sun, being in the shadow of Mars. Habitats could orbit around the L2 point - small positional adjustments would be needed from time to time but that should not prove too difficult. Mars is of course much closer to the asteroid belt, our source of raw materials, than the Earth-Moon system.

Maria Alvarez: Sounds like you've got it all figured out.

Liu Zhang: It's a recurring idea, a meme, buzzing around in my head which I feel compelled to share with others.

Maria Alvarez: Well you've certainly infected me with your meme. So how many people do you reckon could live in each habitat?

Liu Zhang: Well, if we generously designated a "land" area of 50 metres by 50 metres or 2,500 square metres per person, for a cylinder 2 kilometres in diameter and 6.3 kilometres long - and I've worked this out before - that's a total internal usable surface area of about 39 million square metres. If we allow for four lakes one kilometre square each, let's subtract 4 million square metres - that leaves 35 million square metres of usable land. Divide that by 2,500 square metres and you get fourteen thousand. A habitat that big should easily support fourteen thousand people and still give everyone the feeling of wide open spaces.

Maria Alvarez: Wow. A city state in itself. But why 6.3 kilometres long? Why such an odd number?

Liu Zhang: No reason, just appealed to my sense of symmetry. I wanted the length to roughly be the same as the circumference. Also 6.3 kilometres is roughly the distance walked in an hour. Fourteen thousand people may sound large for a space community, but the population would only be that of a small town. Left in isolation over time there would be great potential for small minded parochialism to develop.

Maria Alvarez: Not to mention inbreeding. I suppose ideally we should have several habitats in proximity, orbiting around Mars L2.

Liu Zhang: Exactly. A sort of L2 Mars orbital network with, I dunno, maybe fifty or a hundred mega habitats constantly communicating with one another and exchanging personnel all the time. One thing I haven't worked out is how to convince the powers that be to build such large habitats. Right now, there are only eleven of us in total on and around Mars. A single spinning habitat one tenth the size of what I propose could easily house more than ten times as many of us.

Maria Alvarez: Well here's another question for you. Why not make many little spinning habitats rather than fewer large ones?

Liu Zhang: We will of course have to start small, but I believe that big habitats will be the way to go. Quite apart from aesthetics - the loss of the sensation of wide open spaces when you live in a smaller habitat - having the largest habitat possible is important for maximum biodiversity. We know that biodiversity is proportional to the physical size of the ecosystem. Biodiversity is important for several reasons: first is ecological stability. The more diverse the system, the more stable the system. If you have only one keystone species and it perishes, then a cascade of extinctions may follow. If you have more than one species occupying each ecological niche, then the loss of one species has only a small impact. The second reason is biomass productivity. Quantitatively, biomass production is proportional to biodiversity. Another reason is of course, the greater the number of species around us, the greater will be the biological resources available to us for human applications. Dietary richness and the production of pharmaceuticals are examples.

Maria Alvarez: Sounds like you've been reading up on ecology.

Liu Zhang: It's a fascinating field - I learned a lot from Akira and Jong-Sul on the way over.

Maria Alvarez: Too bad that making those giant habitats is well beyond our abilities and requirements at the moment.

Liu Zhang: It's hard to imagine what possible incentive there could be to construct such large space habitats and what might encourage people to settle in them.

Maria Alvarez: Still, you never know what the future may hold. As they say, necessity is the mother of invention.

THE SECRETS OF WEALTH

Date: May 30, 2049

Location: Mars orbit

Event: Transcript of videocom conversation between Liu Zhang and Maria Alvarez

Maria Alvarez: Hey Liu

Liu Zhang: Hey Maria

Maria Alvarez: So what's new?

Liu Zhang: Our main project now is to devise a means to electrically smelt ore in space. That is the key to producing the ingots which will be shipped back home, once we get stuck into the asteroid belt. For my own personal interest, it is also the key for us to manufacture the basic building components, steel plates and so forth, for the construction of more space habitats. Otherwise it's just the usual daily routine for us.

Maria Alvarez: Things are routine for me too. Getting through our various experiments and the Mars surface surveys. Other than that, just marking time till the ground crew return. Do you mind if I ask you something?

Liu Zhang: Go ahead.

Maria Alvarez: One thing I can't figure out was why you guys would bother to stay eighteen months in orbit around Mars if your main goal was to mine the asteroid belt. Why not go directly for the asteroids like the Europeans did?

Liu Zhang: Well, we initially built two ships simultaneously in Earth orbit. One was to travel to Mars orbit and the other was to head straight for the asteroid belt. But there were missed deadlines and budget blowouts, so we sent this Mars mission first. Initial reports suggested that Phobos and Deimos would be worth mining, but now that appears increasingly unlikely. In any case it is useful for us to be

here to practice on the Mars “moons”, which really aren’t proper moons but merely asteroids in Mars orbit. We’re trying out various survey, mining and smelting techniques in a low risk environment for meteor strikes. If we went straight to the asteroid belt we’d spend maybe a year just finding our feet, all that time exposed to the risk of being hit by rocks. A few months more and we should have figured most things out.

Maria Alvarez: So why not leave for the asteroid belt in the next few months? You’re not bound to wait for a departure time window in the middle of next year like we are, for us to return to Earth.

Liu Zhang: It’s pretty stupid, really. We had orders from our bureaucrats to shadow you, to train our telescopes on you. To protect our L1 and L2 probes against sabotage by you guys. Paranoid and silly as far as I’m concerned.

Maria Alvarez: Yeah, it *is* kind of paranoid. I doubt that even the dirty tricks department of the CIA would order us to sabotage another country’s claims. And even if they did, I personally would not stand for it.

Liu Zhang: So here we are stuck in orbit round Mars together for eighteen months. I’m not complaining though. Gives me a chance to talk to you every day.

Maria Alvarez: I look forward to our chats too. Hey, I’ve been thinking a bit more about your space habitats, those spinning cylinders.

Liu Zhang: Yes?

Maria Alvarez: One more criterion for my ideal environment to add to the checklist. Back on Earth, I hate it when it rains during the day, it really messes up my daytime activities. But rain is essential for any biosphere. One possibility is to irrigate things using ground sprinklers, but the water will never be as evenly distributed as rain falling from above. Also, people would probably miss it if there was no rain at all - our aim is to create an environment as Earth like as

possible, isn't it? So in my ideal environment, it would only rain at night. Perhaps the way to do it would be to purify the used water then pump it up into the central core where it would then be sprayed outwards, towards the rim of the cylinder. And we could set the rain timers for, say, between 2am and 5am only.

Liu Zhang: Great idea, definitely should be included in our grand plans.

Maria Alvarez: I've also got a question about the walls of the habitats. You mentioned flexible laminated walls - articulated steel plates alternating with thick impermeable layers of self sealing foam rubber. Well where will you get the foam rubber from? You'll need huge quantities.

Liu Zhang: Yes, that's one of the tricky issues. I was researching closed cell foam polymer materials on the net and came upon some papers by a guy named Nigel Rutherford twenty years ago. He actually figured out a process to synthesise all sorts of complex hydrocarbons using artificial photosynthesis in 2030. It was originally thought that all his documents were lost in the fire which claimed his life back then, but fragments were recently found in a hidden underground safe. I've been emailing some of our bioelectrical engineers back home and they said it may be possible to manufacture polymers directly from water and carbon dioxide using enzymes and electrical energy. We could make the enzymes from genetically engineered plants.

Maria Alvarez: That would be great because you could then make all sorts of plastic goods without the need for fossil fuels.

Liu Zhang: But direct polymer synthesis is only a distant prospect and will require several research breakthroughs. However, even now, we can harvest polymers from bioengineered plants to turn into plastics. So producing small quantities at this time is no problem. Rubber and plant resins are of course examples of renewable plant derived polymers.

Maria Alvarez: It all sounds quite feasible, doesn't it? I've also been thinking about the socio-economic aspects of those space colonies.

Liu Zhang: Wow, Maria, you're racing way ahead of me now.

Maria Alvarez: Well, you started all this, Liu, I'm just running with your idea. OK, here goes. I'm no Economist so my thoughts are just those of an informed lay person. First, tell me Liu, what is your definition of material wealth?

Liu Zhang: I guess most people would think of material wealth as having lots of money in the bank or having lots of assets.

Maria Alvarez: True enough, but that money or those assets aren't worth anything unless you can use them to your benefit. So I would define wealth as having easy access to a wide variety of high quality goods and services. The rich man lives in comfort surrounded by machines and servants designed to make his life easy, he eats a varied and tasty diet, he can access the best entertainment, he can travel in luxury anywhere he wants and if he falls ill he can get the best medical technology and services. A man with a truckload of gold can't be considered rich if he is marooned on a desert island. Similarly, we may have the huge mineral resources of the asteroid belt before us, but space explorers or asteroid miners cannot be considered rich. Where is our life of ease, the good food, the entertainment, the medical facilities? On my ship as it is right now, we are in fact materially very poor - we live in Spartan conditions which we accept because of the limited duration of our voyage. I believe that for an indefinite stay in space, it will be natural for people to want more than just bare minimum subsistence. Unless high quality goods and services can be delivered to the space colonists, most will want to return to Earth.

Liu Zhang: So how do you propose to deliver those goods and services?

Maria Alvarez: We talked before about having a large number of habitats orbiting around the Mars L2 point. Each habitat must of course be sustainable as far as breathable air, drinkable water and

basic food stuffs are concerned. Beyond that however, I think the way to go would be specialisation of manufacturing and skills within each individual biosphere. For instance, some habitats could produce tropical crops and livestock, others temperate crops and livestock, others could produce, say, microprocessors or pharmaceuticals or plastics, still others could offer expertise in medical or other specific services. Just imagine all those different specialised biospheres trading between themselves. Trade is the lifeblood of human civilisation. Back in the sixteenth century the Europeans endured incredible hardships sailing to the other side of the world, for no reason other than the quest for spice. I don't think we can underestimate the human desire for a wide range of goods and services. That's what makes our lives rich.

Liu Zhang: That's a very compelling scenario you describe, Maria. Quite exciting, in fact.

Maria Alvarez: Trade is what will motivate people to travel between habitats. It will prevent parochialism, inbreeding and cultural isolation.

Liu Zhang: Maria, I agree with you totally. I'm really impressed. You are one brilliant lady.

Maria Alvarez: You're a shameless flatterer.

Liu Zhang: Not at all, it's well deserved praise.

Maria Alvarez: Of course there *are* other forms of wealth. You can't just measure wealth in material terms.

Liu Zhang: That's true. We all know people who may not have much money but are content with what they have: good friends and family. I guess if you are happy, that makes you richer than even a billionaire who is unhappy. There's social wealth, emotional wealth, intellectual wealth. So tell me, Maria, what do *you* consider the most important type of wealth?

Maria Alvarez: They're all important to some degree, I guess. You can't be happy without having your basic material needs met. That aside, though, I think the richest people in the world are those who find true love. You know, a kindred spirit, a soul mate in life.

Liu Zhang: You're quite a romantic, Maria.

Maria Alvarez: Don't you believe in true love, Liu?

Liu Zhang: I didn't use to. I used to think that true love was a myth. A contrived Hollywood fabrication. A ploy to sell tickets at the box office.

Maria Alvarez: Used to? What about now?

Liu Zhang: I don't know anything now. I'm completely confused. I can't answer you.

Maria Alvarez: I'm stunned. Liu without an answer for once. OK you wimp, let's change the subject if that makes you feel more comfortable. So at the next launch window, is NEATO going to send another ship to the asteroid belt to join you? To have two ships there at the same time? *(she puts two fingers up to the video camera).*

Liu Zhang: Actually, they're preparing two ships in Earth orbit right now *(Liu puts two fingers up to the screen)*, which plan to join us in the asteroid belt, so eventually we should have three ships there at the same time *(keeps two fingers up).*

Maria Alvarez: Three ships? *(Maria puts up two fingers)* Are you sure you don't mean three ships? *(puts up four fingers).*

Liu Zhang: No, I don't mean three ships *(puts up four fingers)* and I don't mean four ships either *(puts up three fingers)*, I definitely mean three ships *(puts up two fingers).*

Maria Alvarez (chuckles): Well thanks for making that clear. Look, it's getting late, gotta go soon. You know, Liu, I really enjoy our talks. On my ship I feel starved of positive human interaction. I've

tried to fit in with the guys in the past, tried to laugh at their puerile and witless jokes. Tried to join in their pointless conversations. But it made me feel shallow, even nauseous. It felt so self-alienating. So I gradually withdrew from them. Now I'm lonely in the company of others. But not when I talk to you, though.

Liu Zhang: I feel the same. I really look forward to seeing you and talking to you each day. I just wish I could see you in person though, rather than on this damn video screen.

Maria Alvarez: Doesn't seem likely again, does it?

Liu Zhang: No, it doesn't.

A MEDICAL PROBLEM

Date: April 2, 2050

Location: Mars orbit

Event: Transcript of videocom conversation between Liu Zhang and Maria Alvarez

Liu Zhang: I have bad news, Maria. We just discovered that Su-Lin has ovarian cancer.

Maria Alvarez: My God, that's terrible. How did you find out?

Liu Zhang: She had stomach cramps. Michiko did an ultrasound which showed a cystic tumour the size of a grapefruit arising from her right ovary. It had bled inside, but that seems to have stopped now. Fine needle aspiration revealed cancer cells.

Maria Alvarez: Is it serious?

Liu Zhang: It could be if the cancer has spread. We're not sure at this time. Left alone it is sure to spread. I understand it is a slow growing tumour.

Maria Alvarez: I wish we could help you Liu, but Penny, our Medic, is down on the Mars surface as you know.

Liu Zhang: I doubt Penny can do much anyway. Su-Lin needs a full body scan followed by surgery as soon as possible, then nanotherapy - which can only be done back home.

Maria Alvarez: But you've got another three years to go with your mission.

Liu Zhang: I'm aborting the mission. We'll head back to Earth when the next return window comes around a month from now.

Maria Alvarez: Your bosses won't be too happy with this situation.

Liu Zhang: No, they're not. Actually, they ordered us to continue,

regardless of Su-Lin's condition. They said that aborting our mission halfway would cost the country a billion dollars and that the life of one small Chinese girl wasn't worth one tenth of that.

Maria Alvarez: And you're defying them?

Liu Zhang: They can go to Hell. There is no way I am going to sit back and watch her die. I'm Captain of this mission and I'll decide what's best for my crew. I have just designated her as essential personnel, meaning that this mission cannot continue without her.

Maria Alvarez: But surely you can cover the work she does?

Liu Zhang: Perhaps. Anyway, they didn't buy into that either and they insisted we carry on regardless. I'm ignoring them. They can't do anything to me till we return home. They threatened to relieve me of command but they backed off when I said I would go on strike. Our mission definitely cannot proceed without both nuclear engineers.

Maria Alvarez: You're going to be in big trouble.

Liu Zhang: No more trouble than I am already in.

Maria Alvarez: What do you mean? What other trouble is that?

Liu Zhang: Don't worry about it Maria, it's no big deal.

Maria Alvarez: Is it because of me? Because of the conversations we had?

Liu Zhang: Maria, it is entirely my doing. I chose to say what I said and I gave you information freely.

Maria Alvarez: What's going to happen to you? I've a right to know.

Liu Zhang: Apparently one of my crew, I'm not sure who, intercepted our conversations and retransmitted them home. I'm now

branded as a traitor and will probably face court-martial when I return, being officially an air force employee.

Maria Alvarez: What a mess. If I'd known this was going to happen I would never have passed on any information to Houston. I can't help but feel somewhat responsible for your situation.

Liu Zhang: Please don't, Maria. Look, it's not important. I regret nothing. I wouldn't be alive today if it wasn't for you, for what you did for us fourteen months ago. Now I look upon each day as a bonus and I let tomorrow take care of itself.

Maria Alvarez: Hey, wait a minute. If our previous conversations were intercepted, that means they could be eavesdropping on us even now...

Liu Zhang: Not likely, now that we've changed the comm frequency and are using a different scramble algorithm. Anyway, even if they do hear this, it's not like I can be in any deeper trouble than I already am.

Maria Alvarez: OK, if you say so. If only...I just wish we could find a solution that was satisfactory to everyone...

Liu Zhang: No such luck. To be honest, I really dread returning home, but I see no other option at this time.

Maria Alvarez: You never know what might come up.

PURPOSEFUL POINTLESSNESS

Date: April 30, 2050

Location: Mars orbit

Event: The *Bushbaby* returns to the *George Bush Sr*

The American Mars landing mission was filled with exciting tedium. It was yet another successful failure. A triumphant defeat. A historic non-event. Yes, there *was* water locked up as ice under the Martian surface. No, there *was no* life to be found on Mars. Structures which looked like bacterial microfossils in rocks were just serpiginous crystalline deposits.

And so the Big Question raised by this entire project was:
So What?

The three ground crew lifted off the Martian surface with their collection of stones and soil to rendezvous with the *George Bush Sr*.

The prodigals had returned.

After the crew transferred from the *Bushbaby* back to the mother ship, they cut loose the landing module.

George Bush Jr was a discarded useless appendage that would end up crashing on Mars.

THE POWER OF LATERAL THINKING

Date: May 1, 2050:

Location: Mars orbit

Event: Transcript of videocom conversation between Liu Zhang and Maria Alvarez

Maria Alvarez: Liu, let me run an idea past you which may suit all of us down to the ground.

Liu Zhang: Fire away.

Maria Alvarez: Su-Lin needs to return home as soon as possible, which will be the same time that my mission is returning. You guys were meant to spend another three years prospecting the asteroid belt and would like to stay on. What would you say if we could take her home for you?

Liu Zhang: Maria, that's a very generous offer which I'm not sure you can afford to make. She will be another mouth to feed and another pair of lungs using up oxygen on your ship. You may not have the capacity to support an extra crew member on the seven month trip back. Furthermore she really is an essential part of my team with her nuclear and electronic engineering skills and we would find it very hard going without her.

Maria Alvarez: Well those problems could be overcome if I took her place on your ship and she took my place on mine. You know I can cover her work easily. I already know how your nuclear reactors work inside out.

Liu Zhang: Wow, that's quite a radical idea. If it saves her life and enables us to continue with our mission it would be pretty ideal. Despite the rigid attitudes of my bosses, I just might be able to sell your proposal to them. It makes a lot of sense. But I can't imagine how Houston would agree to such a plan. In fact I can just picture your bosses rubbing their hands with glee at the thought of us having to abandon our mission. To help us would go against America's usual antagonistic attitude towards us. It would be out of character.

And what does your Captain and the rest of your crew think about your plan?

Maria Alvarez: Don't worry, they'll cope. And as far as Houston is concerned, I can guarantee they will not be an obstacle. So it's all systems go. That is, unless you guys don't want me on your ship.

Liu Zhang: Are you kidding, Maria? I'd...we'd love to have you aboard. We work well together. But spending three more years in space - that would be a major sacrifice on your part.

Maria Alvarez: Not at all. Working in space is what I've studied and trained all my life to do. It's what I choose to do. Besides, you guys have all the comforts of home on board, so I don't view it as a hardship in any way. Especially if you continue to cook for me.

Liu Zhang: It would be my pleasure. I must confess I'm quite partial to your idea. But only if you're sure it's what you want.

Maria Alvarez: Right then, it's all set. I'll let you know when to send Su-Lin over to us in your shuttle. I'll have to apply personal leverage to obtain Houston's permission – a special trump card I have up my sleeve. The whole thing has to be handled very delicately and confidentially. So just keep this between ourselves for now, OK? ...

Liu Zhang: OK.

LIU WITHOUT A CLUE

Date: May 4, 2050

Location: Mars orbit

Event: Crew swap

Liu again executed a flawless docking manoeuvre, connecting his shuttle craft one more time with the *George Bush Sr.*

He opened the hatch to find Maria at the other end, peering back at him.

“Hi, Maria, great to see you again,” Liu grinned.

“Likewise Liu,” she smiled back.

“Why don’t you come aboard our shuttle first, we’re still getting organised,” Liu suggested. “Let me get your bag for you.”

She handed her bag to him through the hatch.

Liu was impressed at how light both women were travelling, with rather small bags containing only the essentials.

Maria drifted through the hatch next and introduced herself to Su-Lin, asking after her health, wishing her well and so forth. She had been warned by Liu that Su-Lin was not terribly fluent in English and was also rather shy and retiring, hence the initial polite niceties soon gave way to silence. Su-Lin also seemed distant and preoccupied. She went through her bag and double checked she had all the items she needed and zipped it up again. She appeared to be holding back tears in her eyes.

Liu and Su-Lin spoke to each other in Mandarin. Maria guessed by their body language that she was thanking him for various things and that they were saying their final farewells. Su-Lin seemed almost apologetic in her manner.

Abruptly, Su-Lin wrapped her arms around Liu and kissed him passionately on the lips, to Liu’s surprise. He did not reciprocate her embrace, neither did he push her away - to do so would have been churlish.

Maria was taken aback by what she saw, but maintained a neutral expression and kept out of the way to one corner of the cabin.

That strange moment over, Su-Lin turned around, tears now flowing down her cheeks. She picked up her bag and Maria helped her through the hatch into the *George Bush Sr* where she was

received by the Americans. Su-Lin was greeted by Captain MacIntyre who introduced her to the other crew.

From within the cabin of the shuttle, Maria said a rather cursory goodbye to her crew through the hatch and closed it shut.

Liu and Maria strapped themselves into the cockpit seats, ran quickly through the system checks then disengaged the shuttle from the *George Bush Sr.* They were on their way back to the *Tsushima*.

Not a word was spoken for perhaps ten minutes.

Maria's mood had turned frosty. "That kiss Su-Lin gave you," she inquired in measured words, "it looked pretty passionate for a farewell kiss. What was that all about?"

"I swear, Maria, I have absolutely no idea," Liu answered.

"Looks to me like you two had a thing going," Maria remarked, looking blankly straight ahead through the cockpit windows.

"You've got it all wrong Maria, she was just another crew member to me. I hardly paid any attention to her," Liu protested.

"I think she's quite pretty," Maria said. "Don't you think she's pretty?" Maria maintained her forward gaze.

"I hadn't noticed," Liu answered.

"Well it's obvious she fancied you," Maria observed. "Was it a nice kiss?"

"She took me by surprise," Liu said. "She kissed me but I didn't kiss her back."

Liu was distracted. He found it hard performing two complicated tasks at once, piloting the shuttle and handling a difficult conversation.

"I bet she's going to miss you. Will you miss her, Liu?" Maria asked.

"For God's sake, Maria, give it a rest," Liu said, starting to get annoyed. "Su-Lin meant nothing to me at all. Don't you know it's *you* that I love..." he stopped in mid sentence.

Thereafter followed the most uncomfortable minute of silence that Liu had ever experienced. "Oh shit, shit, I shouldn't have said that," he said. "This is going to make things *really* awkward..."

"Not necessarily, Liu," Maria said, "not if it turns out that I love you too."

Liu turned to Maria. “Do you, Maria?” he said hopefully.

Maria turned to Liu. “God Liu, for a smart guy you can be a real dumb ass at times.”

Maria unbuckled her harness, moved over towards Liu and kissed him.

In an uncharacteristic show of shabby spacemanship, Liu completely botched up the docking procedure to his mother ship and had to execute a missed approach. He overshot so badly that he had to perform a sixty minute orbit around Mars before returning to the *Tsushima*. In that time, despite the fumbly difficulties of zero gravity, Liu and Maria made love twice...

Back on the *Tsushima*

After Liu and Maria returned to the *Tsushima*, the NEATO crew finalised their preparations to depart Mars orbit and journey on to the asteroid belt.

Maria stowed her belongings in her locker. She had taken the bunk below Liu. Akira Hasegawa had taken over Su-Lin’s old bunk, which he preferred as it was a single upper bunk over a storage area. He now no longer had to lie awake at night worrying if Liu was going step on his face.

Maria and Liu sat alone on her bunk.

The other crew were strapped into their seats in the command room, ready for immediate departure. They were awaiting instructions from Earth about a top secret new destination.

“Liu, I have a confession to make,” Maria said. “I want you to hear it from me first, before events overtake us and before Scott MacIntyre makes an irate call to you.”

“That sounds ominous,” Liu said cautiously, “go on.”

“You know how I said I could get Houston’s permission for the crew swap between our ships?” Maria said. “I lied. I didn’t even bother to ask them. You were right when you said they wouldn’t go along with it. Hell, they weren’t even willing to spare you any oxygen when you guys faced death, so why would they approve this?”

“But how did you convince Captain McIntyre to take Su-Lin on board then?” Liu asked.

“I told him she was just going over for a couple of days for Penny our Medical Officer to examine her - to offer a second opinion and maybe some interim treatment for the cancer. Meantime to avoid overcrowding on our little ship I would visit you guys. Also a good excuse for me to check out the *Tsushima* one more time and gather more intelligence about your mission. What I didn't tell McIntyre was that I wasn't going back.”

“I see,” Liu pondered, “but still...Maria, I don't want you to get into trouble...it's not too late, we can still send you back right now if you have any second thoughts.”

“Liu, unless you tell me here and now that you don't love me and you want me off your ship, there's no way in heaven or hell that I'm going to budge,” Maria replied.

Liu took her hand. “You know I love you, Maria. I loved you from the very first time you put a gun to my head,” he said.

“Hey, hey, the *only* time,” Maria protested.

“Anyway, I know better than to try to argue with you once you've made up your mind,” Liu said.

“Right then, it's settled. I'll make a video call to them now. It'll be fun to see Captain MacIntyre's face turn purple with apoplexy when I tell him,” Maria remarked.

“But what will they do to you when you eventually return to Earth?” Liu asked.

“That'll be three years from now,” Maria replied. “A wise man once said to me to look upon each day as a bonus and let tomorrow take care of itself...”

THE DOCTRINE OF PLAUSIBLE DENIABILITY

Date: May 10, 2050

Location: Washington D.C.

Event: Transcript of videocom conversation between Peter Dogowitz, Director of CIA and Anthony Manetti, Director of NASA.

Peter Dogowitz (CIA): That goddamn bitch Alvarez has proved to be a real thorn in our side. This is the second time she blatantly ignored our orders.

Anthony Manetti (NASA): To be fair, with regard to her first act of disobedience last year - when she gave the NEATO's oxygen - I think we have to appreciate that she was in a very difficult position at the time. We issued her a number of warnings subsequently to which she seemed to respond favourably. She did after all provide us with some useful intelligence about the NEATO mission.

Peter Dogowitz (CIA): But nothing that did not become public knowledge anyway a week or two after she told us. We have had two golden opportunities now to gain the upper hand over the Asians in this space race, but we were foiled both times by her treachery. This latest action - defecting to the NEATO ship - is completely beyond the pale.

Anthony Manetti (NASA): In her message she made it quite clear that she was not defecting, that she was not changing loyalties. She tried to sell it to us as a pragmatic gesture designed to promote international goodwill.

Peter Dogowitz (CIA): That's crap. She undermined our authority and ignored our orders. Mark my words, she will pay dearly for her insufferable behaviour. How the hell did that traitor become deputy commander of our Mars mission anyway?

Anthony Manetti (NASA): She got top marks in her psychological tests for intelligence, initiative and determination. Beat everybody else hands down. Her professional qualifications were impeccable

and she passed all her physical tests with flying colours. In terms of ability alone she should have been made commander, however being young and female went against her.

Peter Dogowitz (CIA): You NASA jerks need to select your candidates better. Brains and ability are not the most important thing. You need to ensure they will comply with authority.

Anthony Manetti (NASA): Unfortunately all of the smart candidates with initiative tend to have a strong independent streak. But you know, maybe we can still turn this situation to our advantage. Perhaps she can serve as our on-board spy, reporting all the NEATO activities to us.

Peter Dogowitz (CIA): We already thought of that. All her videocom messages now go through Sinojapanese mission control before being forwarded to us. They censor any sensitive information. And even though we have managed to intercept and decode her raw unedited transmissions, she seems to have clammed shut. She only talks about the most bland topics these days.

Anthony Manetti (NASA): So what do you plan to do in response to her behaviour?

Peter Dogowitz (CIA): Well, there was no way we could admit to the press that she had snubbed us and had done her own thing by jumping ship. That would make us look like complete fools who have no control over our own personnel. So we had to spin the same line - that it was a mutual decision designed to promote international goodwill and that we had sanctioned it.

Anthony Manetti (NASA): I guess it looks like she got away with it. After that piece of media manipulation, it will be impossible for you to prosecute her for insubordination when she returns.

Peter Dogowitz (CIA): Don't you worry, even though she won't be back for a few years, we won't let this go unpunished. The CIA has a long memory. If she was a member of our armed forces, the penalty for treason would be death. We did a good job on one of

those uppity scientists - Katherine Kelly - eight years ago. We'll make damned sure that Alvarez bitch gets exactly what she deserves when she returns. You can count on it.

Anthony Manetti (NASA): I remember the Katherine Kelly case. The Senate inquiry really grilled your agency over her death but you guys strenuously denied any involvement, pleading innocence to all allegations.

Peter Dogowitz (CIA): It was a thing of beauty. A classic example of our *doctrine of plausible deniability* in action. The unwashed masses accepted the Supreme Court verdict that it was suicide, but our hidden message was not lost on the so-called intelligentsia. It was an ideal outcome for us, to be exonerated in the eyes of Joe Public, and yet to be able to send a chilling warning to you egghead types - don't fuck with us.

Anthony Manetti (NASA): I knew it. I always believed you guys murdered her.

Peter Dogowitz (CIA): I can neither confirm nor deny your suspicion.

LAND OF THE CREEPS, HOME OF THE KNAVES

Five months later...October 2050

Premier Da-Pian Lin was revered by Chinese citizens as a senior statesman, a philosopher and a scholar. Despite his usual hard edged analyses of situations, for better or worse he somehow maintained an optimistic view of the goodness of humanity. The common people referred to him as the “big shit”, which was not necessarily meant to be derogatory.

His son, Xiao-Pian Lin was nicknamed “little piss” Lin, which was however intentionally meant to be derogatory. Lin the Lesser was cunning rather than intelligent, manipulative rather than influential, megalomaniacal rather than ambitious. He believed that it was his manifest destiny to become a mighty leader, that he was born to rule.

It was Lin Senior’s greatest regret that things had not turned out as well as he had hoped. Not infrequently he wrestled with his conscience, questioning whether if he had done things differently his son might have grown up to be a more circumspect, less egomaniacal man. He blamed himself for overtly grooming his son from a young age to eventually take over the reins of power, in the belief that the apple did not fall far from the tree. How wrong he was. An army career was the favoured option to instil discipline but also enabled young Lin to establish lifelong connections within the military establishment. Support by the armed forces was the single most important factor, the indispensable key to controlling the country. In this, Lin Junior had succeeded admirably. He had been aware of the need to cultivate allies but had also been adept at eliminating opponents. His meteoric rise through the ranks was undeniably facilitated more by his status as the son of the Premier rather than his merits as a soldier. Nevertheless, it could not be denied that Lin Jr was a sly operator.

Lin the Lesser “retired” young from the army with the rank of Brigadier-General, hence he was sometimes known as B-G Lin, which some took to mean “Baby God” Lin. He now served as Defence Minister.

Date: October 2050

Location: Premier Lin's office, The Great Hall of the People, Beijing

Event: Special policy meeting

Present:

- His Excellency, Da-Pian Lin (Premier of the People's Republic of China)
- Brigadier-General Xiao-Pian Lin (Minister for Defence)
- Dr Tai-Kong Deng (Sino-Japanese Space Consortium)
- Mr Mi-Tuan Chen (Chinese Intelligence Bureau)

Brigadier-General Xiao-Pian Lin: Captain Zhang is a loose cannon. He is too rebellious and too unpredictable. He is uncontrollable. We need to replace him with someone more obedient.

Dr Tai-Kong Deng (Sinojapanese Space Consortium): Liu Zhang has certainly been difficult to deal with. Unfortunately we cannot do anything about him at the moment. But he does deserve some credit. He salvaged the mission last year when they had a major power failure.

Brigadier-General Xiao-Pian Lin: He spent too many years overseas, first as a child then later as a scientist. He has been corrupted and brainwashed by the decadent West. I understand some months ago he took a foreign whore on board his ship who has a strong influence on him.

Dr Tai-Kong Deng (Sinojapanese Space Consortium): She is a highly respected American scientist. She was responsible for saving their lives when their nuclear reactors failed. Furthermore it was only by her initiative we were able to continue our mission when Zhang threatened to abort it because of Dr Yang's illness. If anything, Dr Alvarez has proved a great ally to our cause.

Brigadier-General Xiao-Pian Lin: My reports indicate that he was feeding intelligence to the Americans through her. Zhang is a renegade. My military experience has taught me that all defiance must be crushed early and ruthlessly to maintain proper command and control.

Premier Lin: Son, you are young and headstrong. Sometimes it can pay great dividends to just observe the situation and to look for windows of opportunity to exert one's influence in a subtle manner. It can be counterproductive to try to forcefully micromanage every aspect of every project. Particularly if that project is millions of miles away.

Dr Tai-Kong Deng (Sinojapanese Space Consortium): Due to their distance from us, it now takes twenty minutes for radio signals to be transmitted each way. By necessity we must allow them some degree of initiative.

Brigadier-General Xiao-Pian Lin: That initiative does not extend to deviating from their primary objective. What the hell does Zhang think he is doing, diverting towards the Europeans?

Dr Tai-Kong Deng (Sinojapanese Space Consortium): The Europeans had been prospecting in the asteroid belt for the past few months. Last week however, their ship the *Endeavour* was struck by an asteroid, killing two of their crew. They lost a segment of the rim of their ship and had to halt the rotation to prevent it breaking apart completely, thus they now have no gravity on board. They were disabled and sent out a distress call. The only one close enough to help was the *Tsushima*.

Brigadier-General Xiao-Pian Lin: Explain to me why I should care. They know the risks of space exploration. Out there, as far as I am concerned, it is every man for himself.

Dr Tai-Kong Deng (Sinojapanese Space Consortium): We instructed Zhang to disregard their calls and continue towards the prime objective, the asteroid *Vishnu*. He ignored us and has altered course to help the Europeans. He probably felt that he was obliged to help others in distress because he himself was once in a similar situation.

Mr Mi-Tuan Chen (Chinese Intelligence Bureau): Unfortunately our latest information indicates the Americans were able to crack our cipher code and they now also know the location of asteroid *Vishnu*.

We believe their new ship the *Geronimo* has now changed course in an attempt to reach that asteroid first, in order to claim it for themselves.

Brigadier-General Xiao-Pian Lin: The more I hear about Zhang, the more angry I get. First he leaked classified information to the enemy. Then he threatened to abort the mission and return to Earth. Now he throws away our lead in the race to *Vishnu* against our orders. He is clearly a traitor to the Chinese people.

Premier Lin: Comrade Deng, explain to me again why this asteroid *Vishnu* is so important.

Dr Tai-Kong Deng (Sinojapanese Space Consortium): It is a rare and precious asteroid, identified by one of our unmanned probes just a year ago. Finding it was like finding a fist sized diamond deep within a huge mountain of rubble. We believe it is part of the remnant core of a much larger asteroid. The larger asteroids like Ceres were able to differentiate: gravitational and radioactive heating melted the heavy metals allowing them to sink towards the core, leaving an outer rocky shell. This is similar to what has occurred with planets such as Earth and Mars. In the case of *Vishnu*, we believe the outer shell was chipped away by repeated meteor strikes over four billion years - this asteroid represents a fragment of the old core - it is almost pure metal of which up to one percent may be uranium. An incredibly rich find.

Premier Lin: And you said it was worth sending all three of our ships there, to focus all our efforts on this one asteroid.

Dr Tai-Kong Deng (Sinojapanese Space Consortium): The amount of uranium and precious metals contained is so great that it will keep them occupied for a long time. Mining that very dense, very hard metallic asteroid will however require great quantities of explosives.

Premier Lin: Loss of our claim to *Vishnu* will be unacceptable. Can we not claim it now, being the original discoverers?

Mr Mi-Tuan Chen (Chinese Intelligence Bureau): I doubt any World Court rulings will be honoured by the Americans - they consider themselves exceptional, above International Law. In any case, possession is nine tenths of the law, so it really depends on who starts to mine it first.

Premier Lin: What a shame. We had a great head start with the *Tsushima*, but now that is lost.

Dr Tai-Kong Deng (Sinojapanese Space Consortium): Sir, even without Zhang's ship, we have two other ships on the way there now and if all goes according to plan our smaller ship, being faster, should reach there before the Americans.

Premier Lin: Very well, then, we just have to be patient and see how matters pan out.

Brigadier-General Xiao-Pian Lin: Father, with regard to that turncoat Zhang, once the European ship is sorted out, I believe we must impose a deadline for his compliance. We are not spending billions of dollars just so he can go on his own personal joyride around outer space. He must start delivering uranium to us and he must do so soon. Continued defiance from him will be intolerable. If he does not shape up, I suggest that the next ship we send to the asteroid belt consist of armed soldiers and that we put a military leader in charge of the project.

Premier Lin: Let's not be too hasty. Let's see what happens first. Sometimes it costs us more time and energy to throw good money after bad.

Brigadier-General Xiao-Pian Lin: I have always found that stamping one's authority on a situation is money well spent. Without a demonstration of firm control, the Chinese people may regard you as weak.

Premier Lin: Not everyone sees the world the same way you do, my son.

Brigadier-General Xiao-Pian Lin: It is not a matter of perception. It is a fact that command and control of all the pillars of power in society are necessary to effectively prosecute one's agenda. We have always understood the need for total control over our military, our police, our media, our courts. Even the Americans, after their failed experiment with democracy have come to their senses. Their Neoconservatives have banded together with their corporations and their religious right and have discovered a formula to exercise total control over their media, military, judiciary and so called free elections. They have found a way to silence their critics and act unopposed. We imprison our dissenters. They intimidate and ruin their detractors with expensive lawsuits. Both produce the same results. The land of the Free and the home of the Brave has become a fascist state in all but name. Despite being our rival, I applaud their methods.

Premier Lin: My son, I do not need you to lecture me on the nature of power. I think you are becoming a little paranoid and you grossly exaggerate the influence of the corporations on American policy.

Mr Mi-Tuan Chen (Chinese Intelligence Bureau): With respect, Sir, I would not be too hasty to dismiss your son's assessment. We have reports that the Republicans plan to install Chuck Daney, chairman of one of their energy corporations, as Vice President in the next election.

Premier Lin: Rubbish. That is inconceivable. Making the chairman of Hallitosis Corporation the Vice President of America would represent a massive conflict of interest. Such a move would completely pervert the decision making processes of the American government. It could only occur in the most ludicrous, unbelievable science fiction novel or fantasy story. It will never happen in real life.

Mr Mi-Tuan Chen (Chinese Intelligence Bureau): I am sure Premier Lin is correct.

BUSHWHACKED

Urban legend from the Internet circa 1998:

Scientists at a British aerospace firm built a gun specifically to launch dead chickens at the windshields of airliners and military jets. The idea was to simulate collisions with airborne fowl to test the strength of the windshields. American engineers heard about the gun and were eager to test it on the windshields of their new high speed trains. Arrangements were made and a gun was sent to the American engineers. When the gun was fired, the engineers stood shocked as the chicken shot out of the barrel, crashed into the shatterproof shield, smashed it to smithereens, blasted through the control console, snapped the engineer's back-rest in two and embedded itself in the back wall of the cabin, like an arrow shot from a bow. The horrified Yanks sent the Brits the disastrous results of the experiment, along with the designs of the windshield and begged the British scientists for suggestions.

The British responded with a one-line memo: "Defrost the chicken."

Date: Nov 5, 2050

Location: On board the *Tsushima* (en route to meet the Endeavour in the asteroid belt)

Liu approached Maria with a grim expression on his face. "I've some terrible news, Maria."

Maria had never seen him look so serious before, even including the time the power failed on the *Tsushima*.

"What is it, Liu?" she asked, with a growing sense of unease.

"We've just heard that your ship the *George Bush Sr* has been destroyed," Liu replied.

"My God," Maria exclaimed. She had braced herself for bad news but nothing quite as shocking as this. "They were only a week away from home. What happened?"

"They had almost reached Earth and everything was going smoothly," Liu continued, "when their cockpit window was impacted by a solid object."

"Meteor strike?" Maria asked, thinking of the damage the European ship *Endeavour* had sustained only the previous month.

"They were on live videocom transmission to Earth at the time, four cameras broadcasting simultaneously from different

cabins. It took Ken's head clean off, smashed through the rear cockpit wall then embedded in the third bulkhead. Caused explosive decompression. Slow motion video replay showed it was a frozen brown crystalline structure," Liu explained.

"Oh my God, that's horrible. All those guys I knew and worked with, all dead. And poor Su-Lin as well. It should have been *me* on that ship, not Su-Lin," Maria said, full of regret.

"You had no idea this was going to happen, Maria," Liu tried to assuage her sense of guilt. "You did what you did for the best reason - you wanted to save Su-Lin's life."

"And the impact object," Maria continued, "was it what I think it was?"

"A four kilogram piece of human excreta, frozen solid harder than concrete. Coming in the opposite direction at a speed of fifteen kilometres *per second*, it had more momentum than an antitank missile," Liu answered.

Calamity can be met with various responses. Despair and helplessness are common but are not terribly constructive. Sometimes black humour is used as a means of coping.

"I know this sounds really awful," Maria said, "but...the whole thing would be quite funny if it wasn't so tragic."

"As they say, shit happens," Liu remarked.

"There's got to be a moral to this story somewhere but I just can't think what it might be right now," Maria said.

"Maybe it's this...don't leave your shit around or it will come back to haunt you," Liu offered.

"Or kill you," Maria added.

PURGATORY: DAMNATION

Sophie and the Stranger sat in the cockpit of the escape pod, having escaped from Purgatory.

His revelations had been far too much for Sophie to take in all at once. Everything that she had been taught about her existence, the home she had known all her life and her place in the universe were complete lies. The truth was more amazing than her wildest imagination could ever have possibly conceived. She sat silently trying to let it all sink in.

The Stranger also sat silently. He tried to formulate their next plan of action.

There was no way they could travel to the nearest asteroid colony in the little escape pod. The journey would take months. There was insufficient air, food and water, not to mention fuel. The pods were designed as emergency escape capsules with the expectation of early rescue or for short distance travel to another nearby mega habitat.

The best chance they had was to return to the mother ship that the Stranger had arrived in initially. With luck they might be able to interface the pod's navigation system with the main ship's computer to allow them to locate the nearest asteroid colony and travel on towards it.

Technology had not changed much over the past three hundred years. The few hundred thousands of surviving humans in space represented an insufficiently large population to drive the research and development necessary for major scientific advances. The current systems and standards of operation were similar to the old ones of three centuries ago.

The Stranger tried to call up the nearest asteroid colony on the radio, however the pod's devices were only designed for short range communication.

And so the Stranger piloted the pod around Purgatory in a spiral search pattern to try to find his mother ship, at the same time attempting to hail on radio his two colleagues who had remained behind on the ship - unfortunately to no avail. The search took rather longer than he expected, however they eventually managed to locate it. The mother ship had remained close to Purgatory - automatically

locked into tandem movement with the mega habitat by the proximity radar system.

The Stranger was worried. He wondered why his colleagues had not answered his radio calls, however he did not express this concern to Sophie. Perhaps it was a problem with the pod's equipment. After all, as they had noted before, some of the pods had sustained major damage from previous "roadbumps".

On the mother ship

After they docked the escape pod to the mother ship, the Stranger opened the connecting hatch and they were both immediately overpowered by the most foul unpleasant stench they had ever experienced. All was dark inside. The Stranger closed the hatch again, sickened by the nauseating smell. Things were not looking good.

The Stranger rummaged through the pod's equipment and found respirators and headlamps. He handed one of each to Sophie and donned one of each himself. They opened the hatch again and climbed into the mother ship.

What they found was grim indeed.

In the control room of the mother ship they discovered two putrefying headless corpses strapped to their seats, with their heads on the ground in the corner. The Stranger vomited at this sight, then fled the room. Sophie was also upset and repulsed, but not to the point of becoming completely paralysed. She had witnessed similar gruesome horrors before. She was less than impressed with the Stranger's fragile sensibilities. She was having second thoughts that he could indeed be a Messiah.

The radio equipment and electronic panels bore the scars of scythe blades. The Angels of Vengeance had been here.

Sophie exited the control room and saw the Stranger sitting on the floor of the corridor, head bent down, knees up to his chest and arms around his shins in a foetal position. "Are you all right?" she asked, but received no reply.

She decided to do more exploring.

The ship was a mess. Items were strewn about in every cabin she entered. Whatever was portable and seemed worth pilfering had been taken. She came to the livestock area and found

the decomposing carcasses of small animals in their enclosures. She walked through the hydroponic area and viewed the rotting remnants of vegetation in their trays. She conducted a half hour circumnavigation of the rim and arrived back to where the Stranger remained cringing in the corridor, still immobile. She sat down next to him.

The Stranger finally broke the silence. “Those two thugs, Dubhe and Merak have obviously been here. After they captured me, they ordered the guards to take me to the Overlord but they stayed behind in the North forbidden zone. They must have taken the elevator up to the docking bay and travelled in our shuttle to our ship. Our crew would have let them in, thinking it was us.”

“Come on,” Sophie said, “lets have a look around and see if we can fix anything.” She pulled him up onto his feet and took him around the ship.

The damage to the electronic hardware may have been repairable but the mother ship was no longer environmentally biosustainable. The ecosystems necessary to generate breathable air, water and food could not be salvaged. The basic electrical systems were still operating. With Sophie’s urging, she and the Stranger wrapped up the bodies and heads of the two dead crew and placed them in the freezer.

They then both retreated back to the escape pod so that they could remove their respirators, breathe freely and think. What to do next?

Back in the Escape Pod

Seated in the cockpit of the escape pod they considered their next move. They had only limited oxygen supplies. They had no option but to return to Purgatory soon. Ideally they had to do so undetected. The Stranger wondered how Dubhe and Merak knew in advance of their arrival at Purgatory that first time they entered. The visitors’ initial radio call to Purgatory had probably been received and noted, even though it had not been acknowledged. Perhaps not calling ahead before entering Purgatory this second time round might be sufficient to escape detection. Or perhaps not. Very likely, the opening of the docking bay doors would have triggered a signal,

alerting the Purgatory guards. Entering the docking bay at the South end of the habitat instead of the North end would be no different.

Assuming they *did* somehow manage to get back to Purgatory undetected, their only hope for long term survival was to somehow overthrow the Overlord and his minions. Sophie and the Stranger had no defensive weapons, much less anything that could match the power of the Grim Reapers' scythe-rifles. The Stranger drew himself a diagram of this lethal instrument which was intriguing in its deadly utility, as well as frightening in its dreadful symbolism:



It was a cleverly designed device. Held at waist or chest height, with right hand on the handle and left hand on the lower insulated handgrip it was used as an instrument of decapitation. With the upper part of the staff mounted on the right shoulder, blade behind the shoulder and pointed to the right, right hand on the handle and left hand on either insulated handgrip, it became a semiautomatic rifle. The exclusive use of tracer bullets amplified the terror effect and enabled the bullets to be targeted without the need for aiming sights. If only they could get their hands on one of those weapons.

The Stranger wondered about the possibility of stirring up a popular uprising against the Overlord. There was no way the Overlord could kill everyone if the entire population was united against him. If only the Stranger could convince the people of Purgatory of the tyranny and lies they were living under. Convince them that a whole universe lay before them if only they could cast off the Overlord's yoke of oppression. Perhaps, he thought to himself, perhaps he was their Messiah after all.

But he was getting ahead of himself. How could they reenter Purgatory safely without getting shot? He mentioned their quandary to Sophie. Should they activate the bay doors unannounced and hope to enter undetected but run the risk of being killed because of their stealthy approach? Or should they radio in advance their arrival and sue for peace, ask for a truce and place themselves at the mercy of the Grim Reapers? He told her about the radio systems and possible door entry alerts, about the Northern and Southern access points.

Sophie thought a while about their situation. "How fast can this escape pod move?" she asked.

The Stranger punched a few buttons on the display panel and some specifications came up on the screen. "I'm embarrassed to say that this pod flies pretty slow. It accelerates to three hundred kilometres an hour within ten seconds. Three hundred kilometres an hour is the average recommended cruise speed."

Sophie was astounded. That was faster than anything she had ever heard of in her life. "Three hundred kilometres an hour, that's the same as five kilometres *per minute*. That's more than sufficient for our needs." Sophie had an idea.

They manoeuvred the pod to the South docking bay and radioed Purgatory on the standard hailing frequency. "Guards of Purgatory, we are two unarmed people in an escape pod. We come in peace and throw ourselves at your mercy. We are entering the South docking bay." The Stranger repeated this radio message three times. Shortly after, he keyed in the VHF code to activate the bay doors and watched as the doors started to open.

Dubhe and Merak were sitting in the main control room of Purgatory. The palace of the Overlord had been constructed around

this room. They registered the Stranger's radio call and noted his pleas. As before, they chose not to answer.

"Here we go again," Dubhe said.

"Like lambs to the slaughter," Merak added.

The Angels of Death quickly assembled a posse of guards and made their way to the South forbidden zone. They positioned themselves at the base of the elevator. Within minutes, beeping sounds emanated from their wrist devices and the screen displays on their devices indicated that the South bay doors were opening.

"They'll be down here soon," Merak said.

They had their scythe-rifles poised ready. Nothing happened. After waiting a few minutes more they became impatient. Just then, their wrist devices started beeping again, this time indicating that the North docking bay doors were opening.

"What the hell?" Dubhe said.

"They've tricked us," Merak said. "They're coming in through the North end instead. Even if we run, even if we use our magnetic levitation boards, it will take us half an hour to get to the North zone. They'll be long gone by then."

"Goddammit," Dubhe exclaimed.

"The Overlord will have my balls," Menkalinan, the Captain of the Guards exclaimed woefully.

SUMMARY OF EVENTS 2048-2051:

September 2048: The Americans discover the real purpose of the NEATO “Mars” mission and now redirect their efforts toward prospecting the asteroid belt. Like the Asians and Europeans, the Americans decide to assemble a larger “wheel and axle” interplanetary ship in Earth orbit containing a sustainable environment to support six crew indefinitely. They name this new ship the *USS Geronimo*.

May 2050: Several events occur:

May 4: The *Tsushima* leaves Mars orbit for the asteroid belt (towards asteroid *Vishnu*)

May 4: The *USS George Bush Sr* leaves Mars orbit and heads back to Earth

May 10: The *USS Geronimo* leaves Earth orbit for the asteroid belt (towards the provisionally designated American sector)

May 15: The European ship *Excelsior* leaves Earth orbit for the asteroid belt (towards the European designated sector) - to rendezvous with their existing ship, the *Endeavour*, already prospecting there

May 22: Two NEATO ships, the five crewed *Sun Tzu* and the six crewed *Deng Xiao Ping* leave Earth orbit for the asteroid belt (towards asteroid *Vishnu*)

All ships leaving Earth head towards Mars in the first part of their journey, in order to use the gravitational slingshot effect around the Red Planet to accelerate their trip to the asteroid belt

All three NEATO ships (the *Tsushima* from Mars and the *Sun Tzu* and *Deng Xiao Ping* from Earth) are instructed to head towards asteroid *Vishnu* by Sino-Japanese Space Consortium mission control, with the *Tsushima* expected to arrive long before the others.

October 2050: The European ship already prospecting the asteroid belt, the *Endeavour*, transmits a distress call, having sustained a disabling meteor impact. The *Tsushima* diverts towards the *Endeavour* to help.

The *USS Geronimo* changes its original objective when they discover that the *Tsushima* has diverted towards the *Endeavour* - the *Geronimo* now decides to head for asteroid *Vishnu* in a race against the other two NEATO ships to claim that prize.

November 2050: News is received of the destruction of the *USS George Bush Sr.*, just a week away from home.

January 2051: The *Tsushima* meets up with the *Endeavour* and they begin repairs together. Repairs are completed April 2051.

June 2051:

June 11: The smaller, faster five crewed NEATO ship *Sun Tzu* reaches asteroid *Vishnu* first and prepares to start mining.

June 12: The larger six crewed *USS Geronimo* arrives at *Vishnu*.

June 13: All contact is lost with both the *Sun Tzu* and *Geronimo* at area *Vishnu*.

June 15: The six crewed NEATO ship *Deng Xiao Ping* reaches area *Vishnu* to find nothing there. After some deliberation, they decide to accept an invitation from the *Tsushima* and *Endeavour* to join them.

July 2051: The second European ship *Excelsior* joins the *Endeavour* and the *Tsushima* in the newly designated Eurasian sector of the asteroid belt.

November 2051: The second NEATO ship *Deng Xiao Ping* joins the other three ships in the Eurasian sector.

PHENOMENOMENAL CONUNDRUNDRUMS

Date: January 2051

Location: Asteroid belt, European sector

Event: The *Tsushima* reaches the *Endeavour*

At a glance, the design of the European spacecraft *Endeavour* appeared identical to that of the *Tsushima*, albeit somewhat larger, in order to accommodate six, rather than five crew on a sustainable basis. It had the same wheel and axle configuration. This design similarity was neither a result of random coincidence nor of industrial espionage. It was merely an example of function dictating form.

The leader of the European mission was a fifty one year old robust, red headed Scottish woman by the name of Siobhan MacGregor. As with the crew on the other ships, she was a highly qualified engineer and scientist. She was a no nonsense person, often terse in her speech. She had little time for the ignorant and suffered fools not at all. In her conversations, she generally dispensed with small talk and got to the point straight away, targeting salient issues like a heat seeking missile. She was quick to make pragmatic decisions.

In times of crisis however, MacGregor sometimes paradoxically adopted a wry manner and dropped inappropriate verbal bombshells out of the blue, designed to throw allies and opponents alike off balance. To some, this may have appeared as a strange coping mechanism. To her, calculated unpredictability was a good tactic to keep everyone on their toes. Making off putting remarks was also a means by which she sized up new acquaintances.

In her usual confident manner there seemed to be no problem she could not overcome. Until now.

Scene in the dining cabin of the European vessel *Endeavour*:

Liu Zhang extended his hand to the European Captain, “Captain MacGregor I presume.”

MacGregor took Liu’s hand in a vice like grip and shook it firmly. “The name *Tsushima*, is that your way of saying ‘up yours’

to the Russians in particular, or to all Europeans in general?" she asked, with a thick Scottish brogue.

"I beg your pardon?" Liu was somewhat taken aback.

"You heard the question, explain the name *Tsushima*," she repeated.

"Ma'am, we came over to your ship in reply to your distress call. I think we can discuss the name of my ship another time over a cup of tea," Liu replied.

MacGregor placed her hands on her hips and now turned her attention to Maria, judgementally scanning her frame from head to toe, like a pernickety housewife inspecting supermarket produce for blemishes. "And this must be the infamous ship jumper Dr Alvarez. My, you *are* a sweet young thing, aren't you?" she said rather condescendingly.

Maria winced at MacGregor's grip as she shook her hand, but she refused to be rattled. "And this must be the infamous Dr MacGregor. My, you *are* a sour old thing, aren't you?" Maria met her gaze squarely.

MacGregor stared intently at Maria with her stern penetrating blue eyes for what seemed an eternity, then crow's feet suddenly formed at the corners and she burst out laughing. "I think we'll get along just fine, lassie," she replied, pleasantly amused. "Please be seated at the table. I'm afraid you'll have to make do with the makeshift straps on the chairs to keep you from floating about. We didn't anticipate the loss of gravity on our ship."

Liu began proceedings. "I understand you lost part of the rim of your ship from an asteroid strike."

"Yes. This ship was assembled from prefabricated modules, the rim consisting of six segments. The asteroid neatly knocked out one of the segments. Luckily it took out only a part of the hydroponic area and none of the vital areas," MacGregor said. "It also glanced against the core axis. Regrettably we lost two crew, but it could have been worse. The automatic emergency bulkhead doors shut immediately, preventing too much air loss."

"I believe your nuclear reactors and your ion engine are working well?" Maria asked.

"Our primary reactor was fine but the secondary reactor was damaged - we fixed it without too much trouble though. We have only just now completed repairing our ion drive," MacGregor

replied. “Thus our initial plan was to try to limp back to Earth just as we are. But there were a number of other problems. Loss of part of the rim caused imbalance of rotation which risked tearing the ship apart, hence we had to stop it spinning. Subsequent problems arose from lack of gravity. Our ship, like yours, was designed to operate with normal gravity in the rim. Hence we can’t even go to the toilet properly now and have had to devise makeshift measures. But that’s the least of it. The critical issue was the hydroponic system. Our plants are grown in multi layered trays. They represent our oxygen replenishment and CO₂ scrubbing system. Water would not sit in the trays and would not drain out properly but would just bunch into globules and float about. We managed to jury rig a system using plastic wrap and pumps. It is barely adequate for the time being. But you guys say you can offer us a better solution.”

Liu remarked, “Ideally it would be best if we could locate your lost rim segment to repair and rejoin to your ship, but that’s long gone by now. However we’re surrounded by metallic asteroids in this part of the belt - that’s why you guys came here in the first place. Well, after some practice, we on the *Tsushima* have worked out a technique for electrically smelting ore for steel production. We should be able to fashion the components to rebuild the gap in your ship from asteroid materials.”

“Kind of like back in history,” Maria continued, “when your Captain Cook struck a reef off Australia and went on to repair his ship with local materials.”

“He wasn’t *my* Captain Cook,” MacGregor retorted, “he was a bloody Englishman,” she said, emphasising her Scottish heritage. “But I appreciate the similarity. So two questions: what can my crew do to help and how long will it take?”

“Right,” Liu said, “time to hammer out the details...”

It took them two hours to discuss everything. The task at hand was daunting. It became clear that the resources and skills of one ship alone was insufficient to do the job. They had to pool their expertise and equipment. They drew up a list of the crews with their current abilities, planned a schedule for cross training of skills then allocated duties according to a roster and prepared a timetable.

“Well, looks like we can get cracking as soon as we give our crews their duties,” MacGregor said, “have we left anything out?”

“It was a political name,” Liu said.

“What?” MacGregor inquired.

“The name *Tsushima*, it was a political gesture by the Japanese. They offered our space programme another hundred million dollars just so they could use that name. The Chinese and Koreans didn’t really care one way or another.”

“Was it intended to ruffle any feathers?” MacGregor asked.

“I don’t know. Did the French intend to ruffle any feathers when they named a railway station *Austerlitz*? What about the British when they named a railway station *Waterloo*? You have to ask the politicians.”

“Good answer,” MacGregor said.

“And if the Vietnamese offer us a hundred million dollars to name our next ship the *Dien Bien Phu*, I think my bosses will happily take the money,” Liu added.

On the shuttle craft back to the *Tsushima*, Liu and Maria were trying to figure out MacGregor.

“I find her surprisingly arrogant for someone in need of help,” Maria observed.

“Probably some kind of defence mechanism,” Liu said, “but who knows, maybe she’s got the sort of personality that grows on you in time.”

“Yeah, sure,” Maria remarked, “like fungus.”

A SUCCESSFUL ENDEAVOUR

Date: April 20, 2051

Location: the *Endeavour*

In the three months it took to rebuild the *Endeavour*, the NEATO and European crews worked closely together. Sharing of information was both necessary and inevitable and personal relationships formed. There was nothing like working in close collaboration to overcome a major crisis as a means of bonding people together.

Captain MacGregor's gruff exterior did indeed belie an underlying heart of gold. She was a person always true to her word. Perhaps she had developed such an abrupt demeanour as a means of survival in the aggressive male dominated world of the aerospace industry. Perhaps much was also part of her intrinsic personality. It was her nature not to mince words and to be honest to a fault, even to the point of apparent rudeness. Her favourite dictum was: "*Give me an honest rude person or a polite liar and I will choose the former every time.*"

Even Maria eventually grew to like Siobhan MacGregor.

Careful calculations ensured that the reconstructed portion of *Endeavour*'s rim was the correct mass for perfect rotational balance. If anything, they over engineered the structural integrity of the new segment and its connection to the original structure.

The day of reckoning came. The crew crossed their fingers as they opened the valves of the air tanks, filling the newly constructed portion with air. As the pressure reached atmospheric, they opened the emergency air tight doors between the main ship and the new segment without event. So far so good. Finally they secured all loose objects and activated the retrorockets to restart the spin of the spacecraft. The *Endeavour* crew felt a rising thrill as normal gravity gradually returned. As the meter reached the one G mark, they let out a loud cheer.

The celebration party was held in the new segment. Akira Hasegawa had specially distilled some *sake* for the event. They

brought along a portable audio player which blared out the latest musical hits downloaded by digital radio.

Gerhard Muller, bioecologist of the *Endeavour* and Michiko Saito, medical officer of the *Tsushima*, were sharing a joke. Michiko broke into loud laughter, covering her mouth with her hand as demure Japanese women are wont to do.

“Those two seem to be getting on well,” Liu observed.

“I believe Gerhard has a special interest in Japanese literature,” MacGregor said. “He’s been sharing a few amusing *haikus* with Michiko which are completely incomprehensible to the rest of us.”

“Yes,” Liu said, “not even Akira seems to understand Gerhard’s jokes.”

“Akira told me that Gerhard’s haikus are not in the least bit funny,” Maria commented.

“Then why does Michiko laugh at them?” Liu asked.

“Liu, you really can be quite obtuse at times,” Maria remarked.

MacGregor gestured to the stark shiny walls around them, riddled with exposed wire conduits and piping. “It may look rather bare right now, but I love it. Won’t take us long to furnish this place with more hydroponic trays.”

“I believe our success here marks a major achievement,” Liu said. “It proves we can construct advanced components from scratch using raw asteroid materials. It is only a matter of time before we build complete ships.”

“One step closer to your dream,” Maria remarked, as she slipped her right hand around Liu’s waist.

“*Our* dream,” he added, looking fondly at her.

“It is well to celebrate success, but there’s still the worry that more asteroid strikes may occur. We may not be so lucky next time round. It could be a more severe, fatally disabling blow,” MacGregor cautioned with Scottish pessimism.

“Given a long enough stay here, future asteroid strikes are almost certain,” Maria said. “It is a worry to us as well.”

“We have to find a way to protect ourselves,” MacGregor commented.

“I agree,” Maria concurred, “how do you suggest we go about it?”

“We need to closely monitor for approaching rocks and to either take evasive action before they can strike us or to preemptively destroy them with missiles,” MacGregor remarked.

“Sounds a bit like the anti-ballistic missile technology my country tried to develop but failed,” Maria commented.

“I know, and I don’t have high hopes for our prospects of success with such plans. Especially with our limited resources. But we at least have to try,” MacGregor added.

“Maria and I have another suggestion,” Liu offered. “I agree it is important to try to prevent rock strikes, but it will be impossible to ensure complete protection. A contingency plan will be necessary, indeed, will be essential. Hope for the best but plan for the worst, I always say. What chance will survivors have if your ship is critically damaged next time? If we could construct a refuge, a haven that we could retreat to in the event of major ship damage, surely that will be worth consideration.”

“I’m intrigued. Go on, Liu,” MacGregor encouraged.

“This is what I propose. That between us we construct a self sustaining cylindrical spinning space habitat, a vessel that will vastly increase the living space available to us. It will be our insurance policy against disaster. But that will be just one of its roles. There will be another major role for this habitat. In the asteroid belt, we have an abundance of inorganic materials but we have no organic resources at all, apart from the few plants and animals in our ships. For a lengthy stay we will require more organic products such as plastics, textiles, pharmaceuticals and so forth. The main purpose of this habitat will be to supply us with such products. I don’t mean to be rude, Siobhan, but having been in space this long, I’m willing to bet that your underwear is wearing thin. And what can you do about that? Make steel knickers? If we grew cotton in this habitat, I could make you some new underwear,” Liu said.

MacGregor laughed. “Nonsense, man, I’m not going to give up my steel knickers for anything!” She winked an eye at him.

Liu had not expected such a response, which temporarily derailed his argument.

Maria continued, “It will be our garden in space. We could grow food crops, fibre crops and genetically modified crops which

exude latex or resin for plastic manufacture. Even plant trees. Wouldn't it be great to enjoy the feel of wooden furniture or wood panelling again? And we could raise more livestock. We would start small, the first habitat we build would probably be only, say, sixty metres long and twenty metres in diameter."

"Small? That sounds huge to me," MacGregor exclaimed.

"You haven't heard the half of it," Maria said...

"Our ultimate dream is to create a network of gigantic spinning biohabitats," Liu said...

"Orbiting around the L2 Mars point," Maria continued...

"Each environmentally sustainable in its own right," Liu added...

"But each also specialising in skills or manufacture to enable trade and wealth creation," Maria completed.

MacGregor looked at Maria, looked at Liu, then looked at Maria again and a bemused smirk gradually appeared on her face. "I've seen this before," she remarked.

"Seen what before?" Liu asked.

MacGregor looked at Liu again. "When two people complete each other's sentences. I know what it all leads to."

"What does it all lead to?" Liu inquired.

MacGregor looked back at Maria and raised her drink in Liu's direction. "For a smart guy, he can be pretty dumb at times, can't he?"

"Very," Maria concurred.

LIU WITHOUT A CLUE (AGAIN)

Date: April 28, 2051

Location: dining cabin of the *Tsushima*

Maria and Liu were alone in the dining cabin, seated opposite each other at the table.

“I’ve got news, Maria,” Liu began.

“Yes?”

“Maria, you know I’m sort of fond of you.”

“Whoa, slow down Romeo. Be careful or you’ll sweep me off my feet with that fancy sweet talk of yours. *Sort of fond* indeed,” Maria admonished.

“I’m not very good at this sort of thing,” Liu continued, “OK, here’s the news. I finally got a divorce from my wife back home.”

“That’s amazing,” Maria expressed surprise, “how did you manage it? I thought she was dead against it - that she wouldn’t accept the loss of the perks and privileges of an astronaut’s wife.”

“The details aren’t important, let’s just say that we came to an agreement.”

“No, please Liu, I’m curious, tell me,” Maria requested, “I’m interested in the details. How did you manage the breakthrough?”

“Well, I agreed she could have one hundred percent of my assets. She could have everything.”

“Christ, that’s really severe. I can’t believe you agreed to that.”

“Maria, it was a bargain as far as I’m concerned. Even though she was millions of miles away, she still felt like a stone around my neck. Now I can breathe easy.”

Liu got out of his seat, stepped across to Maria, got down on one knee and took Maria’s hands. “Maria, despite the dangers and the physical hardships we’ve faced, these past two years have been the best time of my life. It’s all because of you. I look at your gorgeous face every day and I want to leap with joy. I think about you all the time and I cannot bear to be away from you for even one day. You have stolen my heart. Will you marry me, Maria?”

Maria was lost for words for a while and looked down at Liu, caressing his hands. “Gee, I don’t know, Liu. I come from a strict Catholic background and my family may not approve of a divorced man. Also, it now seems that you have no assets at all - you are as poor as a church mouse. So if we marry, *I* will have to support *you*. You’re not exactly a good catch, are you?”

Liu’s expectant expression evaporated and his shoulders slumped, crestfallen. “I guess it was too much to hope for. That a beautiful brilliant girl like you would be willing to hook up with a guy like me. Still, you can’t blame me for trying...”

“God Liu, for a smart guy you can be a real dumb ass at times. Don’t you know by now that I’m crazy in love with you too? Of course I’ll marry you!” Maria replied.

Liu had made a platinum engagement ring for Maria from asteroid metal, as diamonds were in somewhat short supply. As there was no point to a long engagement, they decided to get hitched just a week later, barely enough time for him to have a couple of gold bands forged. The workmanship was terribly crude, but Maria did not seem to mind.

Maria and Liu were married by Siobhan MacGregor, who, as a ship’s captain, was authorised to perform the ceremony (not that she had ever expected to exercise that capacity).

It was May 5, 2051, a year and a day after Maria joined forces with the *Tsushima*.

OPERATION SPOIL AND SEIZE

Date: June 15, 2051

Location: The White House, Washington D. C.

Event: President Lance Boyle is woken at 3am in his bedroom for an emergency videocom conference call with Peter Dogowitz and Anthony Manetti.

Videocom transcript:

Lance Boyle (bleary eyed and groggy): You guys better have a damn good reason for waking me at this ungodly hour.

Peter Dogowitz (CIA): Sir, we have news of Operation Spoil and Seize.

Lance Boyle: Spoil and seize? Refresh my memory, will you?

Peter Dogowitz (CIA): As you recall, a couple of years ago, in 2049, we intercepted coded Chinese transmissions describing a major discovery.

Anthony Manetti (NASA): An unmanned NEATO probe had identified a twelve mile diameter metallic asteroid comprised of almost one percent uranium, an incredibly rich find. Sort of like finding a thousand Klondike gold fields all in one spot. Even better than gold, because uranium is much more useful.

Peter Dogowitz (CIA): And that would give them a huge energy advantage in space, or back on Earth, if they sent the uranium back home.

Anthony Manetti (NASA): Our ship the *Geronimo* was in a race against two NEATO ships to claim that asteroid.

Lance Boyle: Oh yeah, but one of their ships was smaller and faster and got there first by just one day. Despite that, we decided we could still somehow seize that asset for ourselves. That was your job. You two had to figure out how to seize it. So what happened?

Peter Dogowitz (CIA): Sir, as you know, we had a number of objectives. Our principal intent was to deny the NEATOs access to asteroid *Vishnu* by covert means in circumstances which could be construed as an accident. If the *Geronimo* could then start mining *Vishnu* before the second NEATO ship arrived, that would achieve our other goal - resubmission of a claim from a new party, namely ourselves.

Lance Boyle: Go on.

Peter Dogowitz (CIA): We sent a remote controlled probe across to their ship to plant a limpet mine on their hull. It was the same sort of remote device we planned to use on the asteroids. It was only meant to disable a non-essential part of their vessel. A storage area. We wanted to make it look like one of their own mining charges had gone off.

Anthony Manetti (NASA): We lost contact with our ship a couple of days ago and couldn't figure out what happened.

Peter Dogowitz (CIA): Not till now, when we intercepted transmissions from the second NEATO vessel, the *Deng Xiao Ping*, which just arrived in that area three hours ago. They found only scattered debris in the location and *Vishnu* had disappeared. It seems the first NEATO ship, the *Sun Tzu*, had ten megatons of nuclear explosives on board. We think our limpet mine must have triggered a bigger explosion which blew apart everything within a one hundred mile radius, including our ship the *Geronimo*.

Lance Boyle: Jesus Christ. Ten megatons. Christ almighty. And what happened to asteroid *Vishnu*?

Peter Dogowitz (CIA): We believe *Vishnu* was sent spinning out of control on an unknown trajectory. We've lost it, we don't know where it's gone.

Lance Boyle: I see. But I guess one out of two objectives were met. We may not be able to use that asteroid but at least we denied them access. Shame about our guys though.

Peter Dogowitz (CIA): Yeah, the six guys on our ship who died. Also five crew on the NEATO vessel died.

Lance Boyle: Hell, those goddamn commies deserved what they got. Serves them right for carrying ten megatons on board. Jesus! Ten megatons! For all we know they planned to use it against us on Earth. A goddamn nukular bomb ship posing as a mining ship.

Peter Dogowitz (CIA): Quite possibly, Sir. I guess they had it coming to them.

Lance Boyle: Damn straight they did, the commie bastards.

Anthony Manetti (NASA): There is another issue of concern Mr. President.

Lance Boyle: What?

Anthony Manetti (NASA): The Chinese intercepted encrypted transmissions of our *Geronimo* crew discussing the limpet mine. It took them several days to decode. They now accuse us of sabotage and are outraged. They demand twenty five billion in compensation and a written apology from you.

Lance Boyle: Deny everything. Tell them to piss off. Use our good friends in the Matlock Press to portray them as whiny complainers, unable to accept responsibility for their own incompetence. Send them a counter claim for the loss of our ship. Peter, you know how to apply our doctrine of plausible deniability. Don't worry, it will all blow over eventually.

Anthony Manetti (NASA): Sir, what about their evidence? They are citing it as factual proof of our skullduggery.

Lance Boyle: I don't care what the facts are. I will never apologise for the United States of America.

MEANWHILE, OVER IN THE ASTEROID BELT...

On June 18, 2051, the crew of the *Tsushima* and the *Endeavour* heard of the tragic loss of the *Sun Tzu* and the *Geronimo* at area *Vishnu* by videocom transmission from the late arriving NEATO ship *Deng Xiao Ping*.

After the successful collaboration between the Asian and European crews with the repair of the *Endeavour*, Captain MacGregor, in consultation with the European Union leaders and the European Space Agency, decided to invite the *Deng Xiao Ping* to join them in the European sector. Experience had demonstrated that joining forces could increase their productivity exponentially. Furthermore, there were more than enough resources to go around. This act of generosity by the EU was not completely altruistic however, as an agreement was brokered with the Asians that joint EU/NEATO mining would also be conducted in the NEATO designated sectors of the asteroid belt in future.

So long as an equal partnership remained, the formerly designated NEATO and EU sectors were now designated as Eurasian sectors.

In July 2051, the second EU ship, the *Excelsior*, joined the *Tsushima* and the *Endeavour* in the asteroid belt. In November 2051, the *Deng Xiao Ping* joined the other three ships, making a total of four ships in the newly designated Eurasian sector.

Mining of uranium began in earnest as soon as the *Endeavour* had been repaired. The first shipments of concentrated uranium ore were sent back to Earth in late May 2051. They were packed in steel capsules (constructed from asteroid iron) to which were attached mini hydrogen/oxygen rocket engines, controlled by microprocessors. They were propelled back to Earth orbit where they were intercepted by orbiting EU or NEATO ships, then repacked with heat shields and parachutes for delivery to the surface. Precious metals were also not uncommon and platinum, gold and silver were included in the shipments back to Earth.

The value of the minerals was mind boggling. An average two kilometre sized metallic asteroid contained ore to the value of twenty *trillion* dollars. The space miners were finally starting to earn their keep, which helped to appease their dissatisfied Earth bound administrators and accountants.

EURASIAN SECTOR OF THE ASTEROID BELT 2051-2053

The possibility of future meteor strikes on the ships in the asteroid belt remained a concern. In addition to their mining activities, the EU and NEATO crews jointly commenced construction of a space refuge/habitat in July 2051 soon after the *Excelsior* joined them.

The first habitat was initially called the “Astral Garden”, although it eventually took on the name “*Eden*”. It was completed in November 2052. It was a rotating cylinder sixty metres long and twenty metres in diameter. It had a triple layered outer steel shell. Soil was made from crushed silicate and carbonaceous asteroid fragments. Water-ice and nitrogenous compounds were extracted from the “volatile” components of the asteroids. These enabled sufficient water supply and the manufacture of nitrate fertilisers. Cracking the nitrogen compounds also enabled production of atmospheric nitrogen for the new habitat. Oxygen production was no problem, derived from electrolysis of water.

At first, they could only grow what plants they already had from their hydroponic supply. They allowed livestock to roam free in the habitat.

The next plan was to obtain a consignment of biological materials from Earth: cotton seed, grass seed, new cereals - indeed germ plasm of as many species of plants (including trees) as possible. They also requested the frozen embryos of various animals with which they hoped to eventually impregnate their existing livestock or poultry, having learned about the future possibility of cross species gestation from recent research breakthroughs on Earth. Even the frozen eggs or frozen larvae of creatures such as fish, earthworms and dung beetles were requested.

They did not stop there. They acquired by datastream download the genetic codes of all organisms whose complete genomes had been sequenced to date. Their data base was being constantly updated from day to day. Even though they did not have the ability to recreate species de novo from their genetic codes at that time, it was their belief that technological breakthroughs could very well enable such a possibility in the future. They had great ambitions for their biohabitats.

They requisitioned delivery of all these biological materials from Earth, unfortunately the soonest the first shipment could arrive was November 2054.

In anticipation, they commenced the construction of a second biohabitat in early 2053. This one was to be somewhat larger than *Eden 1*.

In June 2052, Maria and Liu had their first child whom they named Adam, the first human to be born in space.

DECISIONS TO STAY

Date: December 2052

Location: Dining cabin of the *Tsushima*

Event: The *Tsushima* is due to return to Earth in one month

Present: Siobhan MacGregor, Liu Zhang, Maria Alvarez and baby Adam (now six months old)

Siobhan had indicated that she wanted to speak to Liu and Maria with some urgency. She chose to fly over to the *Tsushima* in her shuttle personally rather than speak to them over the videocom.

They gathered in the dining cabin.

“Listen, you two,” Siobhan said, “I’ve discovered some disturbing facts recently which I think you guys should know about.”

“Yes?” Liu and Maria asked.

“I have a friend in MI-6 who leaked me some information off the record,” Siobhan continued in a serious tone. “Nothing of importance to European security, but issues of vital personal importance to both of you. MI-6 regularly monitors both American and NEATO communications as a routine and my friend picked up a number of messages relating to you guys. It seems that the two of you are in big trouble with your authorities. Liu, you are already aware that you are up for a court martial as a traitor for defying orders. As soon as you return home they plan to have a show trial. It seems they originally intended to execute you, but after you started sending them big shipments of metals they decided to reduce it to life imprisonment.”

“I can’t say I’m too surprised at all that,” Liu remarked.

“Perhaps so,” Siobhan said, “but for Maria, I’ve heard even more worrying reports. Officially the US authorities claimed to have supported you when you jumped ship as a *fait accompli*. They spun that story to the media to save face with the public, but they were actually fuming with rage. We learned that the CIA is arranging for Maria to have a fatal accident soon after she returns. They are vengeful bastards. It will be a coded message to other government employees who may be tempted to defy them in future. I have no reason to doubt the veracity of this information.”

Liu and Maria pondered for a while, trying to appreciate the implications of these revelations.

Maria broke the silence first. "I was dreading our return but I never imagined things might be this bad. What do you suggest we do, Siobhan?"

"There will be no life worth living for either of you if you go home," Siobhan replied. "You will be forcibly separated and Maria will be in danger. And you also have baby Adam to think of now. You have no option. You must stay here."

Liu commented, "I don't care what happens to me but Maria and Adam must be kept safe. If I must, I will return to face trial, but I ask you Siobhan, please take care of Maria and Adam for me."

"Nonsense Liu," Maria said, "we're all going to stay here. None of us are going back. Isn't that right, Siobhan?"

Siobhan agreed. "Thanks to your *Eden* project we have ample space, food and water to support many times more personnel as are living here now. Also, because we lost two of our crew with the asteroid strike, we have extra space on board the *Endeavour* itself for two adults. In practical terms, there will be no problem at all if you choose to stay. In fact it will be a great blow to us if we lost your skills and knowledge and I personally don't want to lose two good friends. Politically however, things will be more difficult. I have some clout with the European authorities and your contribution to our mission has been widely acknowledged and appreciated. I believe I can obtain honorary European citizenship for all three of you, however that will not enable you to return to Earth. If you guys try to settle in Europe, Liu will almost certainly be extradited back to China and Maria will still be in danger whichever country she lives in."

"Then it is settled," Maria declared, "we're staying put. Siobhan, I cannot thank you enough for your advice and help."

"It's the least I could do," Siobhan replied.

In a move which enraged the Chinese and American authorities, Liu and Maria renounced citizenship of their respective countries and took up honorary European Union citizenship (extraterrestrial privileges only). Adam was conferred both terrestrial and extraterrestrial EU rights.

Liu and Maria were concerned about the consequences of their decision on the crew of the *Tsushima*, due to return to Earth in

January 2053. When they explained their circumstances to Akira Hasegawa, Michiko Saito and Jong-Sul Park, they were grateful not to face any overt recrimination. In fact, they were surprised to discover that Michiko was keen to stay on as well.

Things have a funny way of working out, and so it was with this situation.

The *Endeavour* had left Earth orbit around the same time as the *Tsushima* and was now also near the end of its tour of duty. Siobhan MacGregor decided to remain in the asteroid belt also, as she was caught up with the excitement of innumerable projects which she had no intention of abandoning. Similar sentiments were expressed by one of her crew, Gerhard Muller.

Thus a deal was brokered. Akira Hasegawa, Jong-Sul Park and two of the European crew returned to Earth on the *Tsushima* in January 2053.

Siobhan, Liu, Maria, baby Adam, Gerhard and Michiko stayed back on the *Endeavour*. The *Deng Xiao Ping* and *Excelsior* remained in the asteroid belt, as it was still early days in their tour of duty.

DISCLOSURES

Date: Jan 20, 2053, the day after the *Tsushima* left the Asteroid belt for Earth.

Location: Dining cabin of the *Endeavour*

Present: Siobhan MacGregor, Maria Alvarez

Siobhan cradled the cup of coffee in her hands, inhaling the aroma. "Has it changed your outlook Maria, now that you have committed your future to living in space permanently?"

Maria sat across the table from Siobhan. "I was ambivalent as our departure date loomed," she said. "On one hand I was looking forward to seeing my folks again back home, especially my dad. On the other hand I dreaded what might happen when Liu and I returned. Your advice confirmed our worst fears. Once we made the decision to stay it was actually quite a relief."

"You can still keep in touch with your folks by videocom though," remarked Siobhan.

"Yes, it helps," Maria concurred, "although the time delay is a nuisance. They are more like video letters. We cannot have real time conversations. Once in a while it hits me hard, the realisation that I will never again be able to hug my parents, to hold my father's hand."

"Are you quite close to your father?"

"I guess all little girls have love affairs with their dads and think they are the best fathers in the world," Maria said. "Most discover as they grow up that their parents have feet of clay. My father Lewis never diminished in my estimation of him. If anything, as I got older I learned to admire him even more. He was the most ethical, most brilliant man I ever knew and that hasn't changed one bit."

"Liu seems a pretty decent sort of bloke to me," Siobhan remarked.

"In some ways he reminds me of my dad," Maria said. "Liu lives by strong principles which he will not compromise, even when threatened with imprisonment or death," she added. "But he's a bit funny, though. He keeps telling me that he's actually a much shallower person than I take him for. Almost as though he's afraid to be put on a pedestal."

“Humility is considered a virtue in his culture,” Siobhan reflected. “You mentioned previously that your father Lewis Alvarez was a Professor of Physics,” she continued.

“Yes, at one of the so-called second string Universities,” Maria elaborated. “Dad was offered a high paying job at MIT which required he sign a business contract with the Military-Industrial complex, but he declined it. He said that America had more than enough WMDs, even without his help. We weren’t rich but I wanted for nothing as a child.”

Maria paused and took a sip of her coffee. “But what about you, Siobhan?” Maria asked. “What made you decide to stay on in space permanently?”

“I’ve done my dash back on Earth,” Siobhan replied. “There are too many exciting projects going on right here, right now, for me to think of leaving.”

“What about your family, if you don’t mind me asking?” Maria asked anyway.

“None to speak of,” answered Siobhan. “I was married once, briefly. His name was Yves Nakembe. We met eleven years ago when I was working on contract for the Hallitosis Nuclear Corporation in Burkina Faso. He was a proud descendant of Ken Saro-Wiwa, the Nigerian author, on his mother’s side. Yves was also a writer and a social activist. He led the peaceful protest of his tribe against the Hallitosis Corporation, claiming that they were colluding with the American installed Burkinan puppet regime to rape his country of its resources, its wealth.”

“And were they?”

“The first time I met Yves was at a liaison meeting,” Siobhan said. “His eyes burned with a fiery intelligence which I found intoxicating. His arguments were passionate and compelling. He cited page after page of damning evidence against the Corporation which were impossible to refute.”

“So what happened?”

“We had a whirlwind romance and I quit my job. I had previously been naïve and ignorant, but I soon came to realise that the Hallitosis Corporation was being run by despicable vermin. I begged Yves to come to Europe with me and he grudgingly agreed to give it a go. He insisted on living in Paris, so that he could keep in touch with his exiled countrymen and continue his work. He wrote

furiously. Scathing criticisms of his government and of big business. Vicious indictments against the neoimperialist exploiters and their corrupt local collaborators.”

“But things didn’t work out?”

“The life of comfortable domesticity did not sit well with him,” Siobhan explained. “He had an unquenchable desire for social justice in his homeland. He suffered from a massive sense of guilt, that somehow he had become unworthy, living a life of ease while his countrymen suffered in poverty. He felt compelled to return home to work for the cause, despite all my pleas. I warned him that his life would be in danger.”

“Did you go back with him?”

“It was his unflinching courage which attracted me to him in the first place,” Siobhan said. “He had the greatest integrity of any man I had ever met. But I’m ashamed to say that I was weak, that I lacked his bravery and commitment. He went home and within twenty four hours was arrested for sedition. They hanged him a week later after a show trial.”

“You must have been shattered.”

“I was crushed. I went home to Glasgow, shut myself in my bedroom and spoke to no one for two weeks. I couldn’t stop crying. After that I became very, very angry. I was determined to expose the monumental injustice of Yves’ execution. I went to the media, wrote letters to the government, tried to organise rallies. It all fell on deaf ears. The Matlock Newsmedia Company had a stranglehold over the press. The proliferation of their insipid drivel suffocated everything else. Like weeds choking a flower. I was a voice in the wilderness with no audience. After banging my head against a brick wall to the point of exhaustion I tried to take a vacation, but my mind was still racing at a million miles an hour. Ultimately I found the only thing that could numb the pain was to immerse myself in work. As the years went by, my workaholic routine became an unbreakable habit. Somehow I ended up in the European Space Project and here I am now.”

“The horrible consequences following Yves’ return to Africa,” Maria asked, “was that part of your motivation to warn Liu and I of the dangers we faced if we went back to Earth?”

“Maria, I couldn’t bear the thought that two more people I had grown to love might be returning home to a terrible fate,” Siobhan replied.

“Gosh, Siobhan, I see you in a whole new light now.”

EURASIAN SECTOR OF THE ASTEROID BELT 2054-2068

An increasing population

November 2054 saw the arrival of two more ships in the asteroid belt - another NEATO and another EU ship. The eager bioecologists received their consignment of plant germ and animal embryos. Another crew shuffle occurred and one ship containing homesick crew returned to Earth.

In early 2055, there were still only four ships in their small space colony, the same as three years ago, a total of twenty two people - a static population.

The remaining hardcore space colonists eventually persuaded the NEATO and EU administrations that it was more cost effective to establish a larger and more permanent presence in the asteroid belt and that it was not economic to have any ships return to Earth after they arrived. The argument went as follows: if one ship was to arrive from Earth, only to replace another which was leaving, the asteroid mining population would remain static. If the mining population remained static, the mineral output would also remain static. More space personnel would equate to more money for the space administrators back on Earth. Thus, future expeditions should consist only of those willing to stay permanently in space.

To everyone's great surprise, they had no shortage of applicants.

The *Tsushima* reached Earth orbit in February 2054 where it was meticulously refurbished. It was sent back in 2056 with five new crew, to arrive in the Eurasian sector of the Asteroid belt in 2058, this time to stay there indefinitely.

By the year 2068 there were eight ships, three biohabitats and forty eight souls living in the Eurasian sector of the Asteroid belt.

The biohabitats

In October 2054 the second biohabitat, *Eden 2* was completed. At eighty metres long it was slightly larger than the first one. The colonists' requisition of plant seeds and other biological germ plasm arrived in November 2054 with the new ships. This

sparked a flurry of activity and an exciting period of time followed, selecting and growing new crops. They even fashioned ponds and populated them with fish and aquatic plants.

The third biohabitat was larger again than the first two – being one hundred metres long and sixty metres in diameter. Construction had largely been automated by robotic devices.

In time, the space colony was able to make its own plastic goods, textiles and basic pharmaceuticals and enjoyed a richer diet containing a wider variety of cereals, vegetables, fruits, herbs and spices.

Liu kept his promise and finally made new underwear for Siobhan MacGregor in 2055. And about time, too.

Medical facilities

Impressive as these developments were, the space colonists were even more ambitious. They chose to aim for complete self sufficiency, with no reliance whatsoever on resupply or expertise from the Earth. This would entail establishing full medical facilities for themselves.

Michiko Saito took on the project of developing the medical services which included expanding the variety of pharmaceutical plants, building an operating theatre and improving diagnostic facilities. She also established an electronic medical library by datastream downloaded from Earth transmissions. In the library were the molecular structures of all therapeutic agents known to Man and all therapeutic techniques known, including videos of all surgical procedures.

Michiko instituted a surgical training program for all the medical officers. To maintain their skills, they practised operative techniques on anaesthetised “hamlets” before the animals were sacrificed as food.

THE AMERICAN SPACE PROGRAM 2052-2068

After the *Vishnu* disaster in June 2051, the Americans had one more go at asteroid mining. The six crewed *USS Ticonderoga* left Earth late July 2052, swung around Mars in February 2053 and reached the American designated sector of the asteroid belt in September 2053. Things did not work out well.

The President commissioned Madeline “Madguts” Bowell to look into the matter. She was the Chief Policy Adviser to the White House. Intellectually she came across as sharp, incisive, and analytical. Unfortunately despite her undoubted high IQ, she was unable to hold balanced views of world issues. She always tended to steer her judgements and decisions in one inexorable direction: that America was, is and must always remain top dog in all international matters at all costs. That American primacy in all world affairs was the divinely ordained, manifest destiny of the New World Order and that all other considerations were subservient to this overarching principle.

She regarded herself as an American Patriot and had nothing but disdain for other nationalities.

As a person she was ugly, fat and obnoxious. Whether her dreadful appearance was more due to nature rather than nurture, more because of bad genes rather than bad grooming, was immaterial. The point was that in the course of time she had somehow become habitually unpleasant and tended to take it out on anyone she perceived as vulnerable or simply did not like.

She chaired this meeting in February 2055:

**DON'T LOOK AT ME IF YOU'RE FEELING PECKISH /
THE FUTURE OF THE AMERICAN SPACE PROGRAM**

Date: February 2055

Location: The White House, Washington DC

Event: Meeting to review the *Ticonderoga* affair and to consider options for the future of the American space program

Present:

- **Madeline “Madguts” Bowell, Chief Policy Adviser to the President of the United States**
- **Richard Puerile, White House Press Secretary**
- **Vernon Rosenthal, Director of NASA**
- **Professor Siegfried Floyd, Visiting European Professor Emeritus and world renowned Austrian-Irish Psychologist.**

Transcript of the meeting:

Madeline Bowell (Chief Policy Adviser): The aims of our meeting today are to conduct a post-mortem of the *Ticonderoga* tragedy and to consider our options for the future of the American space program. Richard will begin by reading us the official version of the *Ticonderoga* affair.

Richard Puerile (White House Press Secretary): This is the official story we released to the press at the time. (*Reads out from previously prepared statement*):

A year after we lost the *Geronimo* in the *Vishnu* explosion of June 2051, we sent another six crewed ship, the *Ticonderoga*, out to the asteroid belt in July 2052 to set up a mining system similar to that of the joint NEATO/European project, which was by then well established.

The *Ticonderoga* reached the asteroid belt in September 2053 and began prospecting. They had just commenced mining when an unfortunate incident occurred in December 2053. It appears that someone mistook caustic drain cleaner for nutrient solution and emptied a whole bottle into the food crop portion of the hydroponic system. The crew discovered the problem too late the next day, when all the food crops were poisoned and dead.

They reviewed their situation: they were fourteen months away from Earth.

They reviewed their inventory: they had some spare wheat germ for planting, some emergency rations in the form of dehydrated food and some livestock.

They had to devise a survival plan. They could not spare any grain to feed the livestock, hence the first thing they had to do was to slaughter the animals, keep them in deep freeze and consume them first. That would last them about a month. The wheat germ, despite being a fast growing genetically engineered strain, would take at least a couple of months before being ready for harvest. Therefore they had to consume their dehydrated rations next. That would last them another month, just in time for the new wheat harvest. This first harvest would be small and some grain would have to be put aside for replanting. There was no way they could regenerate adequate food indefinitely given their circumstances. Their diet would be poor in both quantity and quality, lacking in other plant foods and meat. The best they could hope for was slow starvation and malnutrition, but hopefully they could scrounge sufficient calories from the next few generations of wheat harvests to hang on to life for another twelve months. Thus in theory this strategy could sustain them just long enough to get back to Earth.

Vernon Rosenthal (Director of NASA): If I may interrupt for a moment, Richard. So far your account conforms precisely to the circumstances at the time. The options were to try to make it back to Earth, fourteen months away, or to head towards the Eurasian sector of the asteroid belt which was eight months away and accept their offer of help.

Madeline Powell (Chief Policy Adviser): Receiving help from the Eurasians was totally unacceptable. I personally lobbied against that option in my meetings with the President. It would be perceived by the American public as a failure of America to take care of our own. The Chinese would have gleefully rubbed our noses in it, at a time when relations were still frosty between our nations due to the long-standing *Geronimo* dispute. We told NASA that the *Ticonderoga* had to make it back home on their own.

Richard Puerile (White House Press Secretary): Unfortunately, four months into the trip back home, long after they had consumed all their livestock and their emergency rations and were just about to harvest the second new generation of wheat, the same thing happened. The wheat was poisoned. Again. They were thus doomed to death from starvation within the next thirty to forty days. They continued on the trip home nevertheless, so that their bodies could be recovered and the ship reused. There was nothing else they could do. Five months into the return trip, the crew died from starvation one after another in quick succession within the space of a week. The dead bodies were placed in deep freeze by the remaining crew, except of course for the last survivor who died in his bunk. When we retrieved the ship we found a decomposed corpse in one bunk and five bodies in deep freeze. The *Ticonderoga* has since been refurbished and serves as a space station in Earth orbit.

Madeline Bowell (Chief Policy Adviser): All right, now that Richard has refreshed your memories, Vernon will tell us about NASA's actual findings.

Vernon Rosenthal (Director of NASA): If you think the official version makes for grisly reading, it was nothing compared to what we actually found. When the *Ticonderoga* was a week away from Earth, we sent a ship to intercept it. We did not find five whole corpses in the deep freeze - instead we found five human heads without bodies. Their brains were also missing. We did find a decomposed body in a bunk but things were not quite as they seemed. Our forensic experts said that this last survivor did not die from starvation shortly after his other five crew mates perished, as we previously believed. He actually lived on for several months after they died. He almost managed to make it back to Earth alive. For reasons best known only to himself, he decided to cut all communications with us just after the fifth crew member died. The only way he could have survived those extra months was to cannibalise the bodies of his dead crew mates and there was certainly ample evidence to prove that took place.

Madeline Bowell (Chief Policy Adviser): Thank you Vernon. Professor Siegfried Floyd, world renowned European Psychologist

happened to be in America on lecture tour at this time and was contacted by the office of the President to offer an expert opinion. He will give us his take on the actual events. Professor Floyd was given access to all information on the understanding that he would conform to the National Security and Official Secrets Acts.

Professor Siegfried Floyd: Rest assured, Ms. Bowell, that all my consultations are conducted in the strictest medical confidence.

We can only speculate as to what really occurred, however let me outline my hypothesis which I strongly believe to be true. This situation was an illustration of the vital role human factors play in the success or failure of any undertaking. Having the most sophisticated technology means nothing unless you have the right personnel on board. The last two US space missions consisted of individuals exclusively from the military, people chosen primarily for their unquestioning acceptance of authority. Both the *Geronimo* and the *Ticonderoga* had all male crews.

Having studied the personality profiles of the *Ticonderoga* crew and having reviewed all videocom recordings and journal entries, I have built up a scenario of what I believe took place. First, let me say that a group of male primates confined together in a small space for a long period of time makes for a potentially explosive situation. Inevitably a hierarchy forms where there is one alpha male and an established pecking order. The alpha male is not always the one who was originally appointed as leader by the authorities. Disputes may not be resolved equitably and a culture of bullying often develops which may give rise to disaffected individuals. If one such individual is repeatedly frustrated and continues to feel that his entitlements are being infringed upon, he may resort to other means.

In this case I believe that one of the crew members was not only disaffected but was also constantly picked on by the others as he was perceived as weak and slightly odd. He usually backed down in conflicts and tended not to defend himself verbally or physically in most confrontations and was thus considered a pushover. Everyone tended to gang up against him. There was one particular case when he was unjustly blamed for a trivial problem. In a rare attempt, he tried to assert himself, but was assaulted by the deputy commander who was the de facto alpha male at the time. I believe it was this particular frustrated crew member who poisoned their food

crops on both occasions. He wanted to retaliate against his tormentors but there was no way he could overcome the other five crew physically or even verbally. Hence he resorted to sabotage.

He only needed to directly murder one crew member. After he poisoned the second batch of crops and the group were starving, I believe he smothered the weakest one when the others weren't watching. He then fed off that corpse, regaining his strength, while the rest grew weaker and starved to death in rapid succession. He continued to stay alive by feeding on the other corpses. Initially, he was unable to cook the flesh, as this might bring the crew's attention to his activities, hence he sliced portions off the corpses and ate them raw. I understand you found traces of blood with the DNA of all the other crew members on his clothes and on his knife.

Richard Puerile (White House Press Secretary): Your theory sounds crazy. He must have known he was committing suicide by poisoning the crops.

Professor Siegfried Floyd: It may be crazy, but human behaviour is crazy. When ordinary people are relentlessly physically and verbally bullied, when they are repeatedly deprived of avenues for peaceful, fair and satisfactory resolution of disputes, when they are unable to physically remove themselves from such a situation; they eventually reach a stage where they will blindly lash out regardless of the consequences. They won't care if they die, so long as they have their vengeance. We have seen many examples time and again. You are aware of the Palestinian situation where suicide bombers have been causing terror from the 1980s to this very day. These bombers are energetic young men. If they had been born into another society, they would be channelling their energies into sports, studies or their careers. However they were born into a situation of helplessness and despair where they have no control over their destiny, are harassed by foreign troops and are treated dismissively and contemptuously. They lack economic opportunities and have no prospects for the future. When all hope is lost, when all dignity is denied and when there is seething resentment fuelled by testosterone, murder and suicide are often the result.

Madeline Bowell (Chief Policy Adviser): Well, now Professor, I must agree with Richard Puerile here. Your theory is crazy. Our good old boys of the US Armed Forces are total professionals. The events you describe could never have happened. The *Ticonderoga* crew were America's finest. They were not a bunch of psycho Ay-rabs.

Professor Siegfried Floyd: Those people you call psycho Ay-rabs could have become normal young men had they been born in America. And those astronauts of yours could have become suicide bombers in Palestine if they grew up in a situation of hopeless misery and were pushed beyond the limits of frustration. The way to reduce terrorist bombings is not to kill as many male Arabs as you can. The way forward is to allow the expression of reasonable grievances by peaceful means, to offer fair resolution of disputes, to provide economic opportunities and hope for the future. Certainly a tiny minority may still resort to violence and can only be dealt with by force, just as there are criminal elements in every society. But the vast majority can be won over by adopting policies to promote social justice.

Madeline Bowell (Chief Policy Adviser): Whoa there Professor, if I had known you were going to come here today to lecture us on foreign policy I would never have agreed to your appointment on our commission of inquiry. I can't believe our taxpayers are paying you good money for this load of psycho-babble garbage.

Professor Siegfried Floyd: Very well Ms. Bowell, if you consider my opinion psycho-babble garbage, perhaps you may have a better explanation as to the real circumstances behind the *Ticonderoga* tragedy.

Madeline Bowell (Chief Policy Adviser): What the hell, I'm no goddamn shrink, but I'm damned sure that you're dead wrong about everything.

Professor Siegfried Floyd: Your attitude is another example of the psychological dysfunction I have observed within your bureaucracy. You people have a culture of selective blindness to the facts. You

only accept information which conforms to your preconceived notions of yourself as Americans and of others as foreigners. You are ultra sensitive to the slightest criticism, even if offered constructively and objectively. It's as though you've all been gripped by a collective madness.

Madeline Bowell (Chief Policy Adviser): I've had just about enough of your crap, Floyd. I think it is now time for you to leave. Get out. And don't ever bother to come back.

Professor Floyd sighs, shakes his head, says nothing, gets up and leaves the room.

Madeline Bowell (Chief Policy Adviser): Goddamn Alien National. We're not going to put up with all his shit.

Gentlemen, it is now time for us to examine our options for the future of the American space program. Vernon, you previously mentioned three possible options. First, do we keep trying to independently emulate the Eurasians in mining the asteroids, second, do we apply to join them in their mining ventures or third, do we adopt a whole other strategy completely?

Vernon Rosenthal (Director of NASA): I think we have to consider the advantages and disadvantages of each option. First, do we try to independently emulate the Eurasians? It is tempting. They now have access to unimaginably huge resources potentially worth thousands of trillions of dollars. I believe the reason they have succeeded is because they developed multiple redundancies in their survival and operating systems. That was achieved more by luck and circumstance rather than through foresight. One ship alone in the asteroid belt will have great difficulty surviving in isolation. We saw in the case of the *Endeavour* and the *Tsushima*, with two ships working together, followed by the backup construction of an extra sustainable habitat on-site, that long term success suddenly became a viable prospect. Now with four ships there and two habitats providing many organic products for them, they are thriving. Therefore, I believe that to emulate them we must send at least two ships simultaneously into the asteroid belt and immediately upon arrival build a backup habitat there, before we even commence

mining. Each ship costs us thirty billion dollars, hence we have to ask ourselves whether the benefits of such a project will exceed the costs.

Madeline Powell (Chief Policy Adviser): It will be difficult to justify such a cost, particularly as we have no need for extraterrestrial uranium, having established control on Earth over all the uranium sources. We determine the flow and the price of uranium here. Historically, our previous manned space missions were largely motivated by prestige.

So the next question is whether we join the Eurasians. Do we reconfigure the *Ticonderoga* for sustainable travel and send it into the Eurasian sector of the asteroid belt and ask for a share in the pie? Do we ask to be included in their joint venture?

Vernon Rosenthal (Director of NASA): It may sound dumb in this modern scientific age, but many of our astronauts expressed reservations about serving on a ship with the ghastly history of the *Ticonderoga*. Somehow, rumours of cannibalism leaked out which we were unable to suppress despite our denials. They have nicknamed that ship the *Donner-deroga*.

Madeline Powell (Chief Policy Adviser): Quite apart from that, in order for us to join the Eurasians, we will have to open negotiations with them first. That will be too much like begging from the very people who walked out on us after the failed WTO talks. Begging is not what America does. America does not ask, it takes. I have no intention of going cap in hand to those Eurasians, especially since we have no real need for those resources at this time. And even if they do let us join them, we will always be playing second fiddle to them in that venture forever after. Remember, our space program has been all about prestige, about America's pre-eminence, and such behaviour will run contrary to that goal.

So I think we should consider the third option. Do we adopt a whole other strategy completely? Of course, this raises the question, what strategy?

Richard Puerile (White House Press Secretary): Well, one recent worrying trend we have observed is the depression of prices of

precious metals on the world commodities market as a result of the Eurasian asteroid mining activities. Take platinum, for example - there will be a real risk of a price crash if they ramp up their production by sending more ships to the asteroid belt. All that could have a destabilising effect on the world economy, especially if several precious metals, particularly gold, suffer a large drop. It could affect the life savings of many retirees - who are a major voting lobby in our ageing population. I think that such a worrying trend could be justification enough for America, with the world's most powerful armed forces, to intervene.

Vernon Rosenthal (Director of NASA): Yes, that is an option. Despite our difficulties with interplanetary travel, we still have a huge capacity to exert our influence in local space, certainly within near Earth orbit. More so than any other country.

Madeline Bowell (Chief Policy Adviser): Very well. I would say that the Eurasian disruption of the precious metals market may constitute a future threat to the world economy and could justify our seizure of their ingot shipments when they arrive in near-Earth space. This then may be our third strategy. To control the fruits of the efforts of the Eurasians by intercepting their deliveries in local space as we see fit. Such a strategy will re-establish our pre-eminence as the strongest nation on Earth, will re-establish our total control over the price and flow of uranium as well as other precious metals, and will not cost us anything as much as a full blown long term mission into the asteroid belt. Indeed, seizure of those assets will enable us to defray costs and should even turn a profit for us. An imputation tax on the Eurasians, if you will.

Richard Puerile (White House Press Secretary): But do you think such behaviour may be construed by others as an act of war? As government sanctioned piracy?

Madeline Bowell (Chief Policy Adviser): It is not without precedent. Historically, we have employed such means in the past, using privateers. In any case, I am not casting this policy in stone here and now. It will still need the approval of the President. I am merely considering it seriously as a major option. Furthermore, I doubt any

nation will dare wage war against us, as we still have the world's most powerful military by far. Let us recall some history. What happened the last time we threatened to cut off a country's energy supply? That was in World War Two when we threatened to cut off Japan's oil. Well, they went to war against us and we beat the pants off them. We kicked ass. So I wouldn't worry about it.

Richard Puerile (White House Press Secretary): Such a plan could lead to the militarisation of space, to a new arms race between the great nations of the world.

Madeline Bowell (Chief Policy Adviser): You say that almost as though you think it would be a *bad* thing.

Vernon Rosenthal (Director of NASA): Richard is being foolish. This policy will certainly keep *my* agency gainfully employed. I'm all for it.

Richard Puerile (White House Press Secretary): Of course, of course. I see now that you guys are totally right. Our first obligation is to our friends in the Military-Industrial Complex.

Madeline Bowell (Chief Policy Adviser): And don't you forget it.

THE FRENCH HAVE NO PHRASE FOR “*LAISSEZ- FAIRE*”

Date: February 2055

Location: Dining cabin of the *Endeavour*

Present: Siobhan MacGregor, Liu Zhang, Maria Alvarez

“The *Ticonderoga* situation was a tragedy that could have been averted,” Siobhan reflected with some sadness.

“I agree,” Liu concurred, “I assessed their circumstances at the time and came to the same conclusion that you did.”

“When they had their first crop failure,” Siobhan continued, “they were fourteen months away from Earth but only eight months away from us in the asteroid belt. If they made for our space colony and we sent a Eurasian ship to meet them half way, we could have rendezvoused with them in four months, before any of them starved to death. We could have supplied food and sent biomaterials to fix their decaying on-board ecosystem. After that, we might even have invited them to join our mining consortium.”

“So why didn’t they agree to your plan, Siobhan?” Maria inquired.

“That’s what surprised me,” Siobhan replied. “I thought that any sensible person would have appreciated its merits. They said they felt they could make it back to Earth on their own and were anyway instructed by their administrators not to deal with us.”

“Yes,” Liu added, “the persisting Sinoamerican dispute over the *Geronimo/Sun Tzu* explosion made NASA reluctant to have anything to do with the NEATOs.”

“If I was on board the *Ticonderoga*,” Maria continued, “I would have certainly agreed to your suggestion Siobhan, irrespective of what the American bureaucrats ordered. Your plan offered them the greatest chance of survival.”

“That’s the difference between you and the new breed of American astronauts, Maria,” Siobhan observed. “It seems their latest selection process has thrown up another type of candidate very different from you. People who obey orders without question. Military types.”

“As a former reservist air force officer I’ve had my fair share of encounters with the Military Moron Mentality,” Liu said. “They know how to paint by the numbers but are unable to do

anything original on their own. Many of their decisions fly completely in the face of common sense.”

“Survival in the harsh environment of space requires initiative, creativity and lateral thinking - facilities possessed only by questioning minds,” Siobhan commented. “Liu and Maria, you have both exhibited those qualities many times, which have made you living treasures to our space community here.”

“I wonder what America plans to do with its space program next?” Maria pondered.

“Who knows?” Siobhan asked rhetorically. “I have seen so many unhealthy trends develop in America. It is a great shame, because America still possesses the greatest talent and the best minds in the world. Unfortunately American excellence is becoming increasingly hobbled - crushed by an overwhelming wave of mediocrity and insipid commercialism in an apparently unstoppable tide.”

“Siobhan, you mentioned previously that your father was American,” Liu recalled.

“Yes, he emigrated back to our ancestral homeland, Scotland, when I was a mere babe,” Siobhan said. “He observed the falling out between America and Britain with growing dismay. We were great allies in the two world wars but things changed drastically in the first half of this century. We mistakenly supported America in the illegitimate Iraq invasion of 2003, a campaign driven by the avarice of a bunch of pretentious liars. Thankfully Britain eventually pulled out. There were also major differences between us over greenhouse gas policies, the Americans remaining intransigent polluters. The final straw was the great betrayal of 2034 when the US used strong arm tactics on the World Trade Organisation to force through one sided policies favouring their corporations. That was when the French led the walkout and took the European Union with them.”

“I did a school project on the history of the WTO,” Maria commented. “The French walkout triggered a barrage of vitriolic invective from the US President. He denounced the French as enemies of free trade. He said that the French had no phrase for ‘*laissez-faire*’.”

“One of his more memorable comments,” Siobhan said. “I also remember that Ronald Bumstead, the future US Foreign

Secretary, called us 'washed out old Europe'. Soon after that NATO disbanded and Britain committed completely to the European Union."

"And two years later," Liu added, "Japan abandoned its US alliance and joined their economy with China and Korea, forming the North East Asian Trade Organisation."

"I'm glad that the NEATO astronauts joining us here continue to be of high calibre," Siobhan observed.

Liu lent a word of caution. "They tell me there is also a faction within the Chinese administration trying to install more idiotic military types into the space program. So far we have been lucky that the Chinese Premier, Lin Senior - who is a bit of a Philosopher and a Historian - has personally ensured that astronaut selection be based purely on merit. Unfortunately his son and heir apparent, Lin Junior, has a completely different view of things."

Siobhan reflected on Liu's comments. "Let us hope we never live to see the triumph of human stupidity."

PURGATORY: SALVATION

Morlocks again

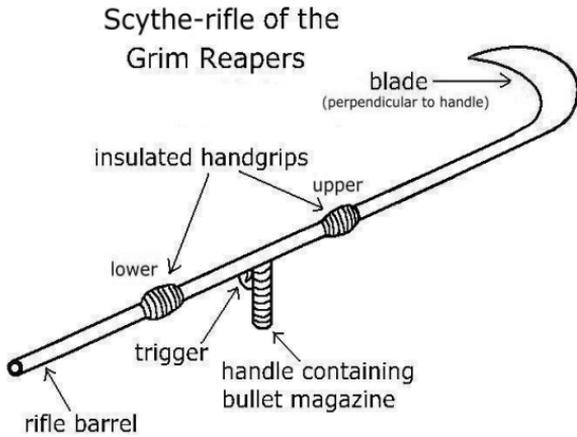
Sophie's ruse worked. She and the Stranger managed to re-enter Purgatory through the North docking bay without incident or hindrance. Once again they made for an underground portal and sought refuge within the tunnel system.

The Stranger now felt he was back to square one, back to where he had started. He felt that he had made no progress whatsoever. He could not see himself hiding in the tunnels indefinitely with the blueskins. He had to do something.

Sophie felt her eyes had been opened to a whole new universe. Her mindset had been completely transformed. She felt thoroughly vindicated in her scepticism of the fairy tales her teachers had foisted on her during her formative years. She also felt it was time to do something, to fight against the lies and deceit of the Overlord and expose him for the fraud that he was. She was energised but she felt powerless. Unless she could recruit support. Mobilise other blueskins. Show them some of the wonders she had seen. The blueskins had always been intimidated by the "divinity" and the power of the Overlord and his Angels of Death, they were scared to confront them in any way, they feared being damned to hell. They were grossly outnumbered and grossly outgunned. Armed with the Truth, perhaps they could now find the courage to rebel. If only they could storm the palace, capture the Overlord and show the general population that he was not in any way a God. But how could they match the swords of the Guards and the scythe-rifles of the Grim Reapers?

The only advantage a weaker, smaller force might have was the element of surprise.

In their conversations, the Stranger produced the diagram of the scythe-rifle that he had previously drawn. Sophie studied it intently:



The Stranger favoured a more direct approach. If only he could address the ordinary people of Purgatory en masse. His very presence as an outsider with different clothes - surely that was evidence enough of a Universe outside Purgatory. Surely he could convince the people of the lies they were living under. It was a risky undertaking, but he felt he had no other options. Perhaps he was indeed a Messiah who would preach a new Gospel, a Gospel of Truth to the people of Purgatory.

Sophie felt that words alone would be insufficient to sway the people. They had been brainwashed from childhood to think in a certain way and would not readily let go of their ingrained beliefs. They needed to see irrefutable evidence of the Overlord's mortality and fallibility before any change of attitude could occur. But how could that be achieved?

The Stranger inquired, "Are there any large gatherings when the people meet?"

"Yes," Sophie replied, "from time to time there are celebrations, proclamations by the Overlord, banishments and sometimes public executions."

"And when is the next one?" inquired the Stranger.

"Four days from now, the feast of Chicxulub," she answered.

"Well, then," he said, "that's as good a time as any."

Three days and three nights passed. Too long, as far as the Stranger was concerned, to be slinking around in the underground tunnels and eating rancid scraps of food.

He knew now this was a dying habitat. The common people must have lost the use of electricity a century ago and it was not even a dim memory to them. Electrical power was now available only for the exclusive use by the Overlord, a symbol of his divine power and “magical” abilities. Plumbing was non-existent and waste disposal was indiscriminate. From the foul air to the putrid rain to the wilting vegetation, he could see that Purgatory was decaying badly. Purgatory was in bad need of restoration and repair which was possible only with the help of the other space colonies.

Over the next few days, Sophie introduced the Stranger to more blueskins underground. They were only seventy or so in number, largely malnourished and constantly hungry. A handful were near death. With Sophie’s help he was able to convince the blueskins of the real truth of their situation.

The Stranger showed the blueskins the corridors to the escape pods. He had been able to open the access doors by means of a microchip embedded in his forearm which he had waved over the door sensor. He discovered that all the inhabitants of Purgatory also had a chip implanted in their right forearms in childhood, just as he had. This was the “credit chip” by which the Overlord controlled the entire economy of Purgatory. When traders brought their produce to the markets, no cash exchanged hands, nor was barter trade allowed. Instead, each transaction was overseen by an official of the Tax Office and Audit Department or TOAD, who used a portable scanner to add or remove credits from each individual’s microchip, in the process simultaneously extracting the usual fifty percent tax for the Overlord, taken directly at the point of purchase. A paper record of each transaction was given to each individual. Only then could goods be exchanged.

At time of banishment, each blueskin had their microchip cut out of their forearm, thus excluding them from the formal economy. And also preventing the blueskins from accessing the escape pods underground.

The Feast of Chicxulub marked the obscure prehistoric origins of the human race. It was a time of congregation, of fellowship and of thanks. But above all it was a time for giving praise to the magnificence of the Overlord. There were gatherings of three thousand people each in four different locations spread equally around the “equator” of Purgatory. The Overlord himself presided over the main ceremony at his Grand Palace which had been built on the equator of the habitat. Two other gatherings were managed by Dubhe and Merak separately and the fourth was overseen by his other representative, the Captain of the Guard, Menkalinan. It was at this fourth location, on the other side of Purgatory diametrically opposite the Overlord’s palace, that the Stranger decided to make his presence known to the people.

An odd commotion

Achernar turned to Celbalrai. “This meeting promises to be a waste of time,” he said, “no executions or banishments today, no entertainment, nothing interesting at all. Just repetitive chanting of praise to the Overlord.”

Celbalrai agreed, “Yes, quite a boring program today. I wouldn’t be here if it wasn’t compulsory. The guards keep a record of attendance and it could be a black mark against you to miss these gatherings, it could damage your credit rating.”

Unukalhai joined in the chorus of dissatisfaction. “You’d think they’d at least let us eat first. It’s another ten minutes before Menkalinan arrives and another half hour of his preaching before we can feast, if we can call it a feast, in view of the lousy harvest we’ve had. I’m bloody starving.”

Rastaban admonished them. “Be silent all of you and show some respect for the day of Chicxulub! Have you forgotten the virtues of obedience and forbearance, the fivefold path to salvation? Remember that the cares of Purgatory are an illusion. Swallow your petty complaints and set your sights on the glorious afterlife instead!”

“Yes, you’re quite right,” Achernar said.

“Rastaban, I apologise for my lack of piety,” Celbarai recanted.

“I’m still hungry,” Unukalhai whined.

Just then a figure in a silvery jacket leapt up onto the stage before the crowd. He wore strange garb, finely fashioned and quite unlike the rags of the common folk. More like the intricately woven garments of the Overlord. "Listen to me people of Purgatory!" he began, "I am an Outsider, I have come from beyond the walls of Purgatory to bring you a message of Truth and Hope."

"Who the hell is that?" Nashira asked no one in particular.

"Never seen him before," commented Gienah.

The Stranger took up on that last comment. "Indeed, none of you have ever seen me before. That is proof positive that I am not of Purgatory, unlike every single one of you who was born here. You have known each other all your lives. You know nothing of me. I bring you news of an unimaginably huge universe outside the confines of Purgatory. I am here to tell you it is now time to open your eyes, to discover new horizons. To tell you that your Overlord is not a God, he is a mortal man just like you and I."

He was met by a perplexed silence.

"People of Purgatory," he continued, "it is now time for you to rise up against the Overlord to take control of your own destinies. The trappings of the Overlord's so-called magical powers, the bright lights of his palace, the floating boards and the fire sticks of the Angels, they are just technology. You too can be masters of technology if you seize this chance to claim your freedom. Look at my jacket," he pointed to the silvery fabric, "this is technology. Look at this," he held up a battery powered torch and flicked the light on and off, "this too is technology."

There were a few murmurings in the crowd now.

Nusakan said, "Who is this clown? Surely he does not expect us to be impressed by his childish magic tricks?"

"Indeed," Mebsuta remarked, "puny magic compared to the great might of the Overlord."

This was not the response the Stranger had expected. He began to realise that his rash plan may not have been very wise after all. Nevertheless he was now committed to a course of action, hence he persisted. "People of Purgatory, you have lived under the yoke of oppression for too long now. You must take this opportunity to march on to the palace of the Overlord and demand explanations. I challenge the Overlord to an open debate during which I will prove

to all of you the Truth about this place and lay bare his monumental deceit.”

Just then a voice shouted out from behind him. “Lies! all lies!” it was Menkalinan, the Captain of the Guard. “This creature is a spawn of Satan, the Great Deceiver!” Menkalinan now jumped on to the stage, sword in hand, pointed at the Stranger’s chest. “He brings you empty promises which will only lead to your damnation if you follow him. The great Overlord does not engage in debate with lowly filth like him.”

“Guards!” Menkalinan shouted out. Half a dozen men now scrambled onto the stage, swords poised, ready to run the Stranger through.

Menkalinan then said to the Stranger in a low voice inaudible to the crowd, “Get off this stage right now and keep your mouth shut or I will slice your belly open with my sword.”

Once again, the Stranger had been captured.

Conversation between the Stranger and the Overlord

Menkalinan and his guards brought the Stranger to the Grand Palace and dumped him unceremoniously on the steps leading up to the dais. The Overlord clutched a scythe-rifle as he sat on his throne. He ordered the guards to leave the hall so that he and the Stranger could have a private conversation.

“You’ve been quite an annoyance to me, Stranger,” the Overlord said.

“I’ve been an annoyance to *you*?” the Stranger responded sarcastically. “You fucking murdered my friends, you scumbag. That makes *you* more of an annoyance to *me*.”

“I suggest you watch your tongue,” the Overlord threatened, “your disrespect may earn you a painful death. Who the hell do you think you are anyway, with that ridiculous performance on stage? What are those letters N.O.E. on your jacket?”

“Nuclear Ordnance Elimination,” the Stranger replied.

The Overlord sniggered, “Hah! You are just a common radioactive waste disposal worker! A glorified garbage man! And you thought you could be the Messiah for these people! What a joke!”

“You’re the joke, mister Overlord, or should I say, Xiao-Pian Lin,” the Stranger said. “You don’t look much like a God to me.”

“Xiao-Pian Lin is a name I have not heard in a long time. But make no mistake, I am God here and you will do well to humble yourself accordingly. Who is God, if not one who holds power over your life and death?”

“Just because you can kill people doesn’t mean you’re God, even though you may have fooled the people here,” the Stranger exclaimed.

“They are simple creatures. They are my digits to use as I please. They squabble and scramble aimlessly about. I give them purpose and direction,” the Overlord retorted.

“You exploit them and keep them ignorant. You deny them human rights and democracy,” the Stranger said.

“Democracy is overrated,” the Overlord declared, “it is nothing more than dictatorship by the majority. Majority rule is rule by the lowest common denominator, a recipe for disaster.”

“A convenient argument to justify your control over them and to advance your own self serving agenda,” the Stranger replied. “I believe in the greatest amount of good for the greatest number of people...”

“Ah yes, Bentham’s old platitude,” the Overlord interrupted. Some of Lin Senior’s extensive knowledge of history had rubbed off on Lin Junior. “Wasn’t Jeremy Bentham that smug old fart who arranged for his own corpse to be stuffed and displayed in a glass case? With good taste like that I suppose you believe he was bound to be correct in all things!”

“Certainly correct in this thing...” the Stranger argued.

“Enough of this nonsense,” the Overlord interrupted again. “You are alive for one reason and one reason only. Information. I have some questions for you. You will remain alive only at my pleasure and if you cease to be of use to me I will cast you aside like yesterday’s trash.”

In truth, the Overlord was curious to learn of all that had occurred outside Purgatory over the past one hundred and fifty years during his self imposed isolation. The Stranger thus informed him of the thriving colony of mega habitats at the L2 point of Mars, as well as the other three smaller colonies in the asteroid belt. Of principal

concern to the Overlord was how the Stranger had managed to locate Purgatory after all these years. The Overlord was relieved to hear that the Stranger's ship had only accidentally stumbled upon Purgatory. Due to their damaged navigation and long distance radio equipment they had not been able to transmit their location to the other space colonies.

In turn, the Overlord seemed more than willing to describe to the Stranger how things had come to be the way they were in Purgatory.

He explained how he had seized power one hundred and fifty years ago. He had studied the methods of cult leaders from history and he assembled a group of disaffected individuals who became his fanatical followers. They made weapons at a time when weapons had become unheard of. The mega habitat he hijacked which later became known as Purgatory was populated by young adults with small children at the time. Most of the adults resisted him, hence he simply killed all dissidents, leaving alive only those who would cooperate and of course his core group of followers. The elimination of dissenting adults enabled him to expunge all memory of the outside Universe in the following generations. They indoctrinated all children to his new religion and he became their God. Only those in his inner circle who had a vested interest in maintaining their privileged lifestyle retained the knowledge of the true nature of Purgatory and were given the task of maintaining it, however clearly the habitat's systems were now running down.

The Overlord also explained why he allowed the underclass of blueskins to exist. Long after eliminating all his opponents, he realised that he could now allow the token presence of a starving and powerless group of people who would pose no threat to his rule. Indeed they fulfilled a few roles which suited his purposes. They were living examples to the others of the terrible fate that befell any who defied him. They were also useful scapegoats. The Overlord found that control of the population was made easier if he could blame the blueskins for any problems in Purgatory and thus deflect any responsibility away from himself. He took advantage of the natural tendency for human beings to adopt a tribal mentality and revile others who looked different from themselves. Blueskins were made out to be the cause of the deteriorating air and water and the poor harvests. Blueskins were all thieves or beggars - they had been

forced to pilfer to survive, having been excluded from the economy. Blueskins were dirty - they had no ready access to clean water for drinking, much less for bathing. Once in a while, frustrated commoners could vent their discontent by beating up or even killing one or two blueskins with impunity.

He wanted this underclass of scapegoats to be immediately identifiable as different from the rest. People who look different are easier to hate and demonise. He initially thought of branding them on the face before banishment, however a distinctive skin colour was a far better marker which was instantly recognisable from a distance. After several generations of genetic mixing, most people had come to have a uniform boring light beige skin colour. One of the Overlord's minions found a way to use a retrovirus to induce permanent blue discolouration of the skin. Blue skin would thus be the marker to discriminate against this newly created caste of untouchables.

The Overlord outlined all of his "achievements" with a kind of perverse pride.

The Stranger warned him that the failing ecosystem of Purgatory would ultimately lead to death for all of them, however the Overlord did not seem to care.

A coup d'etat and a coup de grace

After two weeks, the Overlord decided that the Stranger was no longer of any use to him. He decided to arrange for the disposal of this nuclear disposal man.

The sombre Armageddon Commemoration Day was chosen as a suitable event for the Stranger's public execution. Executions were a useful distraction for the population who were growing increasingly restless because of failing crops and dwindling food supply.

They used the wooden stage in the Great People's Square fronting the Palace of the Overlord from which to conduct the proceedings.

Dubhe, one of the Angels of Vengeance, was Executioner of the Day. The Overlord had a throne upon the stage from which he would officiate.

“People of Purgatory, witness this Child of Evil known as the Stranger, who this day we shall banish to the pits of Hell forever,” Menkalinan proclaimed.

Crowd turnout today was good, as was usually the case with a juicy execution.

A litany of crimes and misdemeanours, said to have been committed by the Stranger against the Overlord, were read out to the crowd by Menkalinan. Even God needed justification for his actions. “By due and proper process,” he said, “this Purveyor of Lies and Disciple of the Devil has been found guilty of unspeakable sins against our God. It is the will of the people that he now be cast into eternal damnation to meet his Master.”

It was impossible to imagine the sheer terror that the poor Stranger must have been experiencing at the time. Even though he had been gagged with a cloth, the wide eyed horror in his face spoke volumes. The guards pushed him down onto his knees and placed a blindfold over his eyes.

Dubhe then raised his scythe high, ready to commit the deed.

Just then, a flurry of arrows flew through the air towards the men standing on the stage. One of these arrows struck Dubhe in the chest, causing him to drop his scythe and fall to the ground. Some of the guards were also struck. A hail of stones accompanied the arrows and pelted the guards.

It was a band of blueskins, armed with recently fashioned slingshots and crossbows, led by Sophie.

The Overlord had ducked the airborne missiles by cringing behind his throne.

The motley band of blueskins stormed the stage. Sophie now discarded her crossbow and picked up a sword which had been dropped by one of the guards. She shouted to her followers to do likewise.

Now ensued a pitched battle between the blueskins and the guards. The audience of commoners looked upon the scene with disbelief, paralysed and immobile.

On stage, it appeared as though the blueskins were gaining the upper hand. There was nothing that could match the fearless abandon of a group of people who had nothing to lose. Except sheer firepower. Just then, bolts of red lightning flashed from the barrels

of two scythe-rifles. It was Merak, the other Angel of Death and the Overlord himself, who had seized Dubhe's weapon. They fired on the rebels, cutting them down one by one. A few tracer bullets went wide, striking a couple of guards and a few bystanders in the crowd. This was of no matter to the Overlord, simple collateral damage of no concern whatsoever.

Finally, among all the blueskins, only Sophie was left standing.

The Overlord pointed his scythe-rifle at Sophie. He walked slowly and deliberately towards her. "Drop your sword!" he shouted.

Sophie complied.

"Now down on your knees!"

Again, she had no choice but to obey.

"Observe, people of Purgatory, the terrible fate of those who dare to oppose the Will of the Overlord!" he screamed, maniacally.

He kicked Sophie violently in the face, causing her to fall backwards supine. Blood trickled from her nose.

"Merak!" he shouted. "Complete the task that Dubhe began!"

Merak walked up to the Stranger, still on his knees and blindfolded. Merak raised his scythe high, then swept it down and promptly decapitated the Stranger.

"No!" Sophie screamed, powerless to do anything.

"Now it is your turn," the Overlord said to her. "A special fate for this ringleader of mongrels."

The Overlord stood over Sophie as he had done once before. She remembered the last time, before she was banished, when he tried to force himself on her, when she froze rigid. His rage then was without equal and he beat her unconscious at the time. Just the memory of it made her wince. This time however he seemed not to recognise her. She probably had been merely one victim among many of his numerous violent assaults.

Now the Overlord pointed the muzzle of his scythe-rifle at her face.

"You know, I've never shot anyone up close like this. It will be interesting to see what a bullet at point blank range does to that pretty face of yours," the Overlord murmured sadistically. "So

tell me, you miserable blueskinned whore, do you have any last words?" the Overlord sneered.

Sophie felt neither fear nor terror. She was however energised by anger and outrage. Even lying on her back on the stage with the rifle muzzle six inches from her face, she spotted an opportunity.

The Overlord stood hunched over Sophie as she lay on the stage. He had his feet planted on either side of her trunk. The upper shaft of the scythe-rifle rested on his right shoulder. The blade was behind his head, pointed outwards to the right. He held the perpendicular handle/bullet magazine in his right hand and his left hand was on the lower insulated handgrip.

Sophie grabbed the barrel of the rifle with both hands. Even though some minutes had elapsed since the last few shots were fired, it was still intensely hot and burned her hands. The endorphins coursing through her veins however completely blocked any sensation of pain. Adrenaline still surged through her system from the recent battle and gave her the superhuman strength she needed to carry out her next act. With all her might, she rotated the rifle barrel anticlockwise 180 degrees, wrenching the handle out of the Overlord's right hand and dislocating his right index finger as it slipped out of the trigger ring. The sharp edge of the blade was now poised directly behind the Overlord's head. Mobilising another burst of strength, Sophie now yanked the rifle barrel to her left, dislodging the Overlord's left hand from the lower handgrip.

"Last words?" Sophie asked the Overlord. "How about this? Go to hell, you self serving scumbag!"

She moved the scythe in a wide arc to the left. With all the force she could muster, she then swept the blade swiftly to the right, slicing into the Overlord's neck and neatly lopping his head off. His lifeless body fell onto Sophie, the pulsatile flow of blood from the stump of his neck spurting onto her face.

Sophie pushed the Overlord's body to the side with disgust, wiped her face and immediately turned her attention to her remaining adversary. Before Merak fully realised what had happened, Sophie had swung the scythe rifle around and adopted the firing position. She let loose a torrent of tracer bullets towards Merak, eventually landing a couple of shots home and felling him.

The remaining guards and all the crowd had gone deathly silent.

Sophie implacably scanned their stunned faces. She walked over to the corner of the stage where the Overlord's head had rolled. She shoved his head onto the end of the rifle barrel and lifted it up for all to see.

"This is your God. I have killed your God! God is dead!" she shouted.

The blueskin legend of a Messiah had proved to be true after all. That Messiah was Sophie.

The death of the Overlord, with his head mounted on a stick, was the incontrovertible proof needed to demonstrate his mortality and to pry open the closed, brainwashed minds of the populace to accept a new paradigm - to confer a hefty dose of the Truth upon them. Curiously however, even though they acknowledged Sophie as the harbinger of this Truth, they also resented her for dragging them out of their comfort zone. The people of Purgatory had been fed rigid views of the Universe which had given them a sense of certainty. This had now been demolished and replaced by confusion and doubt. When the people of Purgatory learned of their true predicament, of the deteriorating environmental systems within the megahabitat about which they could do nothing, they felt dismayed and helpless. They chose to blame Sophie, the bearer of this bad news, rather than the Overlord who had created the whole situation to begin with. There was no reasoning with them.

Nevertheless, it was still Sophie, as the Slayer of the Overlord and seemingly the only person in Purgatory with initiative of any kind, who by default reluctantly became their leader. The next couple of months were a period of turmoil.

Sophie employed the aging technocrats of Purgatory to resurrect the long distance communication and navigation equipment of that habitat. She was thus able to call up the nearest Asteroid colony by radio, inform them of their predicament and advise them of their location.

It was two months before the Asteroid colony rescue ship found them. The visitors were shocked by what they saw on the Stranger's ship, still locked into tandem motion with Purgatory.

They were appalled by the environmental state of Purgatory. These new Outsiders were able to restore some of the habitat's electrical systems and were able to reactivate its rocket thrusters. Purgatory now embarked on an eight month journey to join the Mars L2 colony of mega habitats. "Roadbumps" became a thing of the past.

In due course, Sophie was to see, experience and learn new things more amazing than she could ever possibly have dreamed of.

Most astounding of all to her was the realisation that human beings could indeed live together in a harmonious and civilised manner, however this was achievable only through the application of wisdom, reason, fairness and compassion – unfortunately elements in rather short supply in the largely grotesque and idiotic history of the human race.

NOW BEHOLD, I AM BECOME DEATH, DESTROYER OF WORLDS

Year 2068:

S. Ramachandran (“call me Rama”) barely reached five feet in height. He had the skeletal physique reminiscent of an Ethiopian famine victim. His diminutive stature was, to say the least, unimpressive. To call him physically underwhelming was a compliment; to describe him as weedy, almost emaciated, was probably more accurate. Together with his self effacing demeanour and his shy, soft spoken nature - he had a practically inaudible voice - it was easy to overlook him, to even forget his very existence. In a crowd, his minuscule presence rendered him almost invisible.

One aspect was impossible to ignore, however. His unprepossessing physical frame harboured a formidable brain. His parents were refugees to America from the flooded coastal province of Kerala, South India, thirty six years ago when he was seven years old. Rising sea levels had inundated the village he grew up in. They were impoverished peasants with nothing more than a strong work ethic and a fierce determination to succeed in the land of opportunity. He spoke no English when he started school, but within a few short months it became clear that he was enormously gifted intellectually. A scholarship to MIT followed, one of many awards, by the age of fourteen. He had a stellar career in academia before being head-hunted as an elite NASA scientist when he was thirty three years old.

Rama was popular to work with, not least because he made no fuss whatsoever when other colleagues stole his thunder and took credit for ninety percent of his successes. He appeared constitutionally unable to hold any grudges. Nevertheless, being acknowledged for only ten percent of his outstanding work still placed him head and shoulders above his peers as far as achievements and accolades went.

Another talent of his - for administrative excellence - soon became apparent in due course. Such sheer competence inexorably, almost inevitably, propelled him up the rungs of the hierarchy, culminating as Director of NASA two years ago at the age of forty one. In an unusual turn of events, his appointment as Director had

been unanimous. In the past, candidates chosen by the scientific panel were usually ill favoured by the bureaucrats, who were sick to death of brilliant but prickly Directors. The CIA had compiled a confidential dossier on Rama, describing him as “meek, docile, submissive and easily intimidated”. The administrators in Washington were therefore more than happy to have him put forward as the frontrunner candidate.

His greatest character flaw was being overly conscientious. He was also guilty of excessive humility.

A person’s choice of hero speaks volumes about that person himself.

Rama’s greatest hero of all time was - surprise, surprise - Mahatma Gandhi.

Twelve years after President Lance Boyle Sr retired from office, his son, Lance Jr was inaugurated to the White House in January 2065 following a controversial election. Junior’s background of drug abuse, spousal abuse and drunk driving convictions had been conveniently glossed over by the commercial media, lightly dismissed as youthful shenanigans. His history of failed business dealings, general ineptitude and borderline illiteracy were ignored. Limitless campaign funding for the elections had enabled the professional muck rakers to seek out every parking ticket Boyle’s challenger had ever received, every gaffe his opponent had ever uttered. These were seized with alacrity by the gutter press, whipped up and blown completely out of proportion in a vicious mudslinging campaign. Concerns of nepotism, bribery and voter intimidation by Junior’s team were raised by some, but, as his supporters claimed, “never proven”.

After the dust settled, most ordinary Americans were happy to just get on with business as usual and ignore the politics.

Junior was not exactly blessed with a full deck of cards. Most of his thought processes were confined to below waist level. His character comprised the worst elements of arrogance, incompetence and laziness.

He lacked his father’s facility for nimble oratory and tried to make up for this by raising the volume of his voice in debate, even though the contents of his arguments remained without

substance. *Newspeak*[™] magazine wrote that his modus operandi was to “*speak loudly and carry a small dick*”.

Lance Boyle Junior’s lacklustre performance in almost any endeavour invited various terms of derision from his opposition. “Lance-a-little” Boyle was one favourite - a play on his father’s old nickname of Lancelot Boyle. Another popular one was “Lance Pustule” - a pustule of course being a small boil.

Junior was also nasty, brutish and short. His greatest talent was the ability to fake sincerity. He had also developed the masterful capacity to adopt a serious, contemplative expression when being briefed by his advisers (especially when TV cameras were being trained upon him) even though not a single sensible thought was taking place behind that deeply furrowed brow.

A person’s choice of hero speaks volumes about that person himself.

Junior’s greatest hero of all time was - surprise, surprise - George W. Bush Jr.

Date: August 9, 2068

Location: The Oval Office of The White House

Dr S. Ramachandran had been flown to Washington D.C. from Florida by Air Force supersonic fighter jet to urgently brief President Lance Boyle Jr that same day.

“Mr President, the mission was a near miss,” were his opening words.

“What do you mean?” Boyle demanded.

“Asteroid *Vishnu* is hurtling towards us at a velocity of ten kilometres per *second*. An extremely difficult moving target. We nearly had a direct hit though.”

“I don’t like the sound of that,” Boyle expressed his displeasure. “‘*Nearly*’ don’t sound nearly good enough. Did you or didn’t you shift that rock?”

“Well the explosion broke it into a few pieces. One big piece and a few smaller pieces. Unfortunately the trajectory has not changed,” Rama explained.

“So it’s still going to hit us.”

“Yes Sir, and the impact will be undiminished,” Rama said.

“And what other options do we have?”

“We’ve pretty much run out of options, Mr President.”

“That’s not the answer I want to hear from you,” Boyle adopted his much practised grim faced look.

“The problem is that we found out too late,” Rama said.

“After the Near Earth Object surveillance program funding was cut by Congress five years ago we became dependent on amateur astronomers, lay enthusiasts. *Vishnu* was knocked out of the asteroid belt seventeen years ago and in that time swung around the Sun a few times to finally enter an Earth intersecting orbit. We only found out about its trajectory a year ago and it took us three months to send off the first mission.”

“The first joint mission with the Eurasians that tried to land on that asteroid and deflect it?” Boyle asked.

“Yes, and which failed as you know. The second joint mission tried to land on it and blow it apart and also failed. So we tried to use anti ballistic missile technology after that,” Rama said.

“Putting nukular warheads on space rockets,” Boyle added.

“But that hasn’t worked either,” Rama continued, “so we’ve pretty much run out of options.”

“How long do we have now?”

“One month to doomsday, Sir,” came the reply.

“Is there no hope for survival?”

“The kinetic energy of a twelve mile wide metallic asteroid is more than a billion atomic bombs,” Rama explained. “It’s bigger than the meteorite which killed the dinosaurs. Survival at impact site will be impossible, even if you could hide in a bunker twenty miles underground. Thousands of miles away, the seismic effect will still destroy everything. If it impacts in the sea it will throw up tsunamis thousands of feet high which will devastate cities well inland. Even if you are on the other side of the world and survive initial impact, there will be secondary fallout of molten re-entry ejecta which will ignite the atmosphere and burn all the world’s vegetation.

Worldwide forest fires, smoke, ash - the sun will be blocked out for months, even years. Plants which don’t burn will die from lack of light. Black smoke will then lead to a bitter wintry global cooling and when that clears there’ll be global warming from all the carbon dioxide in the air.”

“Sounds like hell on Earth,” Boyle commented.

“It gets worse. I have a personal theory about major asteroid impacts. We know they disrupt the Earth’s mantle. I believe shock waves travelling in opposite directions around the globe meet at the other side of the Earth, causing cracks in the crust and massive outpouring of lava, with release of more carbon dioxide. Kind of analogous to a blow to the head, where the contrecoup injury is actually more severe than the direct impact. I believe this greatly exacerbated the volcanic activity on the Deccan plateau after the KT asteroid hit the Yucatan sixty five million years ago. Runaway global warming caused by CO₂ from the global conflagration, combined with vigorous volcanic activity may be sufficient to melt the extensive methane hydrate deposits on the ocean floors which could prolong atmospheric warming to well over a century. This is what most likely occurred after the Permian extinction.”

Boyle did not understand the terms “contrecoup injury” or even “analogous”, much less know any of Rama’s geographic or epochal references. He had enough difficulty grasping the concept of global warming, which a handful of American scientists paid by the fossil fuel lobby continued to deny.

Rama continued. “All animals larger than probably the size of a small chicken will die. There will be mass extinctions of millions of species - probably ninety percent of all species. Cockroaches and rats will, I think, stand a good chance in the long run. Humanity is definitely done for.”

Boyle remained stony faced and silent for a couple of minutes. “So we’re done for. But what about the space colonies? Maybe in time they could return to repopulate the earth?”

“The space stations in Earth orbit are not sustainable. They depend on supplies from Earth and have enough to continue for eighteen months, maybe two years tops if they ration. The Eurasian Asteroid colonists however, by virtue of their distance from Earth, have had by necessity to become indefinitely sustainable and independent of supplies from Earth.”

Boyle pondered a while. “Are there any more rockets?” he then asked. “Anything left for a lucky few to escape?”

“We’re down to our last two launch vehicles. One will have to be for extra supplies to our space stations, it’s not configured for a manned crew. It has no life support system.”

“The other one?” Boyle asked.

“If we tweak things a bit we could cram in a small load of people. Ten average sized people. Maybe fifteen smallish people,” Rama explained.

“Nine billion people on the face of this Earth and hope for only a handful,” Boyle commented. “But even if we sent up ten or fifteen people to our space station, what would be the point, if they starved to death after a couple of years? Is there any way of travelling onwards to the Asteroid colony?”

“That may be possible, Sir. You may be aware that our old space station in orbit, the *Ticonderoga* was once an interplanetary vessel. It could probably be modified without too much difficulty to become sustainable for long distance travel again. But that ship can only carry six people. In order for all our personnel to travel on to the sustainable habitats, that will require other interplanetary spacecraft sent from the Asteroid colony to do a round trip. At this time we don’t have any other ships on Earth or in Earth orbit which can make that distance. Those asteroid miners have been able to construct new habitats and repair ships using asteroid materials over the past eighteen years.”

“Ships and habitats made from asteroids. The very thing that destroys us becomes our salvation. How’s that for irony?” Boyle remarked with an uncharacteristic flash of insight, rather pleased with himself.

“Yes, Mr President. But it’s also ironic that if we hadn’t sent the *Geronimo* out to the asteroid belt in the first place and caused an explosion seventeen years ago, Asteroid *Vishnu* would not have been knocked out of orbit and sent on a collision course for Earth.”

“Mah Daddy says that was the fault of those damned Chinks and their ten megatons of nukular explosive,” Boyle protested. “Anyway it’s all in the past now. So how do we choose these ten or fifteen people to be saved?”

“I don’t know Sir. It would be a cruel lottery. Perhaps the most talented or the smartest specimens of humanity by general consent. One month is not a long time to get organised.”

“I’ll discuss things with my Cabinet - we’ll hold an emergency meeting tonight,” Boyle said.

The next day

“First of all Rama,” Boyle began, “I want you to know that this was not my idea, not my idea at all. It was the Cabinet’s decision and as you know, in a democracy you have to go with the majority decision.”

“And that decision was...”

“The ten people to go up in the rocket, the ten people to be saved...they insisted I be included, being the President of the United States of America.”

“Sir, if you consider that to be inappropriate you can always refuse,” Rama suggested.

“Who am I to oppose the will of the people? It will be bad for morale if I don’t go. I will not abandon them in their time of need. Anyway, it’s sort of like, you know, if there was a nukular war I would be bundled into Airforce One with my team, flying in safe airspace till we reach that mountain in Colorado. Same principle. The privilege and duty of office,” Boyle explained.

“Do you have the list of names for me there, Sir?”

“Yes, here you go...”

The names on the list were:

Lance Boyle Jr, President of the United States

Lance Boyle Sr, former POTUS

Ronald Bumstead, Vice President (former Foreign Secretary)

Madeline (“Madguts”) Bowell, Secretary of State

Peter Dogowitz, Secretary of Defence (former Head of CIA)

*Ebenezer (“Scroogeface”) Bryce, National Security Adviser
(another former Head of CIA)*

Kenneth M. Besler, CEO of Energenron

Reuben Matlock, CEO of Newsmedia Company International

*Chuck Daney, CEO of Hallitosis Nuclear corporation**

and

*Candy Kincaid, assistant White House intern with big tits***

(The CEO of the Hallitosis Corporation never did become Vice President of America. Such a scenario would be too outlandishly unbelievable and corrupt, even in a completely ridiculous made-up story like this one*

*** Courtesy of Cow-Dorning Industries, manufacturers of fine silicone)*

Rama expressed surprise. “Young Candy Kincaid, the assistant intern, is that a mistake Sir? What about the First Lady?”

“The First Lady and I, we haven’t been getting on too well lately. But that’s beside the point. Poor Mrs Boyle, she don’t cope too good with jet travel and living in confined spaces. Going up in a rocket, that would be a fate worse than death for her.”

“So be it, Mr President, then death she shall have.”

“Fuck you, Ramachandran,” Boyle exclaimed, visibly pissed off. “I won’t stand for any of your smartmouthin’, do you hear me? This is the biggest crisis Mankind has ever faced and I expect you to do your duty until the very end. Anyway, the First Lady, she’s well past child bearing age. If we have to continue the human species we’ll need to include at least one healthy young woman on board.”

“Yes, Mr President, whatever you say Sir.”

“One more thing,” Boyle added. “I expect you to keep this project under wraps. Only NASA personnel are to be involved, none of the public must know about it, they just wouldn’t understand, you see. And you needn’t worry the First Lady about it either.”

“Your instructions are perfectly clear, Sir,” Rama acquiesced.

**THE THINGS THAT YOU'RE LIABLE, TO READ IN THE
BIBLE, IT AIN'T NECESSARILY SO**

(apologies to G. Gershwin)

Date: August 11, 2008

Location: A bar frequented by NASA employees after work

**Present: Fred Murphy, Senior Aerospace Engineer and S.
Ramachandran, Director of NASA**

CIA transcript of covertly monitored conversation:

Fred: Rama, I've been working my butt off for twenty five years as an aerospace engineer, and for what? For nothing. It's curtains for everyone in one month. I really don't see the point to anything right now. Doesn't it just piss you off? I mean, President Pustule and his cronies choosing themselves to go up in the spaceship and leaving the rest of us to die?

Rama: You don't understand, Fred.

Fred: It's all wrong if you ask me. It makes me sick to the stomach. Rama, if I were you, I would refuse to play ball. I would not cooperate. To hell with them. I mean, what's the worst they can do to us? Kill us? We're all going to die anyway.

Rama: As I recall, Fred, you have two sons and no daughters?

Fred: Yeah, that's right.

Rama: Then I cannot possibly explain the situation to you.

Fred: Huh? I don't see what that's got to do with anything... Look, Rama, you're the most patriotic American I have ever met, but this is beyond ridiculous. Do you think that being loyal to the President is the same thing as being loyal to your country? *It ain't necessarily so.* Hell, if the President and his self serving scumbags turn out to be the greatest traitors of all, then your loyalty to them will actually be a betrayal of your country. Just think about *that*, will you?

Rama: I will, Fred.

Fred: Sorry to go on about this, Rama, but it really gets my goat. To think that we are all about to die and that undeserving piece of human garbage Lance Pustule is going to live on.

Rama: “Human garbage”, that’s a little harsh, isn’t it?

Fred: You’re right, Rama, very harsh. Calling Pustule “human garbage” is an insult to garbage. I wouldn’t want to give garbage a bad name. It is offensive to garbage to be associated with Lance Pustule.

Rama: Be careful what you say, Fred, the barstools have ears. Maybe you’ve had a little too much to drink.

Fred: Rama, we’ve been coming to this bar for drinks after work every Friday evening for eight years and I’ve never once seen anything in your hand stronger than concentrated orange juice. How about going wild for a change and I’ll buy you a vodka martini or maybe just a beer?

Rama: Very kind of you Fred, but I guess I’m just a creature of habit.

Fred: Good old dependable, predictable Rama. You know, I’ve gotta say you’re the best boss I’ve ever had. Super dedicated. It’s been a real pleasure working with you and for you. And do you know why, Rama?

Rama: Please, Fred, this is embarrassing.

Fred: No, no, some things just have to be said. Especially now. It’s because of ability. You’re the smartest guy around and you work twice as hard as anybody and you make good decisions. That’s why we respect you and that’s why things run smoothly. But Lance Pustule, what the hell did he ever do to become President? He knows nothing except how to kiss the asses of those big business bastards who bought votes for him. He’s a mediocre boot licking

toady. And here *you* are, one of the most brilliant and capable guys in America and you have to answer to that pea brained nincompoop. The system is all totally screwed up if you ask me...

silence

...Well, I suppose you're going ahead with "operation save the President's butt" then?

Rama: They've given me unlimited resources and I have one month to plan the salvation of fifteen souls. It keeps me busy. It gives me something to do. It's better than just sitting around contemplating our extinction.

Fred: Well, my philosophy is fuck them and let's go out and enjoy ourselves. But I guess you have your own way of coping and good luck to you. As for me, I'm going to get drunk and get laid. And then get drunk again.

Rama: You have fun then, Fred. I'll be off now, got things to do.

Fred: See ya later Rama.

Aftermath

The next day, Fred Murphy was found dead with a sniper bullet in his brain. His body had been dumped on the sidewalk fronting a wine and liquor store called "*The Wrath of Grapes*".

Peter Dogowitz, Secretary of Defence and former Head of the CIA, personally telephoned Rama with a "regret to inform you" call.

Rama was shocked at the news. "So he was murdered in cold blood," Rama said. "Who did it?"

Dogowitz commiserated. "Believe me, Dr Rama, I share your pain. Do you know of anyone he might have offended recently? Anyone he might have upset?"

"I have my suspicions," Rama muttered under his breath.

Curiously, Dogowitz failed to follow up on Rama's intriguing comment.

"I must say, Secretary Dogowitz," Rama remarked, "I was surprised to receive this personal phone call from someone so senior as yourself, particularly as you and I have never met and we know nothing of each other."

"On the contrary," Dogowitz replied, "I know everything about you. We have detailed files. Let's just say that this call was a courtesy to you, to keep you informed of this important consequence."

"Consequence? What's that supposed to mean?" Rama asked, a little alarmed.

"Did I say consequence? My mistake, I meant to say occurrence. Very similar sounding words," Dogowitz replied.

No one likes to die before their time, even if it is only one month before their time. Rama was no exception.

"Your words sound like a veiled threat to me," Rama said. "Did the CIA have anything to do with Fred's murder?" he asked.

"I can neither confirm nor deny your suspicion," Dogowitz replied.

ICECUBES IN ROCKETS

Date: September 10, 2068

Location: Cape Canaveral

The party of VIPs gathered in the pre-flight change room in their underwear. Each had their own personal assistant to help them don their gear. As instructed, they had all showered, towelled down and removed all loose articles and detachable accessories such as rings, watches and jewellery. Including wigs. Standing about in the room were nine completely hairless individuals of indeterminate age and one young woman with platinum blonde hair and dark roots. A couple of exceptions had been made at the request, nay the insistence, of the President of the United States. Young Candy Kincaid had been permitted to wear her evening cocktail shoes with stiletto high heels, without which she would have felt “completely naked”. She had also been allowed to apply her usual generous layers of rouge, lipstick and eyeshadow.

The assistants brought out silvery jumpsuits and helped each of the VIPs ease into their space wear. The suits were eminently comfortable and designed to fit most body frames snugly with only minor adjustments of a few velcro straps here and there. Candy’s assistant did however have a little trouble zipping the suit up over her excessively bumpy frontage.

The group was assembled and ready to go.

Candy cried out in a whiny childlike voice to President Boyle, “Oh, Pookie, I’m so scared!”

Boyle Jr replied reassuringly, in a tone one whole octave lower than his usual voice, “Now don’t you worry creampuff, everything’s going to be all right. Good old Lance will take care of you. Think of it as a great big adventure. Come on, kiddo, it’ll be fun!”

“Oh Pookie,” Candy said, “I guess you’re right. It could be fun. I can always count on you to say the right things and to look after me.”

“You got it, baby,” Boyle Jr said, “stick with me and you’ll really go places.”

“Woo hoo!” Candy exclaimed. “To infinity and beyond!” she shouted, thrusting an arm into the air. “That’s a line from my all time favourite old movie, you know...”

When the party was ready they were escorted through enclosed corridors. All windows had been painted over to protect them from the prying eyes of the public and to maintain the confidentiality of this select group. They went up and down a number of elevators, then again through more enclosed corridors in what seemed an unending journey. Then more elevators. Their progress was hampered somewhat by the difficulty Candy had walking in her high heels. She stood a head taller than Boyle Jr and put a hand on his scalp from time to time to steady her balance. They finally arrived at an air bridge leading to the door of a space capsule. They stepped through the hatch one by one.

The Captain of the mission respectfully greeted each of his charges and guided them to their seats, personally supervising the fastening of their buckles and straps.

They were now ready for countdown.

“Just a minute, skipper,” Lance Boyle Jr said to the Captain. “Before we get going, there’s a call I really should make. It’s only polite.”

“Very well, Mr President,” the Captain said. “There’s a video screen in your armrest, just pull it out and I’ll patch you through.”

The President wanted to thank Ramachandran for all his efforts. He wasn’t about to abandon the good old Southern manners that his mammy had taught him as a boy.

“You know, Rama, I had my doubts about you earlier, but in the end you really came through, you really delivered the goods,” Boyle said. “You have the thanks of a grateful Nation and a grateful President for your dedicated service.”

Ramachandran wore a blank expression on his face as he looked back at Boyle on the videocom monitor. “Mr. President, you are much too kind. You have nothing to thank me for.”

Boyle erupted with an odd guffaw. “Aw heck Rama, I swear you’re gonna kill me with that famous modesty of yours.” He giggled hysterically a while more before settling down. “Oh, and by

the way,” Boyle added as an afterthought, “if things get too horrific after the asteroid hits, don’t forget those suicide pills we gave you.”

Rama stared back at Boyle on the video screen with his usual meek demeanour. He replied in a quiet mellow voice. “Yes, Mr President, that was very thoughtful of you Sir. Much appreciated Sir. Have a good trip.”

Countdown completed, an ear shattering roar enveloped the cabin accompanied by violent vibrations. The Captain turned around, surveyed the anxious faces of his passengers and reassured them. “Don’t worry folks, all part of normal operations. It’s all systems go. We have liftoff!”

And so it came to pass that on the day before the End of the World, a space rocket full of immensely important individuals cast off the surly bonds of Earth and hurtled through the air on its way to the International Space Station *Vigilance* in Earth orbit. To life and to a future.

The Captain of the space station *Vigilance* sat at his command post. He was in the process of receiving a videocom message.

“USS *Ark* to Space Station *Vigilance*. ETA 2315 hours UTC. Standby to receive the most precious passengers in the history of Mankind,” the voice coming from the control panel said.

“Roger *Ark*,” said Jim Cavanagh, the Captain of the Space station. “See you in thirty. *Vigilance* out.”

Docking occurred uneventfully and the Captain of the *Vigilance* positioned himself by the entry hatch ready to greet his very important visitors. He raised his hand in a salute as a crew member opened the hatch. “Welcome to the International Space Station *Vigilance*, Mr President,” Captain Cavanagh said.

The first visitor emerged, slowly floating into the cabin. She was a girl no older than sixteen with pink dyed hair and nose studs, wearing a denim jacket and ragged jeans. “Howdy, Cap’n,” she returned his salute.

Thereafter drifted in fourteen other young girls between the ages of twelve and seventeen. “Hey Boss,” said one. “Hiya,

Skipper,” said another. “How’s it goin’?” inquired another. And so it went.

Jim Cavanagh froze in his salute, stunned.

The Captain of the USS *Ark* emerged last of all. He was not the same man who had helped the President and his entourage into their space capsule.

“What the hell is going on, Jack? Where’s the President? Where’s the Cabinet? Where are the CEOs?” Cavanagh asked.

The Captain of the *Ark* handed Captain Cavanagh a datacard. “Jim, there’s a message on this datacard from Rama to you which will explain everything much better than I possibly can.”

Jim Cavanagh moved to the Captain’s chair at the bridge, inserted the datacard in a video player and watched Rama’s message contained therein:

“Dear Jim,

I imagine you’re a little surprised that the passengers I sent you were not the ones you expected. We go back a long way Jim, and I apologise for not including you in my confidence. Unfortunately, in order for us to pull this plan off, we needed to maintain absolute secrecy until the very end. I didn’t even plan to tell my wife Shanti that I was sending our Pushpa away until liftoff was confirmed.

In a way President Boyle himself should take credit for the idea. He said something before the mission which got me thinking. He said that to perpetuate the human species we would need to include at least one healthy young woman on the escape vessel. Well, just one healthy young woman was by no means sufficient to ensure the survival of humanity.

All the female crew presently working in space are accomplished professionals. Having dedicated many years of their lives to their careers, they are virtually all past childbearing age. I know fertility technology can allow older women to bear children, but you do not have the expertise up there and the failure rate is high anyway. For all we know, the cosmic radiation may have damaged their ovaries as well.

There have only been two extraterrestrial births so far, both males, hardly sufficient to keep humanity going.

Sending you a shipload of supercilious twits who would not contribute in any way to the space colonies would be, as you so delicately put it, like sending you a bunch of bloodsucking parasites to steal your air, water and food.

If however we could ensure the survival of a group of bright young girls, girls just around puberty, girls with many potential reproductive years ahead of them, that could well stack the survival cards in humanity's favour. But how could we go about choosing worthy candidates and how could we get them to you? Boyle and his cronies, being the self serving scumbags they are, would never agree to such a plan. We had to act covertly.

Jim, it would have been ideal if we could pick and choose worldwide for the healthiest and brightest young lasses, but that was not possible given the need for discretion and the lack of time. I will not pretend to you either that ensuring my Pushpa survived this Armageddon was not a motive of mine. Of course it was. What would I not sacrifice, what would I not do, to save the life of my only beloved daughter? And the same strong sentiments were shared by many of my NASA colleagues. To a man, every single NASA engineer I approached who had a daughter of similar age agreed to this plan. They all kept absolute confidentiality. They let nothing slip and maintained the tightest deception all the way.

I may be blinded by my views as a proud father, but I believe my Pushpa is one of the smartest and bravest young lasses in the world, the best seed for future human progeny possible. And the same is true of your other young charges, all daughters from good families with highly intelligent parents.

To ensure our plan worked, Boyle and his associates had to believe we were working completely in the service of their interests. That way they spared us no expense, workers or resources to make things happen. What they did not know was that we were going to send them up and down elevators and through a series of enclosed corridors leading to a ground based simulator. And that we were going to send our daughters up to you in the launch vehicle instead.

These girls now in your charge may be young, but they fully comprehend the gravity of this, humanity's greatest catastrophe, and they are old enough to understand their purpose. I know they will be safe in your care until the Asteroid colony ships

arrive to pick them up. They are the most precious passengers in the history of Mankind and I entrust them to you.

I remain, your good friend, Sabapathy Ramachandran.”

Maria Alvarez pressed a button on the remote control and the screen went blank. She sat in an armchair with her right arm around a six year old child seated on her lap. Pushpa sat on her left, with tears in her eyes. She held Maria's left hand. Liu stood behind Maria with his hands on her shoulders. His face had acquired a few more age lines over the years and he now wore a greying beard. They were in the dining cabin of the *Tsushima*. They had been watching Rama's message on the holographic screen.

The asteroid colony had sent five ships, including the Tsushima, to the Earth space stations to collect the survivors of Armageddon (each ship had been manned by two crew coming from the asteroid colony and these five ships picked up nineteen Earth survivors). The ship Ticonderoga in Earth orbit was in due course reconfigured for interplanetary travel and formed part of the six ship convoy leaving Earth orbit. This convoy carried twenty five Earth survivors and thirty five souls in total. Instead of returning to the asteroid belt, they travelled into Mars orbit to establish a new space colony. This was Liu Zhang's dream - to create a major human colony at the Mars L2 point, away from the meteor strikes of the asteroid belt and sheltered from solar flares behind Mars. Two biohabitats, Eden and Eden 3, were fitted with rockets to propel them from the asteroid belt towards Mars orbit in order to support the new colony. Liu, Maria, Adam and Lewis, their second son (who later came to be known as "Lew"), travelled within Eden. With six ships and two biohabitats now all located at Mars L2, there was much to be done. Maria took charge of the welfare of the fifteen young girls, of whom Pushpa was one.

Three ships and Eden 2, a eighty metre long biohabitat, remained in the asteroid belt. In due course, the asteroid colony would construct larger biohabitats and transport them to the Mars L2 colony to cater for a growing population.

Maria turned to the lass on her left. "Pushpa," she said, "always remember that your father was a great man. History will

record that Mankind's debt to him is beyond measure. In fact, I personally believe that his actions saved the human race from extinction. Future generations will revere him as a Grand Saviour."

"Thank you for your kind words, Maria," Pushpa said. "I miss him terribly. And the rest of my family."

"Well, you're part of *our* family now," Maria said.

"Whatever is ours is also yours. If you need someone to talk to, if you need a shoulder to cry on, here I am."

"You're a good friend, Maria," tears continued to stream down Pushpa's cheeks.

Liu remarked, "God, I would have given anything to see the look on the politicians' faces when they discovered they were in a ground simulator and not in the escape rocket. You know Maria, that funny term we use to describe self serving statements, '*icecubes*'?"

"Yes I remember," Maria replied, "the first day we met, from the conversation we had after we fixed the *Tsushima*'s reactor. I misheard you when you said '*Scubed*'."

"Well, we can also use the term '*icecubes*' to describe some types of people," Liu said. "Ramachandran said it in his speech. *Self Serving Scumbags*. They were a bunch of icecubes in a rocket."

"Yes," Maria said, "icecubes in a *phoney* rocket." Maria reflected a while. "Liu," she asked, "do you think the human race will ever learn from it's mistakes?"

"Who knows, Maria?" Liu pondered. "We can only hope."

Unfortunately, even as they spoke, another rocket full of icecubes was on its way to the space colonies.



APPENDIX #1: ANNOTATIONS

January 2005

Dear Reader,

Some readers felt, quite rightly, that the dialogue in the White House scene justifying the invasion of Burkino Faso (pages 18-28) was utterly ludicrous. Accordingly, I have collated references to show just how closely that ludicrous dialogue reflects the sad truth of the current American (and British) ruling regime(s). The profane language used by the American Presidents in other scenes was not a patch on the old Nixon tapes.

Page 24 paragraph 3: “Unfortunately the Good Lord didn’t see fit to put uranium only where there are democratic regimes friendly to the United States.”

“Defending Liberty in a Global Economy”, The Collateral Damage Conference, Cato Institute June 23, 1998:

“The good Lord didn't see fit to put oil and gas only where there are democratically elected regimes friendly to the United States. Occasionally we have to operate in places where, all things considered, one would not normally choose to go. But we go where the business is.” - Richard B. Cheney

Page 25 paragraph 3: “forty five minute alert”:

Financial Times, New York Times, Washington Post, 25 September 2002:

“British Prime Minister Tony Blair released a 50-page report claiming that Iraq could launch chemical warheads within 45 minutes, and that the country was one to five years away from having nuclear capabilities. Iraq emphatically denounced the report as false and again insisted that a new batch of UN inspectors would be given free access to all sites.”

“Do not use 45-minute claim, CIA told No 10”, The Guardian, Thursday July 31, 2003:

“The CIA objected to claims in the British government's September dossier on Iraq's banned weapons programme, the issue at the heart of the Kelly affair, it was revealed yesterday. It appears that among

the CIA's objections was the much-trumpeted claim that Iraqi forces could deploy chemical and biological weapons within 45 minutes of an order to do so. That claim was strongly challenged by David Kelly, the government's senior scientific adviser, and will be one of the issues at the heart of the Hutton judicial inquiry into the circumstances leading up to his death. The inquiry opens in London tomorrow. The 45 minutes claim was questioned by Dr Kelly, Whitehall's top adviser on chemical and biological weapons, both in conversations with BBC journalists and in evidence he gave to the foreign affairs committee on July 15, two days before he apparently killed himself. Dr Kelly, a former UN inspector in Iraq, told the committee that it 'would be very difficult to see how Iraq could deploy in 45 minutes'." - Richard Norton-Taylor and David Leigh

Page 25 paragraph 4: "mushroom cloud":

Cincinnati OH, 10 July 2002:

"...we cannot wait for the final proof, the smoking gun that could come in the form of a mushroom cloud..." - George W. Bush, in the buildup to the Iraqi invasion

Page 25 paragraph 5: "fifty thousand troops":

"Pentagon Contradicts General on Iraq Occupation Force's Size", New York Times, February 28, 2003:

"Mr. (Paul) Wolfowitz, the deputy defense secretary, opened a two-front war of words on Capitol Hill, calling the recent estimate by Gen. Eric K. Shinseki of the Army that several hundred thousand troops would be needed in postwar Iraq, 'wildly off the mark'. Pentagon officials have put the figure closer to 100,000 troops. At a Pentagon news conference with President Hamid Karzai of Afghanistan, Mr. Rumsfeld echoed his deputy's comments. Neither Mr. Rumsfeld nor Mr. Wolfowitz mentioned General Shinseki, the Army chief of staff, by name. But both men were clearly irritated at the general's suggestion that a postwar Iraq might require many more forces than the 100,000 American troops and the tens of thousands of allied forces that are also expected to join a reconstruction effort..." - Eric Schmitt

“U.S. Troop Level In Iraq To Grow: Will Be Extended for Elections”, Washington Post, Thursday, December 2, 2004:

“The Pentagon said yesterday that it will boost the number of U.S. troops in Iraq to about 150,000, the highest level since the U.S. occupation began 19 months ago... Some observers said the latest announcement indicates that the Pentagon is recognizing just how long the effort in Iraq may take. ‘This announcement makes it clear that commanders in Iraq need more troops and that this will be a long and very expensive process for the United States,’ said Sen. Jack Reed (D-R.I.), a member of the Armed Services Committee who recently returned from a visit to Iraq.” - Thomas E. Ricks

“War on the Cheap”, New York Times Editorial, December 20, 2004:

“From the earliest planning stages until now, the war in Iraq has been a tragic exercise in official incompetence. The original rationale for the war was wrong. The intelligence was wrong. The estimates of required troop strength were wrong. The war hawks' guesses about the response of the Iraqi people were wrong. The cost estimates were wrong, and on and on. Nevertheless the troops have fought valiantly, and the price paid by many has been horrific. They all deserve better than the bad faith and shoddy treatment they are receiving from the highest officials of their government...”

Page 25 paragraph 6: “ensure America’s energy security”:

From www.kryssstal.com/democracy_whyusa_iraq.html(2004):

“Dick Cheney used to head Halliburton (the world's biggest oil-services company worth \$18,200 million). From 1992 to 2004, Halliburton contributed \$1,600 million to politicians. It was a co-sponsor to a measure to open the Arctic National Wildlife Refuge to oil drilling and voted against the Clean Water Act which required industries to release their toxic emission records. Since 1998, Halliburton has completed \$24 million worth of repairs to Iraqi oil pipelines. Dick Cheney, [who was put in charge of the National Energy Policy Development Group], has stated that ‘energy security should be the priority of USA foreign policy’ (*National Energy Policy report 01-NEPD4*, May 2, 2001.)”

“Is energy independence an impossible goal?”, the New Yorker, October 11, 2004:

“In 1999, when Cheney was still at Halliburton, he gave a speech at London’s Institute of Petroleum in which he pointed out that by 2010 the world would probably need another fifty million barrels of oil a day. ‘So where is the oil going to come from?’ Cheney asked. ‘While many regions of the world offer great oil opportunities, the Middle East, with two-thirds of the world’s oil and the lowest cost, is still where the prize ultimately lies.’ - John Cassidy

Page 25 paragraph 7: “It all reminds me of September 11”:

Baltimore Sun, November 9, 1998:

“1975 Frank Church, then chairman of the Senate Intelligence Committee, concluded that the CIA, in a shadowy alliance with U.S. corporations, carried out ‘massive covert operations within a democratic state [Chile], with the ultimate effect of overthrowing [the] duly elected government’.” - Maurice Zeitlin

“U. S. Documents Confirm Destabilisation of Allende”, InterPress Service, 11 Sep 98:

“Nixon informed CIA Director Richard Helms that an Allende regime in Chile would not be acceptable to the United States and instructed the CIA to play a direct role in organizing a military coup d'etat in Chile to prevent Allende's accession to the Presidency.” - Jim Lobe

Page 26 paragraph 2: “what’s the point of having the strongest military if we don’t use it?”

From <http://archives.cnn.com/2001/US/01/10/albright.farewell/#4>:

“In 1993, Madeleine Albright, then U.S. ambassador to the United Nations said to Colin Powell, then Chairman of the Joint Chiefs of Staff (regarding sending troops to Bosnia), ‘What's the point in having this superb military you are always talking about if we can't use it?’

In his 1995 book, Powell said of the incident: ‘I thought I would have an aneurysm. American GIs were not toy soldiers to be moved around on some sort of global game board.’”

Other memorable quotes from Ms. Albright:

Television interview, "60 Minutes", May 12, 1996:

Lesley Stahl, speaking of US sanctions against Iraq: "We have heard that a half million children have died. I mean, that's more children than died in Hiroshima. And...and you know, is the price worth it?"

Madeleine Albright: "I think this is a very hard choice, but the price...we think the price is worth it."

Washington Post, April 23, 1997, p.4:

Asked if it is not hypocritical to punish Burma for human rights violations while refraining from sanctions on China for similar, Albright replied, "We have consistent principles and flexible tactics".

Page 26 paragraph 6: "Our preemptive policy justifies action on the basis of assertions which we don't know that we don't know."

Department of Defense News Briefing, February 12, 2002:

"...as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns - the ones we don't know we don't know..." – Donald Rumsfeld, US Secretary of Defense

Page 26 last paragraph: "Repeat a lie often enough and people will eventually swallow it...The fact that I own so many different news vehicles gives people the impression that they are receiving information from lots of independent sources."

Readers' letters, The Nation, 6 May 1996:

"...two of the principles established (in 1940) by the Nazi propagandist Dr Joseph Goebbels himself: firstly, that if you repeat a simple lie often enough, it will eventually be believed; secondly, that you must never be seen to initiate the lie in your own journals, but always plant it somewhere else. Goebbels would start his lies in, for example, the ostensibly neutral wartime *Svenska Dagbladet*, and then 'quote' it as coming from that source..." - David Irving, author of "*Goebbels: Mastermind of the Third Reich*"

Page 27 paragraph 5: “Counting civilian deaths brings us bad publicity. We don’t do it.”

The Guardian, 29 October 2004:

“About 100,000 Iraqi civilians - half of them women and children - have died in Iraq since the (American) invasion, mostly as a result of air strikes by coalition forces, according to the first reliable study of the death toll from Iraqi and US public health experts. The study, which was carried out in 33 randomly-chosen neighbourhoods of Iraq representative of the entire population, shows that violence is now the leading cause of death in Iraq. Before the invasion, most people died of heart attacks, stroke and chronic illness. The risk of a violent death is now 58 times higher than it was before the invasion. Last night the *Lancet* medical journal fast-tracked the survey to publication on its website after rapid, but extensive peer review and editing because, said *Lancet* editor Richard Horton, “of its importance to the evolving security situation in Iraq”. But the findings raised important questions also for the governments of the United States and Britain who, said Dr Horton in a commentary, ‘must have considered the likely effects of their actions for civilians.’” - Sarah Boseley, health editor

Page 28 mid page: “People are either with us or against us in this crusade...”

Press conference September 16, 2001:

(www.whitehouse.gov/news/releases/2001/09/20010916-2.html)

“...this crusade, this war on terrorism...” - George W. Bush

6 Nov 2001: “You're either with us or against us in the fight against terror.” – George W. Bush

24 June 2002: “I've said in the past that nations are either with us or against us in the war on terror.” - Bush yet again

“You Scare Us - Bush is Giving Latin America the Willies”, Los Angeles Times, Sunday, September 26, 2004:

“What is alarming about the Bush administration is its formal denunciation of the basic rules of international intercourse. With us or against us, President Bush declares starkly and simplistically. The U.S. acts according to its own interests, ‘not those of an illusory

international community,' asserts national security advisor Condoleezza Rice." - Carlos Fuentes

Page 160 last paragraph: "I don't care what the facts are. I will never apologise for the United States of America."

On July 3, 1988 the American Navy guided missile cruiser USS Vincennes shot down an Iranian commercial airliner. All 290 civilian people in the aircraft were killed. The plane was on a routine flight in a commercial corridor in Iranian airspace.

"I will never apologize for the United States of America - I don't care what the facts are." - President George Bush Sr, commented in response to that incident.

Page 185 bottom of page: "The French have no phrase for 'Laissez-Faire'"

Washington Post, Wednesday, July 10, 2002; Page C03:

"...liberal politician Shirley Williams recounted to an audience in Brighton that 'my good friend Tony Blair' told her the following anecdote: 'Blair, Bush and [French President] Jacques Chirac were discussing economics and, in particular, the decline of the French economy. 'The problem with the French,' Bush confided to Blair, 'is that they don't have a word for *entrepreneur*.'"

– Lloyd Grove, Staff Writer

Webster's New Collegiate Dictionary states the noun "*entrepreneur*" originates from the French word *entreprendre*, which means "to undertake".

Page 186 top of page: "...Ronald Bumstead, the future US Foreign Secretary, called us 'washed out old Europe'."

BBC News, Thursday, 23 January 2003

(<http://news.bbc.co.uk/1/hi/world/europe/2687403.stm>):

"French and German leaders have reacted angrily to comments by the US Defence Secretary Donald Rumsfeld describing the two countries as 'problems' in the crisis over Iraq. French Finance Minister Francis Mer said he was 'profoundly vexed' by Mr Rumsfeld's remarks - which branded France and Germany 'old Europe' - while a former employment minister described the US as arrogant. German Foreign Minister Joschka Fischer said that the word 'problem' was inappropriate."

APPENDIX #2: THE SCIENCE AND MATHEMATICS OF THE STORY

Asteroid extinction - Survival strategies

There is now overwhelming evidence to support the asteroid impact theory of global mass extinction which was first advanced by the father and son team of Luis and Walter Alvarez. What was originally considered an outrageous hypothesis has achieved mainstream scientific acceptance. Certainly the Cretaceous-Tertiary and possibly the (more severe) Permian extinctions were consequences of large asteroid impacts.

The celebrated Harvard biologist Edward O. Wilson in his book '*The Future of Life*' stated that more than ninety nine percent of all species that have ever existed are now extinct. Thus very probably, Mankind too will pass into oblivion, whether by our own hand or in the natural course of events. Holistic philosophers may argue that the obliteration of humanity may be the best outcome for this besieged world of ours, polluted and ravaged by our misdeeds. Especially if we are the main cause of the runaway extinctions occurring in the world today. The majority of people will however decry the prospect of our annihilation and will no doubt expect our leaders and scientists to take measures to ensure the survival of our species. There are two ways to achieve this. The most obvious is the detection, then deflection or destruction of a potential impact asteroid, as has been advocated by some and even dramatised in populist movies. What are the chances such a strategy will work? We cannot be certain it will. Indeed, for a number of reasons, failure may be more likely than success. This much is certain: if such a strategy fails, we are done for.

The contingency plan of sustainable space habitats which I described in this novel will, if successful, guarantee at least some human survivors, hopefully enough to eventually repopulate the Earth after the biosphere regenerates. Surely it is worth consideration.

Population strategies

If only a small core group of individuals were to survive global Armageddon, the human species will remain endangered until and unless population numbers can be sufficiently increased and survivors can be distributed between different habitats to hedge our

bets. Needless to say, it makes sense to select for high quality for-bears with intelligence and drive, to advance and enhance future human existence. Logic dictates we choose a group of healthy bright young females with maximum reproductive longevity as the first generation of mothers. Let us presume fifteen such young women, starting from an age of about 17 years, have one child every 2 years to an average of 7 children each, till each mother is about 31 years old. In order to maximise numbers in subsequent generations, we must also ensure that all of their offspring are female. If each of these daughters in turn have, say an average of 7 daughters each and even allowing for an average age of death of the proverbial three score and ten, there will be more than 6,000 human souls after 60 years. I am indebted to Mark for help with the calculations:

Age groups	0-17	18-35	36-53	>53
Year 0	15	0	0	0
Year 17	105	15	0	0
Year 35	735	105	15	0
Year 53	5145	735	105	15
Year 71	36015	5145	735	105
Year 89	252105	36015	5145	735

For reasons mentioned in the story, artificial insemination must by necessity eventually give way to natural reproduction with equalisation of the gender ratio to facilitate optimal genetic diversity in the long term. Subsequent doubling of the population every 40 years equates to a mere 1.7% per annum increase in population.

The improbable and implausible

Using the gravitational slingshot effect around Mars may or may not be the best or fastest means of travelling to the asteroid belt, depending on where exactly in the asteroid belt one is headed. The UCLA Dawn mission scheduled for 2006 to send an unmanned probe to the asteroids Vesta and Ceres will take 4 years to reach Vesta. For purposes of this novel I specified a travel duration of about 14 months each way between Earth and the Asteroid belt. Presumably with the advent of more powerful ion drives, such rapid transit times may become reality.

The likelihood that one particular explosion in the asteroid belt may send one particular rock careening away on a course eventually bound for Earth is of course minuscule.

The likelihood that any random asteroid will eventually hit the Earth resulting in mass extinction in the indeterminate future is certain. It has happened before and it will happen again. It is only a matter of when.

Value of metallic asteroids

From the Internet: www.Matter-AntiMatter.com

The near Earth Asteroid 3554 Amun is two kilometres in diameter and is about the size of a typical open-pit mine. It has a mass of thirty billion (30,000,000,000) metric tons. Assuming the composition of a typical iron meteorite, the following metals could be obtained:

\$8 Trillion Iron and Nickel

\$6 Trillion Cobalt

\$6 Trillion Platinum Group including: platinum, osmium, iridium, palladium, etc

\$20 Trillion Total Market Value based upon values on earth

This is a small asteroid. There are millions of asteroids that can be mined.

Mixture of units

Purists may decry my hodgepodge use of both imperial and metric units at different times in the story. Not only do I claim poetic licence, I assert that this routinely occurs in real life practical situations. Aviators regularly measure height in feet, distance in nautical miles, atmospheric pressure in millibars and fuel volume in litres with no difficulty whatsoever.

Organic plastics

Some uninformed people may take exception to my description of plastics as organic products.

We should vigorously oppose those who attempt to pervert the meaning and precision of words because of their ignorance or because they wish to promote their own self serving agenda. I am particularly outraged by the (unfortunately largely successful) man-

oeuvre by the gambling industry to replace the word "gambling" with the contrived term "gaming". Resist with all your might!!

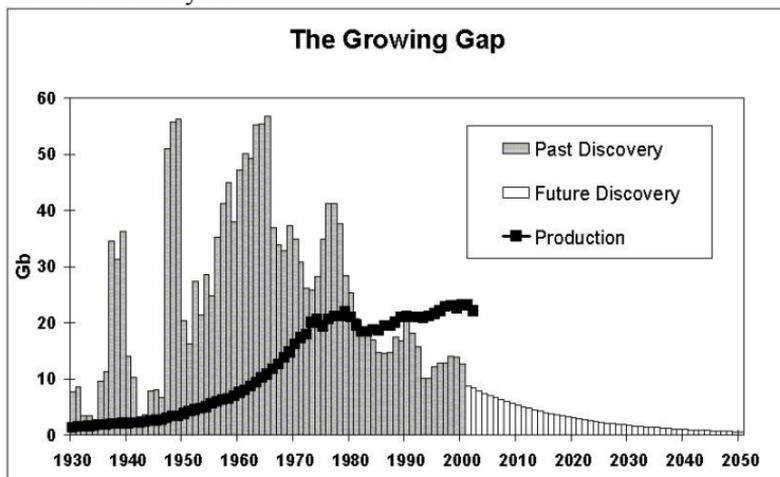
The *Collins* reference dictionary defines the term "organic" as "derived from living organisms" or "of compounds formed from carbon". New Age wierdos, homeopaths and naturopaths who try to equate the term "organic" with "natural" or "healthy" should be condemned for their disingenuous attempts to redefine this word to suit themselves. They may argue that plastics should not be described as organic because plastics are not "natural". Unfortunately such silliness has infiltrated itself into popular consciousness, to the extent that one manufacturer of bottled drinking water has chosen to market it as "*Organic*" water in an attempt to capture silly consumers who equate "organic" with healthy. Personally I prefer my drinking water to be as inorganic as possible, because the most likely organic substances to be found in water are *E. Coli* and faecal matter.



But if some people prefer to drink shit, that's their business.

APPENDIX #3: "Better paradigms for our energy futures: From fossil fuels to *phytofuels* to *photofuels*"

Back in the 1950s, a geophysicist named M. King Hubbert predicted that peak *American* oil production would occur in the early 1970s. He was proven absolutely correct. Since then, there has been a relentless decline in flow from the US oilwells - which now represents just 3% of world reserves. Numerous scientists applying Dr. Hubbert's analytical techniques have since determined that *World* peak petroleum production, the eponymous "*Hubbert Peak*", will be reached before 2010 and indeed may well have been passed by now. Given the mature state of the geological sciences, it is virtually certain that all reserves of easily extractable petroleum have already been identified – that no more exist. Smaller discoveries will continue to be made, in ever more inaccessible areas, but it is all downhill from now on as far as total oil production is concerned. It has been estimated that conventional petroleum will be depleted within 30 to 40 years¹.



Graph by: Dr. Colin J. Campbell, Oil Depletion Analysis Centre, London

Thus we can expect an inevitable reduction of oil output from now on, even as there is a worldwide burgeoning demand for petroleum, particularly from the rapidly developing countries such as China and India. At the same time, America, representing less than 5% of the World's population, continues to consume 25% of all

petroleum and remains the largest producer of carbon emissions, while officially casting doubt on the existence and/or importance of global warming. Political measures by the American automobile and oil companies to heavily artificially subsidise gasoline for their consumers, coupled with perverse government incentives to popularise gas guzzling vehicles such as SUVs (sports utility vehicles) serve to exacerbate a looming global crisis², while America defiantly cocks a snook at the rest of the world.

Wars have been and are being fought over petroleum. The Japanese assert that Pearl Harbour was provoked by the American threat to cut off their oil³.

What was the real reason for America's invasion of Iraq? It is now clear it had nothing to do with Al Queda or terrorism, nothing to do with weapons of mass destruction, nothing to do with liberating people from a brutal dictator and nothing to do with creating a better, safer life for the average Iraqi⁴. (As of October 2004, the average Iraqi faced a 58 fold higher risk of violent death under American administration compared to when Saddam Hussein was in power⁵).

There is no doubt the US invasion of Iraq was primarily related to America's sense of entitlement for "energy security" and continued access to cheap oil; their belief in their God-given right to the profligate consumption of petroleum irrespective of future global consequences^{2,6}. Of course, the Republican neoconservatives will never admit to this – to do so will prove them to be the duplicitous morally bankrupt thugs they are.

The only connection between September 11, 2001 (in which fifteen of the nineteen airline hijackers were Saudi Arabian Nationals⁷) and the US invasion of Iraq was the realisation by America that their continued access to cheap Saudi Arabian oil was far more precarious than they had hitherto suspected. The Saudi Royal family are holding on to power by a thread and are deeply resented by the Saudi populace – they are perceived by many common Saudis as a corrupt self serving regime propped up by American self interest^{8,9}.

Loss of access to cheap oil from Saudi Arabia, the country with the largest reserves in the world, was and is unacceptable to America. So how best to hedge their bets? Secure a supply from the country with the second largest reserves – Iraq.

Senator John Kerry, the Democratic presidential candidate in the 2004 US election campaign, highlighted energy independence and the pursuit of alternative (non-fossil fuel) energy sources as crucial issues, which was tantamount to admitting that the Iraqi invasion was all about oil.

At the Democratic Convention in July, Kerry said in his speech: *“I want an America that relies on its own ingenuity and innovation—not on the Saudi royal family...and our energy plan for a stronger America will invest in new technologies and alternative fuels and the cars of the future—so that no young American in uniform will ever be held hostage to our dependence on oil from the Middle East.”*².

He failed in his presidential bid, suggesting to me at least, that the average American couldn't care less about such matters.

Bush's agenda however involves the use of more fossil fuels, including a controversial proposal to begin drilling for oil in the Arctic National Wildlife Refuge².

Australia is equally culpable and delinquent in supporting and emulating America's disingenuous policies. Our two nations alone remain defiant among developed nations in their refusal to sign the Kyoto protocol, now that Russia has become a signatory¹⁰.

Surely globalisation of trade and profit opportunities also require that responsibilities for a sustainable future and for environmental conservation are shared globally. Surely it is reasonable to expect that the nations which are the highest per capita consumers of fossil fuels (and the worst per capita polluters) ought to bear the greatest responsibilities.

What scenarios may we anticipate for our energy futures? Many paradigms have been advocated.

What is clearly unacceptable however, is adoption of the American strategy of denial of scientific evidence, perverse incentives to encourage ongoing profligate oil consumption and unconscionable pollution, and illegitimate invasion of other countries to ensure one's own “energy security”. Emulation of such despicable behaviour by other major powers will inevitably lead to wars over future energy resources¹¹. There must be a better way.

Here is one suggestion: we should invest in scum. Confused? Read on and all will be revealed.

Advantages and disadvantages of the various energy sources

Nuclear fission looked very promising in the past (before the Three Mile Island and Chernobyl disasters and concerns about terrorism) and provides a large proportion of energy for some countries such as France and Korea¹². In the short term, it appeared to be non polluting. Unfortunately, radioactive plutonium is a very toxic substance. A single speck of plutonium dust has the potential to cause lung cancer in an individual who inhales it^{13,14}. The effects of radioactive caesium and iodine entering the food chain are well known. The use of so-called "depleted" uranium warheads in Iraq has been associated with numerous adverse health effects in children and others^{15,16}, despite denials by the US government¹⁷.

Clearly however, an option such as nuclear fission which allows a State with few alternative sources to be less dependent on oil and which has a "petroleum sparing" effect will continue to remain attractive, despite the thorny unresolved issues of disposal of nuclear waste and decommissioning of old nuclear plants (which may end up being encased in concrete and cordoned off for decades at great expense). Furthermore there is potential for the acquisition of materials by rogue states or terrorists for bomb building or just making "dirty" conventional bombs to spread radioactive dust.

Renewable sources of energy such as photovoltaic, wind, geothermal, hydroelectric or tidal energy are tremendously appealing, but are applicable only to specific geographic areas and often with wide fluctuations in availability.

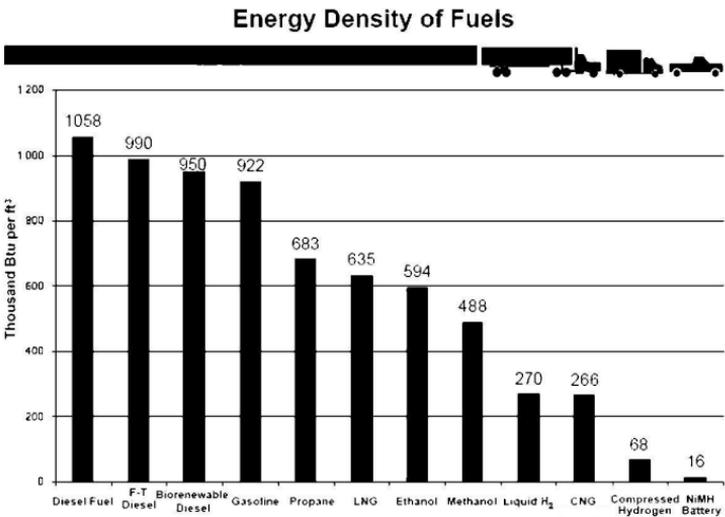
The drawbacks of the **fossil fuels** are well known: carbon emissions, the greenhouse effect and global warming, pollution by impurities or additives (sulphur dioxide, lead compounds), acid rain and especially the fact that they are a non renewable resource.

Petroleum products continue to be an indispensable source of energy for the transport industry and there are good reasons for this. Apart from the economic reasons, **oil based fuels are a near ideal chemical energy source** for the following reasons:

1. **High energy density:** Biochemically, fats and oils are the most concentrated sources of energy per unit weight or volume. For instance, the calorific value of fats and oils is 9kcal/g as compared with 4kcal/g for either carbohydrates or proteins and

7kcal/g for ethanol¹⁸. With regard to transport/industrial fuels, energy density (by energy per unit volume in btu/cubic foot) is highest for diesel at 1058, similar for biodiesel and gasoline at 950 and 922 respectively, lower for propane and liquid natural gas at 683 and 635 respectively, even lower for ethanol and methanol at 594 and 488 respectively, much lower for liquid hydrogen at 270 and pathetically poor for compressed hydrogen at 68¹⁹.

Liquid hydrogen may well be the most energy dense in terms of energy per unit weight (and thus suitable for rocket propulsion), however to enable the same performance and range for more mundane vehicles such as cars or trucks, fuel tanks almost four times larger than normal diesel tanks will be required. This will of course represent loss of revenue cargo space and the larger pressurised tanks will also represent additional non cargo weight to be carried about.



Graph by: Dr James J Eberhardt, "Fuels for the future for cars and trucks", US Department of energy 2002

- Advantages of the liquid medium:** Gaseous fuels e.g. Compressed natural gas or methane have low energy densities (per unit volume) and are difficult and bulky to transport and

contain, requiring pressurised containers. Solid fuels cannot be readily atomised to produce an air-fuel mixture to power internal combustion or jet engines. Liquid fuels (ie. Fuels which are liquid at normal temperatures and pressures) overcome both disadvantages, with the added benefit that they can take on the shape of any container (unlike solid fuels) such as the wing tanks of aircraft, resulting in space optimisation. The ideal fuel will remain liquid at extremes of temperature, even the sub zero Antarctic or the scorching Sahara.

3. **Transportability and storage:** For electricity to be distributed, power lines, pylons and cables need to be set up and transformers/substations built. The electricity will be available only at fixed outlets and needs to be consumed directly. Petroleum products can be transported to any site unrestricted by fixed lines of delivery and can be stored for future utilisation at any date.
4. **Aviation:** There is no energy source at present which is superior to or can effectively substitute for petroleum products for aviation. Nuclear, hydroelectric, wind and geothermal power may generate electricity, but how may this electricity be stored on an aircraft and produce power to match that of a jet engine? Expensive hydrogen powered space rockets and experimental planes exist but we have no precedent for a practical hydrogen powered commercial transport plane. Furthermore, hydrogen combustion planes will produce water vapour which, although probably innocuous at ground level represents a potent greenhouse gas when expelled into the upper atmosphere and will exacerbate global warming²⁰. Without petroleum, the entire air transport industry will grind to a halt. One may conceive of alcohol or LPG powered planes, but again, due to the lower energy density of these fuels or bulky storage containers, the performance and range of such aircraft will be inferior.

Interim measures

What measures should we take now to minimise the shock of the upcoming oil crisis? Conservation will go a long way to delay the

inevitable oil shortages. Co-generation (burning waste to produce heat and electricity), better building construction (insulation, reflective glass etc.), more efficient engines, hybrid engines, use of alternative energy sources to "spare" petroleum and so forth will help.

It has been estimated that "*if the United States became as energy-efficient as Germany, it would consume 50 percent less energy, a reduction equivalent to more than twice the level of U.S. Imports of Saudi oil.*"⁹

When the present oil fields run dry, there are other means of obtaining oil (from "non conventional sources"): from oil shale or oil sands, or by injecting detergents into previously tapped oil wells, or by synthesising oil from coal or natural gas. These methods exist now but are little utilised being generally not cost competitive with good old crude.

But here is the other problem: in doing our utmost to extricate every last bit of energy from all the corpses of organisms accumulated underground over the past billion years, we will also ensure that every last bit of the carbon locked up in these fossils will have been released into the atmosphere.

No reasonable person these days can deny the truth of global warming or that it is the result of human activities^{21,22}.

There is merit to the idea of trading in carbon credits²³, now an approaching reality since the Kyoto Protocol was ratified. Pumping carbon dioxide underground into "carbon sinks" has been advocated²⁴. To me, this sounds like sweeping a problem under the carpet and is a diversion, a red herring – not a solution. There is no guarantee that the carbon dioxide will not leak out into the atmosphere eventually.

The above are all just temporising measures however. After that, notwithstanding any breakthrough, air travel will all but disappear. Some might say the return to an agrarian lifestyle is the way to go²⁵. This is unlikely to be acceptable to the majority of people used to a high standard of living. Furthermore, in a world of 6 billion people (possibly 9 billion by mid century), it will be impossible to revert to low productivity agricultural economies without mass starvation.

The nuclear fusion / hydrogen scenario

Let me now outline the future energy scenario that many Physicists and some politicians will have us believe in – it is a big money scheme, and we're talking trillions of dollars:

A few (?ten ?fifty) years from now there is a major breakthrough in fusion research (research which has already cost multiple billions to date) and electricity becomes laughably plentiful and essentially inexhaustible. So powering our cities and many industries is no longer a problem and it is all pollution free.

What of transportation? Over land, the electric vehicle will come into its own, whether by road or rail. Sea transport is a little trickier as it is unlikely that fusion generators (?Tokomaks) may be reduced to a size that even a super tanker could contain in the near future, and even if they could, it may not be cost effective. Independent fusion units would certainly be out of the question for small craft. The need for a new aviation fuel will still remain and will not be solved by abundant electricity.

The answer to these issues, we are told, is hydrogen, derived from the electrolysis of water. And hydrogen is so wonderful because when you burn it (or utilise it in a fuel cell), all you get is nothing more than water again – no pollution. Thus we will have hydrogen powered ships and jet aircraft. The only problem is, this will entail the complete redesign of current fuel storage, transportation and distribution facilities around the world, not to mention new engines and tanks on all these craft. Can liquid hydrogen be transported across thousands of miles by pipeline as oil is currently being done? Liquid hydrogen would be immensely more difficult to store and handle than current petroleum based fuels. Bulky pressurised and heavily insulated hermetic tanks will be necessary. Precautions must be taken in handling this intensely cold commodity, cryogenic technology must be introduced.

Another major problem will be the inevitable "boil off" of liquid hydrogen if stored for any length of time, which will represent a large waste and be dangerous if occurring in an enclosed environment (hydrogen is the smallest atom and thus the easiest to leak out of containers). The potential for accidents will be ever present, hydrogen being more volatile than many petroleum products (for instance – throw a burning match into a pool of cold kerosene or

diesel and what do you get? An extinguished match.) The image of the burning Hindenburg may not be a fair one to conjure up but it is an inevitable one.

What if I were in the middle of a desert at night, or in a boat in the middle of the sea at night, and needed an energy source to run my generator or tractor or boat engine? Diesel or petrol are very convenient for this and it is difficult to conceive how hydrogen could supplant these fuels in small scale geographically isolated situations. Direct solar or wind generated electricity cannot provide sufficient power for many tasks.

In any case, the Holy Grail of fusion energy remains an unattainable illusion for now and the foreseeable future. As the joke goes, fusion energy is just forty years away from us – and always will be²⁶.

Better paradigms

There are more practical energy sources and technologies which are available right here and now. These sources are sustainable and renewable and do not result in a net increase of carbon dioxide in the atmosphere. Collectively we term this “biomass energy”.

What do I mean by “do not result in a net increase of carbon dioxide in the atmosphere”? Surely when one burns a piece of wood, carbon dioxide is released? The answer is simple: so long as a new tree is planted for every equivalent mass of wood burnt, there is no net increase in atmospheric carbon dioxide, as the growing tree will lock atmospheric carbon into its mass again. This is the attraction of all biomass energy provided we replenish everything we burn.

Is biomass energy just a fancy term for cow dung and wood and other organic matter which humans have used throughout history anyway? If so, what is the big deal?

New approaches to biomass energy were introduced last century. Small scale methane-from-sewage projects are now widespread throughout China and India. One of the most ambitious schemes is the Brazilian National Alcohol Programme where sugar cane is used to produce ethanol which, alone or mixed with gasoline has gone a long way to reduce their dependency on petroleum. Ethanol in Brazil now sells for about 60-70% of the cost of petrol in the free market²⁷.

Other strategies to convert wood and plant waste to usable hydrocarbon fuels, whether aqueous (fermentation, chemical reduction) or thermochemical (pyrolysis, gasification, hydrogasification) have not proved to be practical or viable on a large scale.

Nevertheless, I believe modern methods can allow biomass energy to substitute for petroleum based fuels, including aviation fuels. This has already been done in a limited manner.

Towards the end of World War Two when the Japanese ran out of oil, they resorted to pine resin to power their fighter planes for some missions. It worked to a degree although the engines tended to gum up²⁸. Few would be surprised with the suggestion that good old turpentine can be used as a fuel. Rudolf Diesel himself wrote in 1911 that “the diesel engine can be fed with vegetable oil”, a fact proven time and again at various times and places. Tractors were run on sunflower oil in South Africa many decades ago. During World War Two the Chinese developed an industrial process for cracking vegetable oils and turning them into motor fuels which did not clog engines²⁹.

Nowadays biodiesel is no longer considered experimental and is available at many roadside bowsters in Europe for use in ordinary diesel vehicles with minimal engine modification (the Germans are particularly far sighted in this respect). Techniques have now advanced to the stage that private individuals can utilise kitchen-chemistry kits to convert their waste cooking oil to biodiesel to power their family cars. The exhaust apparently smells faintly of – French fries!³⁰

Modern diesel powered piston aviation engines may well replace avgas (leaded petrol) powered piston engines for light aircraft in the next few years for many practical reasons. (The Morane Renault company has been one pioneer in this respect).

Diesel fuel is physically and chemically very similar to kerosene which is, of course, none other than jet fuel.

Let us now summarise the characteristics of the ideal fuel. It should have all the advantages of petroleum based oils i.e. Have a high energy density, be a liquid over a wide range of ambient temperatures and it (or its derivatives) should be a viable aviation fuel. It should have none of the disadvantages of fossil fuels i.e. It should be renewable, should not add to the net carbon dioxide load

in the atmosphere and it should be minimally polluting. It should have none of the handling disadvantages of liquid hydrogen – which it will not if it has the physical characteristics of petroleum based oils.

It should also have a minimal environmental impact in the event of a spill or leak and should be biodegradable. Additionally, it should be non-toxic. Some hydrocarbon based fuels are quite poisonous e.g. Methanol can induce metabolic acidosis and blindness and benzene is carcinogenic. Even diesel emissions contain carcinogenic polycyclic aromatic hydrocarbons (far less in biodiesel emissions). A major bonus would be if this fuel could be used in existing engines with no or minimal modification.

Now we come to the speculative, perhaps controversial part. I believe it is possible for us to create the ideal (or near ideal) fuel with existing technology.

Virtually all the chemical energy we use today is ultimately derived, directly or indirectly, from the photosynthetic process, and this is where I believe our efforts must be concentrated.

The question is, what is the most direct and most cost effective way of converting sunlight into liquid hydrocarbons (preferably oil, although alcohol is also useful) rapidly and in volume?

Phytofuels

In the first instance we should strive to produce a plant derived oil – what I term a "*phytofuel*". The biggest obstacles to its development are economic and political. It will need to be price competitive with petroleum based oils and be able to meet current and future demands i.e. Will have to be produced cheaply on a large scale.

Growing sugar cane then converting it to alcohol (which has a lower energy density than oil) is a two stage process. Furthermore there is opportunity cost in that cane fields can be used for growing other crops, and sugar itself is a worthwhile commodity whose value may exceed that of the alcohol produced, depending on market circumstances. Similar issues hold for the vegetable oils, in that there is opportunity cost in the land utilisation and the oils themselves are useful commodities in non-fuel applications. The same applies to pine oils. Additionally, much of the solar energy,

water and nutrients consumed during the growth of these crops goes into the formation of roots, stems or other plant parts which we are not primarily be interested in. This brings us to the **characteristics of the ideal fuel crop**.

The ideal fuel crop should:

1. Grow rapidly and be harvested easily.
2. Utilise land (or even lake or marine areas) not otherwise useful for other purposes.
3. Efficiently convert sunlight, water, CO₂ and nutrients to the end product i.e. Oil, with minimal diversion of energy into the formation of other plant parts. In the extreme situation, such a plant would consist of little more than chloroplasts and oil producing organelles surrounded by a cell membrane – namely, an algal species.
4. Not require significant extraneous application of fertilisers. For example, perhaps the nitrogen fixation ability of legumes can be spliced into the genome of the oil crop.
5. If fresh water is in short supply, be able to use sea or brackish or artesian water.
6. Should it inadvertently escape the confines of the "fuel farms" it should not proliferate rampantly and pose an ecological hazard. Perhaps a self destruct sequence could be built into its genes or it could be engineered to require an essential nutrient not normally found in the greater environment.

One inescapable criterion, however, will be that such a crop will require lots of sunshine. Perhaps areas like outback Australia or Arizona could prove to be just the place for such "fuel farms".

Of course, such a plant does not exist. Not now, at any rate. Consider this however: simple selective plant breeding has enabled Mankind to exponentially increase the food yield of cereal crops, transforming grain poor wild grasses into the highly productive staples of rice, wheat and maize we know today³¹.

We now have our disposal a far more powerful and efficient tool than simple selective breeding: biotechnology. I believe biotechnology will enable us to create plants with far greater oil productivity than the current traditional bio-oil sources such as canola, soya-bean or oil palm, dramatically increasing the economic competitiveness of such oils. But innovation and investment are required. Creation of economically viable "*phytofuels*" will involve

genetic engineering, the controversies surrounding which need to be discussed separately. Given the current state of biotechnology, it is entirely feasible to introduce an oil producing gene into a rapidly growing algal species to produce such a plant. Some algae already have a very high lipid content e.g. *Botryococcus braunii* has been found to synthesise large amounts of hydrocarbons with oil contents of up to 86% of dry weight³². Some microalgae have a doubling time of less than a day.

Hence my initial suggestion – that we should invest in scum.

Other possibilities include bioengineering seaweed or kelp for the same purpose. In all probability there will be no single ideal fuel crop but several different sorts, depending on the local environments where they will be grown, producing different sorts of oils for different uses.

Some preliminary research has already been done on the above, dating back several decades. However, no breakthrough has occurred, largely, I believe, due to lack of funds and lack of interest especially because of current artificially cheap petroleum prices. Barring another petroleum crisis or John Howard being unexpectedly afflicted by an attack of decency, there is unlikely to be adequate Government support for such a project.

Biotechnology may also be the key to the production of new renewable polymers and plastics, which, after all, are presently derived from petroleum. But that is a whole other story.

Photofuels

Will the development of bioengineered *phytofuels* solve all our energy problems? Almost certainly not. At the very least however, my hope is that *phytofuels* will replace fossil fuels in the transport industry, and that vehicles with hybrid³³ *phytofuel*-electric engines will become the environmentally friendly standard.

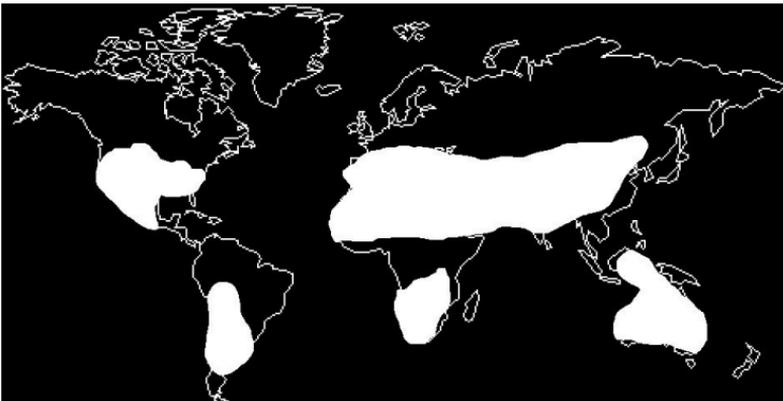
It is likely that nuclear fission, hydroelectricity and increasingly, wind power, will be important sources for future electricity generation.

We do not know at this time the maximum volumes of oil which can feasibly be produced by bioengineered plants. However there may be another strategy which could far exceed the solar energy

gathering efficiency of even the most wildly productive bioengineered oil plant and utilise far less water.

The rate at which solar energy is delivered to the entire Earth's surface, despite cloud cover, atmospheric attenuation (reflection, scattering, absorption), cosine effect (obliquity of rays at locations above or below the equator), rotation of the Earth (day and night phases) and other factors, averages a total of 1.2×10^{17} watts, or *20 thousand times* the total rate of human consumption³⁴. It is clear that there is huge potential to vastly increase our energy collection from the sun. By my own back-of-the-envelope calculation, a 100% efficient solar energy collecting facility will need to be about 10% the area of the Nullabor Plain to meet *all* the world's energy needs – a tiny dot on the map of the world³⁵. If we were able to develop a 33% efficient solar process, a facility comprising 30% the area of the Nullabor Plain (75,000 square kilometres) may be required (much less if we can curb our present rampant profligate habits).

Certainly that represents a huge land area, however we should compare that figure with the estimation by an Utrecht University team, that for *wind* power to meet the global *electricity* (not total energy) demands of 2001, a land area of 2.4 *million* square kilometres (about the size of Saudi Arabia) will be required, which one science journalist considered an *upbeat* assessment!³⁶.



Map of areas of high solar insolation

Nevertheless, 75,000 square kilometres *is* a massive land area and a single such solar gathering facility will represent a monumental engineering feat far exceeding that of the Great Wall of China. A much more practical and likely scenario is that several hundred such facilities should be built around the world in areas of high insolation to collectively add up to such an area. What sort of solar energy collecting facilities are we talking about?

Let us revisit a question previously posed: *what is the most direct and most cost effective way of converting sunlight into liquid hydrocarbons rapidly and in volume?*

I believe that, far more efficient than bioengineered "*phytofuels*", the direct conversion of light energy to hydrocarbons will ultimately be the way to go – in other words, **artificial photosynthesis** – to enable the production of what I term a "*photofuel*". The aim is to eliminate the biological middleman (the plant), to more efficiently produce a sustainable oil.

To me, artificial photosynthesis is the Holy Grail of renewable energy. Where do we currently stand in this matter? Surprisingly, hardly a word is mentioned about this topic in the popular science literature. It is an idea which deserves far wider publicity and a massive injection of funding.

A number of groups around the world are looking into this matter including Lund University in Sweden; the Brookhaven National Laboratory, Arizona State and Boston Universities in the US and our own CSIRO (among others). The AAPN (Australian Artificial Photosynthesis Network) is a small multidisciplinary group of scientists in Australia and New Zealand who have a particular interest in this issue. I quote directly from their website: "*The primary photochemical conversion processes in nature...are much more efficient (~ 4 times) than the best silicon based photovoltaic systems. They have been highly 'refined' by evolution to extract the most from the spectrum of solar light flux received at the earth's surface. For this reason, we regard a program to develop chemically robust, 'biomimetic' photo-electric conversion systems, as highly valuable.*"³⁷

To date progress has been modest, with the inefficient production of small volumes of hydrogen or methane at slow rates.

I believe however that research into artificial photosynthesis is much more likely to yield breakthroughs than the search for

controlled nuclear fusion. After all, we have no precedent for the occurrence of controlled nuclear fusion under Earth-like conditions and it may never be possible to achieve this. Plants, however, have been quietly performing photosynthesis under ambient conditions for billions of years. We just need to discover how to mimic them. Surely it is not beyond human ability to find out how a primitive unicellular blue-green alga works.

A metaphor

Let me use a metaphor to describe our present situation. We are rapidly steaming ahead through dense fog on board a ship very much like the Titanic. Our radar indicates there is a huge iceberg directly in our path (the iceberg represents the impending industrial and agricultural collapse consequent to petroleum depletion, as well as the dire effects of global warming). The iceberg is half a mile away. Unfortunately we need two miles of seaway to stop our ship and our rudder is jammed, hence we cannot change course. Our captain (who represents America) used to be a benevolent and helpful fellow, kind to children and animals, but has recently been gripped by an aggressive madness. An Arab crewmate named Saudi recently slapped the Captain in the face (remember that in the September 11 hijackings, 15 of the 19 hijackers were Saudi nationals), so the Captain did the natural thing and beat up *another* Arab crewmate named Iraq to a bloody pulp. Those Arabs all look alike anyway, so he was fully justified. In any case, he needs Saudi to bring him his food.

We all know how to survive the impending collision with the iceberg: engage full reverse thrust to delay and lessen the impact, and lower the lifeboats to save the passengers.

The Captain has at different times denied the existence of the iceberg on the radar or dismissed its importance - we can crash through it no problem, he says. Stoke up the boilers and full speed ahead. He claims it is all a left wing conspiracy, although he cannot explain how or why those shifty left wingers could or would fabricate such evidence.

We cannot overpower the Captain and take command. He has adopted a Rambo mindset and carries knives, guns and grenades on his person which he will not hesitate to use. We are either with him

or against him, he says. All we carry are tiny nailclippers with spiky bits.

The first mate, Britain, who is currently stomping on Iraq's face with hobnail boots, has come to accept the existence of the iceberg but has done precious little except make a few token statements.

Some European crewmembers have begun to lower lifeboats and round up their favourite passengers.

Australia is a lowly midshipman who has always been loyal to the Captain. Despite our tiny stature, we have had the dumb good fortune to be blessed with morbid obesity. Our exuberant rolls of fat (representing our coal and uranium resources), serve as insulation and flotation, hence we will be able to survive much longer than anyone else in the frigid waters after the ship sinks. Complacency is thus the easy option for us. Let the others freeze and drown, why should we care? We'll be OK in the short term. However, we also have at our fingertips the operating handbook for the largest lifeboat of all, one that may save most, if not all the passengers. We just need to figure out the instructions for deployment.

What would you do?

Conclusion

At present, the only proven practical replacement for petroleum products in the transport industry is plant derived oils. Oil based fuels are infinitely more user friendly than liquid hydrogen. We have the ability to greatly improve the economics of "*phytofuel*" production with the application of biotechnology. With adequate support and funding this can undoubtedly be achieved within a decade or two. "*Phytofuels*" alone however are unlikely to adequately meet our needs.

Success in artificial photosynthesis research is less certain, but it is much more likely to bear fruit than nuclear fusion research. Additionally, photosynthesis research can be undertaken without the need to construct multibillion dollar infrastructure facilities such as Tokomaks and is thus ideally suited for medium sized but highly capable economies such as Australia. It may take thirty to forty years to achieve the breakthroughs in "*photofuel*" development, assuming we embark on a concerted effort right here and now.

As individuals, the task ahead seems insuperable.

Can we persuade right wing Governments and Corporations with vested interests in fossil fuel consumption to acknowledge the Truth and to do the Right Thing? Some companies like BP have seen the writing on the wall and are actively investing in alternative energy research. Automobile firms like Toyota have achieved brilliant breakthroughs in hybrid engines. For others however (in particular the Bush and Howard administrations), trying to reason with them is a complete waste of time – they are intransigent, duplicitous, self serving and mutually support each other in powerful networks – as evidenced by past behaviour. They can be vindictive, bullying and resort to verbal gang bashing against those who may express an honest, valid but differing opinion^{38,39}.

John Howard said that developing nations such as India and China should be included in carbon emission agreements. Let us recall that America consumes *fifteen*⁴⁰ times more fossil fuels per head of population than China (and Australia is even *worse*). Advocating that *all* countries limit their emissions to around 1990 levels (as per the Kyoto protocol) amounts to insisting that poor countries should be condemned to perpetual poverty, while rich countries, having historically burnt off more than their fair share of fossil fuels in order to *become* developed, can continue to enjoy doing so. The aspirational impoverished of the world must surely view John Howard as a sanctimonious hypocrite with an overweening sense of entitlement. Fair minded Americans do exist, even if they have been sidelined and are only able to express themselves indirectly. In the Emmy award winning (fictional) TV series *The West Wing*, the Nobel prize winning economist President Barlet said in one episode that a nation of SUVs has no moral right to lecture about reducing fossil fuel emissions to a nation of bicycles.

The methods adopted by Detroit, the fossil fuel industries and their government proxies to discredit and deny the evidence behind global warming is reminiscent of the way the tobacco lobby vigorously endeavoured to cast doubt on the link between smoking and lung cancer. Their tactics and moral standards are identical.

I believe our best strategy is public education. Democracy can only work if a critical mass of voters possess a reasoned understanding of issues. We need to build grassroots support for policies promoting sustainable futures. All adults and children from

perhaps age twelve need to be taught to think critically and must realise that there is nothing less at stake here than their future living standards, employment prospects, risk of global mass starvation and wars over resources. These ordinary folks are the ones we must recruit, who we ultimately depend on, to vote out useless lying-rodent politicians, to be replaced with courageous visionaries.

Photocopy this essay or print it out from www.rationalist.com.au (issue 70) and give it to your friends. Teachers or lecturers can use it to prompt discussion with their students. If you discover any inadvertent factual errors in your perusal, write in to the Rationalist to have them corrected, then disseminate the corrected version.

Let us dream of a future where human beings live sustainably and have minimal impact on the environment. A future where our descendants will look back and shake their heads in amazement at how greed, short term agendas, war mongering and wasteful practices dominated our lifestyles and are thankful they have found a better way.

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Errata/Clarifications:

I apologise for some confusion regarding efficiency of conversion of sunlight to other forms of energy.

There is a difference between direct conversion of sunlight to electricity by photovoltaic (PV) panels and the efficiency of conversion of sunlight to chemical energy (whether oils, carbohydrates or structural plant materials such as lignin or cellulose)

PV conversion to electricity is up to 20% efficient and may theoretically be improved by utilisation of a wider range of the spectrum of sunlight.

Conversion of sunlight to chemical energy is 3 to 6% efficient by natural photosynthesis, the C4 plants being more efficient than C3 plants. Theoretical maximum efficiency of artificial photosynthesis is around 11%

APPENDIX #4: ESSAY:
THE HAZARDS OF IMMORTALITY
with a few off tangent meanderings

This essay was written in 2004 just after the Treasurer Peter Costello announced new fiscal policies attempting to deal with an aging population.

The road to longevity

This is an exercise in “what ifs”. It is admittedly a speculative journey, but one which I believe is based on reasonable supposition.

Among the great mythical treasures dreamed up by the wishful imaginations of the ancients, none were so enduring and so greatly desired as these two: the philosopher’s stone to transform base metals into gold and the fountain of youth. The former could confer one wealth beyond the wildest dreams of avarice and the latter could confer one an eternity to enjoy it. Wouldn’t those be nice!

Scientific progress has indeed enabled the successful transmutation of metals in the physics laboratory. Unfortunately the practical reality of the process - the physical conversion of one element to another by means of manipulation of atomic nuclei - is tedious, horrendously expensive and productive of only tiny molecular quantities of the desired end product. Hardly the road to riches envisioned by some.

We have however seen in living memory the dramatic prolongation of human lifespans. Not merely postponement of death while surviving in an infirm state, but worthwhile extension of quality existence.

People are living longer, healthier lives.

In ancient Greece and Rome the average life expectancy was about 28 years; in the developed countries of the world at the beginning of the 1990s it was about 74 years (*Encyclopaedia Britannica* 2002). In Australia a child born today can reasonably expect to live into his/her early eighties.

The shape of the population curve is also changing as a result of increased longevity. According to Yearbook Australia 2003, “The proportion of the (Australian) population aged 65 years and over is

expected to increase substantially, from 12% in 1999 to between 24% and 27% in 2051 and to between 25% and 28% in 2101. The proportion aged 85 years and over is expected to almost quadruple, from a little over 1% in 1999 to around 5% in 2051 and around 6% in 2101”.

To what do we owe such dramatic increases in life expectancy? Apart from us no longer being prey for wild animals or marauding Visigoths, and apart from the great improvements in our nutrition, I would regard **triumph over infectious disease** as probably the first great human milestone on the road to longevity. Not so much due to antibiotics (which have nevertheless played an important role) but principally because of huge advances in public health: clean water, clean food, proper waste disposal and of course, immunisation. The latter has resulted in an event within this generation that was unprecedented in all of human history- the complete eradication of an entire disease: smallpox.

No doubt the astute reader will remind me that infectious disease is still the primary cause of death in the developing world: malaria is now more rampant than ever and tuberculosis has seen an alarming resurgence, riding on the coat tails of that relatively new but implacably deadly virus: HIV.

I shall however confine my discussion to the trends in developed countries.

Presently the major cause of death in the middle aged and elderly is **vascular disease**, namely heart attacks and strokes. Again, the past few decades have seen unprecedented advances in the treatment and prevention of coronary artery disease and to a lesser extent, cerebrovascular disease. Is it not unreasonable to envision the elimination of the vascular causes of death thirty to fifty years from now? To believe that an antidote to atherosclerosis may eventually be found?

Next among the afflictions favoured by the grim reaper is **cancer**. It is inappropriate to regard “cancer” as a single condition: there are of course many types of cancer, each with different causes and courses. Steady progress is also being made across the board, with dramatic results in management of specific malignancies. Many types of leukemia, virtual death sentences just a few years ago, are now eminently curable.

For argument's sake, let's say the scourges of vascular and malignant disease are conquered in due course. As a consequence one may expect additional, though not indefinite prolongation of life. Temporal deterioration of the body will still proceed relentlessly - whether in the form of progressive sclerosis (hardening), calcification or caramelisation of the body's tissues. Examples of **degenerative conditions** in the heart include calcific narrowing of the aortic valve and conduction block of the electrical system - both which, by the way are currently treatable with surgery.

The very elderly will still be burdened by arthritis and plagued by fragile tissue paper skin, prone to easy bruising and tearing. And what worth is life in quantity, if it lacks quality? Precious little many would agree. People will eventually succumb to degenerative conditions such as Alzheimer's disease or suffer from osteoporosis leading to hip fractures followed by death from pneumonia or from blood clots in the legs, being bed ridden.

The final obstacle to discovering our fountain of youth thus appears to be the hurdle of degenerative disease. What methods may we adopt to preserve and even restore the supple elasticity of youthful tissue? To restore the spring to our step, so to speak?

Detailed discussion of these options is not my intent. Suffice to mention a few things.

Firstly, that calorie restriction has been found to prolong life. Some have facetiously argued that life with less food is not actually longer, it merely seems longer. But I digress.

One exciting possibility is gene therapy. Specific single gene mutations in nematodes and fruit flies have resulted in the dramatic prolongation of the healthy lifespans of such organisms. Another promising avenue is the restoration of the frayed ends of our chromosomes using the enzyme telomerase, which may then enable our cells to continue dividing (rather than grind to a halt) and hopefully to produce youthful rather than senescent tissue.

Additionally, stem cell therapy shows increasing potential for the treatment of what we currently regard as irreversible tissue damage. Promising projects include the restoration of dopaminergic function to the brains of patients with Parkinson's syndrome and the introduction of new contractile cells into scarred heart muscle.

Oxidative damage of cellular processes is another feature of age related deterioration. Hence antioxidant therapy has also been

advanced as an important aspect of antiaging treatment. Nearly ten years ago Orr and Sohal bred flies with extra genes for the enzymes superoxide dismutase and catalase which are involved in the removal of free radicals. These flies lived up to a third longer than ordinary flies and remained more energetic in their old age.

Thus for the first time ever, human beings can at least glimpse the faint but realistic (rather than fanciful) prospect of an “indefinite” healthy life, perhaps in the none too distant future.

Countless articles and papers have been written regarding longevity research - there is even a conference this year in Sydney on this very topic. All such papers seem to make the prior assumption that healthy longevity is an intrinsically good and noble goal to strive for. Examined from the individual point of view, who can argue against this? I would certainly like to enjoy the longest possible healthy life for myself and wish the same for others whom I personally know. Is that after all not the entire purpose of the field of medicine? The most natural desire of any normal individual?

Few articles however have considered the implications that successful longevity research may have on society as a whole.

The social consequences of “immortality”

This then is **the purpose of my article: to imagine the consequences of “immortality therapy” in and on society** should this goal be realised. Of course no one will ever achieve true immortality because accidental and traumatic death can never be completely eliminated. For practical purposes let us modestly refer to “immortality” as an individual lifespan of, say, two hundred years or more.

To visualise such a future society, we will need to **ask ourselves a number of questions:**

Firstly, who will receive “immortality therapy” and how many candidates will be eligible? Will it be limited to an exclusive few or will such longevity be made widely available to any and all comers?

Secondly, assuming that not everyone will have access to such therapy, what will be the nature of interaction between the “immortals” and the remaining mere mortals comprising the rest of society?

Thirdly, if the answers to the first two questions conjure up a frightful dystopian scenario, should we or could we put in place measures by which a more agreeable society may be attained, if not for all, at least for most?

Before we start let me describe a TV “documentary” I saw a couple of years ago - many of you may remember it. It was the biography of Rupert Murdoch, famed robber baron of the international media. It was clearly not an obsequious hagiography - to inflict such a travesty upon us would have been a blatant insult to our intelligence and we would no doubt dismiss the whole thing out of hand as a whitewash. Some may have described it as a warts and all revelation. I suspect however that only selected warts were revealed (specifically those warts already known to the public anyway and a few other warts which might engender sympathy in the audience).

They even went so far as to include an interview with his daughter Prudence, who called him a dirty old man for dumping his wife for the nubile young Wendy Deng. They were however careful to include the daughter’s comment later, after she got to know Wendy, that Wendy was really quite a nice person after all, wouldn’t you know it.

All in all, a fairly effective public relations exercise.

I was however vaguely troubled by the whole thing. The abiding image burned in my brain was that of Murdoch’s sagging septuagenarian frame heaving and wheezing away while exercising in a gym, his wrinkly hound dog visage grimacing in discomfort. The frightening thought burned in my memory was his stated intention to live to at least 100 years if not more. If anyone in the world was well placed to purchase such longevity, he was.

I don’t know about you, but I dread the idea of the inexorable oligopolisation of the mass media. I cringe at the thought of a never ending stream of puerile drivel, chock full of American jingoism and simplistic platitudes expounding right wing attitudes geared towards the lowest common denominators of society. But that’s just me.

Perhaps I’m being unfair. Someone who allows Phillip Adams a weekly platform for expression can’t be all bad. But I digress. Back to the topic.

Question one: who will receive “immortality therapy” and how many candidates will be eligible? Will it be limited to an

exclusive few or will such longevity become widely available to any and all comers?

Clearly the ultimate dispensers of “immortality therapy” will be the medical researchers who make the breakthroughs in this field. Very likely they will be American. Very likely they will be enamoured of the free market system and view this as a golden opportunity to strike it rich. A just reward for decades of tireless research. In a way, it will be their very own equivalent of the philosopher’s stone - an endless pot of gold.

I put it to you that there are two main ways of making obscenely ridiculous sums of money, they are: high volume low margin sales, for example selling 100 million widgets at a profit of 10 cents each; or low volume high margin sales, for example selling 10 whatsits at a profit of 1 million dollars each.

I put it to you that peddling the fountain of youth will fall in the latter category. Why? Because early on in the technology, access will inevitably be restricted - available to very few individuals indeed. High margins will be charged, the justification being to recoup previous research costs.

But more importantly, even if the technology could be easily and cheaply rendered to many more people in due course (think of IVF technology), **the consequences of a whole generation suddenly becoming “immortal” would be too horrendous to contemplate:**

- I. Imagine a second population explosion resulting from failure of the older cohort to exit this mortal coil. Even if birth rates fall below today’s replacement levels, “indefinite” survival of the aged will lead to burgeoning population increases with added demands on the world’s resources and shortages of commodities. Well, perhaps and perhaps not. The reader will no doubt remind me of another chap named Malthus who made dire predictions which turned out to be wrong - so far.
- II. Let us consider a more optimistic albeit unlikely scenario: a virtual reproductive halt is instituted and the population explosion is contained. How then will the demographics of an old population affect society? Let us say the retirement age is increased to seventy or even eighty. Despite this measure, ultimately 70, 80, even 90% or more of the

population will eventually exceed retirement age. The burden of productivity and service provision will lie with an ever diminishing and increasingly resentful younger minority. The only alternative will be to abolish the practice of retirement completely - an idea which may not sit well with those who feel they have had enough of a lifetime of work and now wish to coast along on their considerable savings. But the very worth of those savings may be eroded by the increasing scarcity of progressively dearer social services delivered by fewer and fewer people.

- III. Today in the rampant free market economies we see a widening disparity of wealth - increasing polarisation between the rich and poor. In a world of “undying old” there will be many elderly who have paid off their mortgages and hold on to their assets which accrue compound interest over time - there will be a sizeable cohort of asset rich oldies in contrast to a small cohort of impoverished struggling youngsters, youngsters who have little hope of coming into any inheritance in the foreseeable future. Older voters will constitute the majority of the population and will force the government to institute policies which favour them at the expense of the young - travel and medical subsidies being examples - while youngsters are faced with ever greater “user pays” charges. We see such phenomena even now. First home buyers are finding it increasingly difficult to obtain affordable housing. Just recently (26 February) amidst howls of ineffective protest, the Queensland University of Technology abruptly increased its HECS fees by 25%. Unchecked, such trends are a recipe for social unrest.

Creating a whole generation of “immortals” will thus lead us down the rocky road to ruin. No doubt for the reasons mentioned above, policy makers will see fit to keep a lid on immortality therapy and ensure very limited access to it (themselves excluded of course).

I am therefore willing to bet that just an elite few - the outrageously wealthy and well connected - will be allowed access to and be charged phenomenal sums for the privilege of “immortality treatment”. I predict that such access will remain exclusive, even if

the eventual true cost of “immortality therapy” falls dramatically. The rest of us will continue to die in the same way and at the same age we always have.

One may argue that patent laws for medical therapy should expire after 17 years or so, however I am also willing to bet that the wealthy, influential and powerful will use teams of lawyers to construct ways and means to circumvent this, to keep “immortality therapy” to themselves.

Why should the wealthy elite not wish to share such longevity with the general populace? Because the very basis of their wealth depends on having masses of eager beaver workers employed at a minimum wage (“*would you like fries with that?*”). It also depends on having gullible consumers on tap - consumers easily persuaded that the latest overpriced branded sneakers are a “must have” fashion item; who can be induced into compulsive text messaging to vote in or out pseudo celebrities from reality TV shows. Most mature members of the population are resistant to such exploitation, unlike successive malleable new cohorts of youngsters - who will be ever replenished as the old die out.

Question two: what will be the nature of interaction between these “immortals” and the remaining mere mortals comprising the rest of society?

Before tackling this question, perhaps a couple of biological analogies may be worthwhile.

A revolution of thinking in biology occurred in 1972 when Kerr, Wyllie and Currie introduced the idea of programmed cell death - they coined the term *apoptosis* to describe it. Just as cell division is a prerequisite for the normal growth, development and remodelling of the body’s tissues, these processes cannot occur without the orderly elimination, culling if you will, of redundant cells - cells which have served their former purpose but now represent an impediment to the organism at its new stage of life. Examples include resorption of the tail of the tadpole as it metamorphoses into a frog or the regression of the webs between the digits of the human foetus as it develops in the womb. Apoptosis is an indispensable part of the normal development of the human brain - to ensure that inappropriate neuronal connections are severed and that proper final hardwiring of the neurons takes place. Even as

adults, the processes of construction and destruction in tissues are ongoing: Exercise causes micro ruptures of muscle fibres, encouraging healing and resulting in the strengthening and enlargement of the muscle. Bone is constantly laid down and also continually removed by specialised cells called osteoblasts and osteoclasts. Healing of fractures would not be possible were that not the case. Old cells lining the gut - exposed to microbes and toxins - are continually shed and replaced by new mucosal cells.

Cell division and apoptosis complement each other throughout the life of every organism - programmed cell death is not only a normal process of life, it is an essential process of life.

Would it be unreasonable for us to propose this analogy - that just as new cell formation and old cell destruction are necessary for the health and vitality of the organism, perhaps the birth and death of individuals may also be essential for the health and dynamism of human society? I acknowledge there may be many pitfalls to this sort of comparison, however I offer it to you, dear reader, not as an inviolable argument but merely as food for thought.

Surely all cell lines eventually die, don't they? Not necessarily. Some cells multiply uncontrollably, crowding and starving out normal cells in the local vicinity and may even spread to distant areas causing similar damage. Some cells truly are immortal, meeting their demise only through the death of the larger organism. We call such cells cancer cells.

Let me relate a story which may induce the more squeamish among you to squirm.

Those of you with a background in biology will know of HeLa cells. As a medical student, I was taught that the term "HeLa" was taken from the first two letters of the first and last names of Helen Lane, the unfortunate patient from whom these cancer cells were harvested. Later I discovered that this was a wilful deception. HeLa was indeed coined from the first two letters of the first and last names of the patient, but her name was not Helen Lane. Why the disinformation? Some said it was to protect her family from unwelcome scrutiny. Others said it was to protect the researchers against financial claims from her relatives - after all, considerable profits had been made from the results of numerous studies utilising these cells over the years.

In 1951 a physician removed cells from the cervix of Henrietta Lacks, a 31 year old impoverished black woman admitted to the segregated ward of a Baltimore Hospital. She died eight months later from cervical cancer. This physician provided Dr. George Gey of Johns Hopkins University with a sample of these cells. The HeLa cells survived and multiplied in culture so well that they were soon being shipped to research labs all around the world for study. Over the past 53 years, research on HeLa cells has provided scientists with an enormous amount of knowledge about the physiology and genetics of cells and have contributed to the production of vaccines, particularly against polio. HeLa cells survive to this very day, long after the demise of their rightful owner. In fact, they have been cultured so often that the cells' present combined mass exceeds many times that of her original body (you can squirm now).

Again, dear reader, I apologise for digressing.

The point I try to make is this: can we also view the human body as a metaphor for society and the immortal cancer cells as a metaphor for the "immortal" individuals? Admittedly again this is not a precise comparison because we do not expect the "immortals" to multiply endlessly and crowd out the rest of society. What we can expect however is the unshakeable grip these people will have on all sectors of society which will only increase with time. By virtue of the selection process, from the very outset these "immortals" will have been people with considerable wealth and influence to begin with - CEOs of transnational corporations, media moguls and undoubtedly not a few crony politicians included. With effective immortality, there will be no end to their influence and control, whether conducted overtly or behind the scenes.

In a nutshell **I put to you that the future relationship between the "immortals" and mere mortals will be that of control** - the relationship of master to servant, feudal lord to serf - albeit perpetrated in far more subtle ways than the blatant injustices of historical times.

To me, this scenario also represents a nightmarish dystopia - tyranny without end. Indeed, the mere thought of John Howard even slightly delaying his retirement is enough to make me violently ill. But that's just me.

It is not unreasonable to believe that those in control will establish their own network of mutual support to further tighten their reins over the populace: industry will fund the political campaigns of their compliant puppet politicians, media corporations will promote these favoured candidates and use all means to discredit rivals, elected politicians will then be beholden to industry and the media and subsequently encourage policies favourable to the propagation of their profits.

Some of you may shake your heads in disagreement - perhaps I am just another loony paranoid conspiracy theorist. Do not be too hasty to dismiss these ideas. Rule by corporatocracy rather than democracy has already taken hold in America. Politicians in collaboration with corporations like Halliburton have duped young people into invading Iraq, to become cannon fodder for no reason other than to ensure their countries' continued profligate consumption of oil.

Let me include a salient quotation:

“Modern democracies have been around for long enough for neoliberal capitalists to learn how to subvert them. They have mastered the technique of infiltrating the instruments of democracy - the ‘independent’ judiciary, the ‘free’ press, the parliament - and moulding them to their purpose. The project of corporate globalisation has cracked the code. Free elections, a free press, and an independent judiciary mean little when the free market has reduced them to commodities on sale to the highest bidder” - Arundhati Roy, Booker prize winning author, 13/5/03.

It is argued that mega corporations are vital economic engines of growth and contributors to society, whether as a result of jobs created or from products or services provided. It is undeniable that the Japanese *zaibatsus* and Korean *chaebols* have played a vital role in the material ascendancy of those countries.

But when the genie escapes the bottle, when he no longer serves his master (customers or the public), when he takes control and makes rules to suit himself to the detriment of others - that is when we should worry. We should worry about the unbridled insatiable greed and lack of accountability increasingly characterising the behaviour of these people.

I highly recommend perusal of the October 11-17th 2003 issue of *The Economist* ("Where's the stick?") and quote directly from the editorial:

".....Bosses' pay has moved inexorably upwards, especially in America. In 1980s, the average pay for the CEOs of America's biggest companies was about 40 times that of the average production worker. In 1990, it was about 85 times. Now this ratio is thought to be about 400. Profits of big firms fell last year and shares are still well down on their record high, but the average remuneration of the heads of America's companies rose by over 6%".

Question three: if the answer to the first two questions conjures up an frightful dystopian scenario, should we or could we put in place measures by which a more agreeable society may be attained, if not for all, at least for most?

Before we attempt to answer this question, permit me a couple of final meanderings on the topic of voluntary euthanasia.

Let me relate to you a traditional Inuit tale which I have on good authority (ie. a friend of a friend) is true. Go to any Canadian souvenir shop and you will find carvings or statues of an old Inuit woman, brandishing nothing more than a stick with a mitten at the end, doing battle with a polar bear. In days gone by, tradition among the Inuit demanded that the elderly upon reaching a particular age should voluntarily self destruct. With failing strength, stamina, eyesight and hearing, they represented a burden to a community living in a harsh environment, where resources and food were scarce and the margin for survival was slim. So when the time came, a relative, perhaps the eldest son, would accompany the elder out into the icy wilderness to say the final farewell. Only the son would return. The elder would stay on and freeze to death or float out to sea on an ice floe. Or be eaten by a polar bear. And so it came to pass that this particular old woman who was left to die was being sized up as a tasty morsel by a polar bear. Rather than passively accept her fate, her survival instinct took hold, no doubt fuelled by terror. She stuck a mitten at the end of her walking stick and thrust it towards the bear, even as it lunged at her. As luck would have it, the mitten lodged deep in the bear's throat and the bear choked to death.

All fired up by this remarkable event, she decided to walk back to her village and tell everyone about it. The villagers were highly sceptical - some were even mean enough to suggest that this tall tale was merely a ploy she was using to avoid her fate. They decided to walk with her to the spot where she did battle and true enough, found the bear stone cold dead with the mitten in its throat. Ever since that day the Inuit never again practised the ritual of “voluntary” euthanasia of the elderly.

At the opposite end of the scale from those who desire immortality are those who seek the right to suicide, not only for terminal illnesses or intractable discomfort or disability, but also should they simply become bored with life. You may recall back in 2002 the case of Nancy Crick whose death was facilitated by barbiturates provided by supporters. Post mortem revealed no trace of the recurrent bowel cancer she claimed to be suffering from. That same year also saw the departure of 79-year-old French-born retired academic, Lisette Nigot, who took a fatal overdose in Perth. And in Bundaberg, Queensland, Marjorie and Sydney Croft, both 89, overdosed in their retirement village that October. None of these folks had terminal illnesses - they simply just had enough. All sent farewell notes to Dr Philip Nitschke, currently the world’s most prominent euthanasia advocate, now that his US counterpart, the notorious Jack Kevorkian, languishes in prison.

Should we, as one of the codes of conduct for our future society make a virtue of knowing how and when to withdraw gracefully?

Perhaps our motto should be the exact opposite of Dylan Thomas’ exhortation: when our time has come, let us *not* rage against the dying of the light.

The trouble is, formal endorsement of such a policy could be the thin edge of the wedge to enable assisted suicide of people with depression - which is clearly unacceptable. Furthermore, we have no hope in hell of ever being able to enforce such a code on general society. For most people, our survival instinct is just too powerful, no matter what our age. If I were offered the opportunity for an endless vigorous life, I would most likely grab it. It is the natural individual response.

Am I advocating the routine termination of life once a person is no longer economically productive? Certainly not. In itself that

would make science fiction fodder for a nightmarish dystopia. I mentioned the stories above merely to illustrate examples of the inappropriate and impractical. Indeed, those examples might entirely miss the point I am trying to make. The very people who would willingly exit life voluntarily are likely the very ones we would be happy to have stick around - people who impose only a small footprint on this planet, who are loath to trouble anyone else, who have a great generosity of spirit and a strong sense of consideration towards others.

Apropos nothing at all, one final anecdote, just for the heck of it. The opposite of withdrawing gracefully is, of course, withdrawing *disgracefully*. To me, the worst example of a crass exhibitionistic departure was that by Dr. Timothy Leary. You remember Timothy Leary, inventor of the “turn on, tune in, drop out” catchphrase? In my opinion, he was the most irresponsible advocate of hallucinogenic drug abuse, whose glib talk was exceeded only by his profound ignorance of pharmacology. (His doctorate was in psychology - he wasn't a *real* doctor, you understand). When he discovered he had terminal prostate cancer in 1995 he decided to parade himself on the Internet, with day by day explicit accounts of his physical deterioration, culminating in a “live” net casting of his demise. A showman to the bitter end, he requested that some of his ashes be blasted into space where they orbit the earth to this very day. I was most amused to read in a San Francisco newspaper the suggestion that his epitaph should read: “Timothy Leary: turned off, tuned out, dropped dead”.

Anyway, back to the main topic - so what was the point of my last question?

What I ponder is how we may break the tyrannical yoke of an elite gerontocracy who control the transnational corporations and influence government policy, who set the agenda for our futures without our permission and who have no sense of responsibility to anyone or anything except the state of their own bank balances (euphemistically termed “obligation to their shareholders”).

And so, in response to this last question I have posed for myself, I am, I admit, stumped. I'm afraid I have no answers at this time. I merely offer up these few memes of mine to you, dear reader; to rattle around in your brain for a while, perhaps to take root and maybe even flourish.

Who knows, in due course perhaps one of you may come up with a solution that is satisfactory to all.

In the meantime let me wish each and every one of you a long and healthy life - and to hell with the social consequences.