

Understanding Space and Time by Alastair Reynolds

"Mars ain't the kind of place to raise your kids"

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Part One

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Something very strange appeared in the outer recreation bubble on the day that Katrina Solovyova died. When he saw it, John Renfrew rushed back to the infirmary where he had left her. Solovyova had been slipping in and out of lucidity for days, but when he arrived he was glad to find her still conscious. She seldom turned her face away from the picture window, transfixed by the silent and vast twilight landscape beyond the armoured glass. Hovering against the foothills of Pavonis Mons, her reflection was all highlights, as if sketched in bold strokes of chalk.

Renfrew caught his breath before speaking.

"I've seen a piano."

At first he did not think she had heard him. Then the reflection of Solovyova's mouth formed words.

"You've seen a what?"

"A piano," Renfrew said, laughing. "A big, white, Bösendorfer grand."

"You're crazier than me."

"It was in the recreation bubble," Renfrew said. "The one that took a lightning hit last week. I think it fried something. Or unfried something, maybe. Brought something back to life."

"A piano?"

"It's a start. It means things aren't totally dead. That there's a glimmer of ... something."

"Well, isn't that the nicest timing," Solovyova said.

With a creak of his knees Renfrew knelt by her bedside. He'd connected Solovyova to a dozen or so medical monitors, only three of which were working properly. They hummed, hissed and bleeped with deadening regularity. When it began to seem like music--when he started hearing hidden harmonies and tonal shifts--Renfrew knew it was time to get out of the infirmary. That was why he had gone to the recreation bubble: there was no music there, but at least he could sit in silence.

"Nicest timing?" he said.

"I'm dying. Nothing that happens now will make any difference to me."

"But maybe it would," Renfrew said. "If the rec systems are capable of coming back on line, what else might be? Maybe I could get the infirmary

back up and running ... the diagnostic suite ... the drug synth..." He gestured at the banks of dead grey monitors and cowed machines parked against the wall. They were covered in scuffed decals and months of dust.

"Pray for another lightning strike, you mean?"

"No ... not necessarily." Renfrew chose his words with care. He did not want to offer Solovyova false optimism, but the apparition had made him feel more positive than at any time he could remember since the Catastrophe. They could not unmake the deaths of all the other colonists, or unmake the vastly larger death that even now it was difficult mention. But if some of the base systems they had assumed broken could be brought back, he might at least find a way to keep Solovyova alive.

"What, then?"

"I don't know. But now that I know that things aren't as bad as we feared..." He trailed off. "There are lots of things I could try again. Just because they didn't work first time..."

"You probably imagined the piano."

"I know I didn't. It was a genuine projection, not a hallucination."

"And this piano..." The reflection froze momentarily. "How long did it last, Renfrew? I mean, just out of curiosity?"

"Last?"

"That's what I asked."

"It's still there," he said. "It was still there when I left. Like it was waiting for someone to come and play it."

The figure in the bed moved slightly.

"I don't believe you."

"I can't show you, Solovyova. I wish I could, but..."

"I'll die? I'm going to die anyway, so what difference does it make?" She paused, allowing the melancholic chorus of the machines to swell and fill the room. "Probably by the end of the week. And all I've got to look forward to is the inside of this room or the view out this window. At least let me see something different."

"Is this what you really want?"

Solovyova's reflection tipped in acknowledgement. "Show me the piano, Renfrew. Show me you aren't making this shit up."

He thought about it for a minute, perhaps two, and then dashed back to the recreation bubble to check that the piano was still there. The journey took several minutes even at a sprint, through sunken tunnels and window-lined connecting bridges, up and down grilled ramps, through ponderous internal airlocks and sweltering aeroponics labs, taking this

detour or that to avoid a blown bubble or failed airlock.

Parts of the infrastructure creaked ominously as he passed through. Here and there his feet crunched through the sterile red dust that was always finding ways to seep through seals and cracks. Everything was decaying, falling apart. Even if the dead had been brought back to life the base would not have been able to support more than a quarter of their number. But the piano represented something other than the slow grind of entropy. If one system had survived apparent failure, the same might be true of others.

He reached the bubble, his eyes closed as he crossed the threshold. He half expected the piano to be gone, never more than a trick of the mind. Yet there it was: still manifesting, still hovering a few inches from the floor. Save for that one suggestion of ghostliness, it appeared utterly solid, as real as anything else in the room. It was a striking pure white, polished to a lambent gloss. Renfrew strode around it, luxuriating in the conjunction of flat planes and luscious curves. He had not noticed this detail before, but the keys were still hidden under the folding cover.

He admired the piano for several more minutes, forgetting his earlier haste. It was as beautiful as it was chilling.

Remembering Solovyova, he returned to the infirmary.

"You took your time," she said.

"It's still there, but I had to be sure. You certain you want to see it?"

"I haven't changed my mind. Show me the damned thing."

With great gentleness he unplugged the vigilant machines and wheeled them aside. He could not move the bed, so he took Solovyova from it and placed her in a wheelchair. He had long grown accustomed to how frail human bodies felt in Martian gravity, but the ease with which he lifted her was shocking, and a reminder of how close to death she was.

He'd hardly known her before the Catastrophe. Even in the days that followed--as the sense of isolation closed in on the base, and the first suicides began--it had taken a long time for them to drift together. It had happened at a party, the one that the colonists had organised to celebrate the detection of a radio signal from Earth; originating from an organised band of survivors in New Zealand. In New Zealand they had still had something like a government, something like society, with detailed plans for long-term endurance and reconstruction. And for a little while it had seemed that the survivors might--by some unexplained means--have acquired immunity to the weaponised virus that had started scything its way through the rest of humanity in June 2038.

They hadn't. It just took a little longer than average to wipe them out.

Renfrew pushed her along the tortuous route that led back to the bubble.

"Why a ... what did you call it?"

"A Bösendorfer. A Bösendorfer grand piano. I don't know. That's just what it said."

"Something it dragged up from its memory? Was it making any music?"

"No. Not a squeak. The keyboard was hidden under a cover."

"There must be someone to play it," Solovyova said.

"That's what I thought." He pushed her onward. "Music would make a difference, at least. Wouldn't it?"

"Anything would make a difference."

Except not for Solovyova, he thought. Very little was going to make a difference for Solovyova from this point on.

"Renfrew..." Solovyova said, her tone softer than before. "Renfrew, when I'm gone ... you'll be all right, won't you?"

"You shouldn't worry about me."

"It wouldn't be human not to. I'd change places if I could."

"Don't be daft."

"You were a good man. You didn't deserve to be the last of us."

Renfrew tried to sound dignified. "Some might say being the last survivor is a sort of privilege."

"But not me. I don't envy you. I know for a fact I couldn't handle it."

"Well, I can. I looked at my psychological evaluation. Practical, survivor mentality, they said."

"I believe it," Solovyova said. "But don't let it get to you. Understand? Keep some self respect. For all of us. For me."

He knew exactly what she meant by that.

The recreation bubble loomed around the curve in the corridor. There was a moment of trepidation as they neared, but then he saw the white corner of the floating piano, still suspended in the middle of the room, and sighed with relief.

"Thank God," he said. "I didn't imagine it."

He pushed Solovyova into the bubble, halting the wheelchair before the hovering apparition. Its immense mass reminded him of a chiselled cloud. The polished white gleam was convincing, but there was no sign of their own reflections within it. Solovyova said nothing, merely staring into the middle of the room.

"It's changed," he said. "Look. The cover's gone up. You can see the keys. They look so real ... I could almost reach out and touch them. Except I can't play the piano." He grinned back at the woman in the wheelchair. "Never could. Never had a musical bone in my body."

"There is no piano, Renfrew."

"Solovyova?"

"I said, there is no piano. The room is empty." Her voice was dead, utterly drained of emotion. She did not even sound disappointed or annoyed.

"There is no piano. No grand piano. No Bösendorfer grand piano. No keyboard. No nothing. You're hallucinating, Renfrew. You're imagining the piano."

He looked at her in horror. "I can still see it. It's here." He reached out to the abstract white mass. His fingers punched through its skin, into thin air. But he had expected that.

He could still see the piano.

It was real.

"Take me back to the infirmary, Renfrew. Please." Solovyova paused. "I think I'm ready to die now."

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He put on a suit and buried Solovyova beyond the outer perimeter, close to the mass grave where he had buried the last survivors when Solovyova had been too weak to help. The routine felt familiar enough, but when Renfrew turned back to the base he felt a wrenching sense of difference. The low-lying huddle of soil-covered domes, tubes and cylinders hadn't changed in any tangible way, except that it was now truly uninhabited. He was walking back toward an empty house, and even when Solovyova had been ill--even when Solovyova had been only half present--that had never been the case.

The moment reached a kind of crescendo. He considered his options. He could return to the base, alone, and survive months or years on the dwindling resources at his disposal. Tharsis Base would keep him alive indefinitely provided he did not fall ill: food and water were not a problem, and the climate recycling systems were deliberately rugged. But there would be no companionship. No network, no music or film, no television or VR. Nothing to look forward to except endless bleak days until something killed him.

Or he could do it here, now. All it would take was a twist of his faceplate release control. He had already worked out how to override the safety lock. A few roaring seconds of pain and it would all be over. And if he lacked the courage to do it that way--and he thought he probably did--then he could sit down and wait until his air-supply ran low.

There were a hundred ways he could do it, if he had the will.

He looked at the base, stark under the pale butterscotch of the sky. The choice was laughably simple. Die here now, or die in there, much later. Either way, his choice would be unrecorded. There would be no eulogies to his bravery, for there was no one left to write eulogies.

"Why me?" he asked, aloud. "Why is it me who has to go through with this?"

He'd felt no real anger until that moment. Now he felt like shouting, but all he could do was fall to his knees and whimper. The question circled in his head, chasing its own tail.

"Why me," he said. "Why is it me? Why the fuck is it me who has to ask this question?"

Finally he fell silent. He remained frozen in that position, staring down through the scuffed glass of his faceplate at the radiation-blasted soil between his knees. For five or six minutes he listened to the sound of his own sobbing. Then a small, polite voice advised him that he needed to return to the base to replenish his air supply. He listened to that voice as it shifted from polite to stern, then from stern to strident, until it was screaming into his skull, the boundary of his faceplate flashing brilliant red.

Then he stood up, already light-headed, already feeling the weird euphoric intoxication of asphyxia, and made his ambling way back toward the base.

He had made a choice. Like it said in the psych report, he was a practical-minded, survivor type. He would not give in.

Not until it got a lot harder.

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Renfrew made it through his first night alone.

It was easier than he had expected, although he was careful not to draw any comfort from that. He knew that there would be much harder days and nights ahead. It might happen a day or a week or even a year from now, but when it did he was sure that his little breakdown outside would shrink to insignificance. For now he was stumbling through fog, fully aware that a precipice lay before him, and also that he would have to step over that precipice if he hoped to find anything resembling mental equilibrium and true acceptance.

He wandered the corridors and bubbles of the base. Everything looked shockingly familiar. Books were where he had left them; the coffee cups and dishes still waiting to be washed. The views through the windows hadn't become mysteriously more threatening overnight, and he had no sense that the interior of the base had become less hospitable. There were no strange new sounds to make the back of his neck tingle; no shadows flitting at the corner of his eye, no blood freezing sense of scrutiny by an unseen watcher.

And yet ... and yet. He knew something was not quite right. After he had attended to his usual chores--cleaning this or that air filter, lubricating this or that seal, scrutinising the radio logs to make sure no one had attempted contact from home--he again made his way to the recreation bubble.

The piano was still there, but something was different about it today. Now there was a single gold candelabra sitting above the keyboard. The candles burned, wavering slightly.

It was as if the piano was readying itself.

Renfrew leaned through the piano and passed his fingers through the candle flames. They were as insubstantial as the instrument itself. Even so, he could not help but sniff the tips of his fingers. His brain refused to accept that the flames were unreal, and expected a whiff of carbon or charred skin.

Renfrew remembered something.

He had spent so long in the base, so long inside its electronic cocoon, that until this moment he had forgotten precisely how the bubble worked. The things that appeared inside it were not true holograms, but projections mapped into his visual field. They were woven by tiny implants buried in the eye, permitting the images to have a sense of solidity that would have been impossible with any kind of projected hologram. The surgical procedure to embed the implants had taken about thirty seconds, and from that moment on he had never really needed to think about it. The implants allowed the base staff to digest information in vastly richer form than allowed by flat screens and clumsy holographics. When Renfrew examined a mineral sample, for instance, the implant would overlay his visual impression of the rock with an X-ray tomographic view of the rock's interior. The implants had also permitted access to recreational recordings ... but Renfrew had always been too busy for that kind of thing. When the implants began to fail--they'd never been designed to last more than a year or two in vivo, before replacement--Renfrew had thought no more of the matter.

But what if his had started working again? In that case it was no wonder Solovyova had not been able to see the piano. Some projection system had decided to switch on again, accessing some random fragment from the entertainment archives, and his reactivated implant had chosen to allow him to see it.

It meant there was still a kind of hope.

"Hello."

Renfrew flinched at the voice. The source of it was immediately obvious: a small man had appeared out of nowhere at the end of the piano. The small man stood for a moment, pivoting around as if to acknowledge a vast and distant invisible audience, his eyes--largely hidden behind ostentatious pink glasses--only meeting Renfrew's for the briefest of instants. The man settled into a stool that had also appeared at the end of the piano, tugged up the sleeves of the plum paisley suit jacket he wore, and began to play the piano. The man's fingers were curiously stubby, but they moved up and down the keyboard with a beguiling ease.

Transfixed, Renfrew listened to the man play. It was the first real music he had heard in two years. The man could have played the most uncompromisingly difficult exercise in atonality and it would still have sounded agreeable to Renfrew's ears. But it was much easier than that. The man played the piano and sang a song; one that Renfrew recognised--albeit barely--from his childhood. It had been an old song even then, but one that was still played on the radio with some regularity. The man sang about a trip to Mars: a song about a man who did not expect to see home again.

The song concerned a rocket man.

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Renfrew maintained the ritual that he and Solovyova had established before her death. Once a week, without fail, he cocked an ear to Earth to see if anyone was sending.

The ritual had become less easy in recent weeks. The linkage between the antenna and the inside of the base was broken, so he had to go outside to perform the chore. It meant pre-breathing; it meant suiting up; it meant a desolate trudge from the airlock to the ladder on the side of the comms module, and then a careful ascent to the module's roof, where the antenna was mounted on a turret-like plinth. He'd spend at least half an hour scooping handfuls of storm dust from the steering mechanism, before flipping open the cover on the manual control panel, powering up the system and tapping a familiar string of commands into the keyboard.

After a few moments the antenna would begin to move, grinding as it overcame the resistance of the dust that had already seeped into its innards. It swung and tilted on multiple axes, until the openwork mesh of the dish was locked onto the Earth. Then the system waited and listened, LEDs blinking on the status board, but none of them brightening to the hard, steady green that would mean the antenna had locked onto the expected carrier signal. Occasionally the lights would flicker green, as if the antenna was picking up ghost echoes from something out there, but they never lasted.

Renfrew had to keep trying. He wasn't expecting rescue, not any more. He'd resigned himself to the idea that he was going to die on Mars, alone. But it would still be some comfort to know that there were survivors back on Earth; that there were still people who could begin to rebuild civilisation. Better still if they had the kindness to signal him, to let him know what was happening. Even if only a few thousand people had survived, it wouldn't take much for one of them to remember the Mars colony, and wonder what was happening up there.

But Earth remained silent. Some part of Renfrew knew that there would never be a signal, no matter how many times he swung the dish around and listened. And one day soon the dish was simply not going to work, and he was not going to be able to repair it. Dutifully, when he had powered down the antenna and returned to the inside of the base, he made a neat entry in the communications log, signing his name at the top of the page.

On his rounds of the base, Renfrew made similar entries in many other logs. He noted breakdowns and his own ramshackle repair efforts. He took stock of spare parts and tools, entering the broken or life-expired items into the resupply request form. He noted the health of the plants in the aeroponics lab, sketching their leaves and marking the ebb and flow of various diseases. He kept a record of the Martian weather, as it tested the base's integrity, and at the back of his mind he always imagined Solovyova nodding in approval, pleased with his stoic refusal to slide into barbarism.

But in all his bookkeeping, Renfrew never once referred to the man at the

piano. He couldn't quite explain this omission, but something held him back from mentioning the apparition. He felt he could rationalise the appearance of the piano, even of the personality that was programmed to play it, but he still wasn't sure that any of it was real.

Not that that stopped the piano man from appearing.

Once or twice a day, most days, he assumed existence at the piano and played a song or two. Sometimes Renfrew was there when it happened; sometimes he was elsewhere in the base and he heard the music starting up. Always he dropped whatever he was doing and raced to the recreation bubble, and listened.

The tunes were seldom the same from day to day, and the small man himself never looked quite the same. His clothes were always different, but there was more to it than that. Sometimes he had a shapeless mop of auburn hair. At other times he was balding or concealed his crown beneath a variety of ostentatious hats. He frequently wore glasses of elaborate, ludicrous design.

The man had never introduced himself, but once or twice Renfrew felt that he was close to remembering his name. He racked his memory for the names of twentieth century musicians, feeling sure it would come to him eventually.

In the meantime he found that it helped to have someone to talk to. Between songs the man would sometimes sit silently, hands folded in his lap, as if waiting for some instruction or request from Renfrew. That was when Renfrew talked aloud, unburdening himself of whatever thoughts had been spinning around in his skull since the last visitation. He told the man about the problems with the base, about his loneliness, about the despair he felt every time the antenna failed to pick up anything from Earth. And the man simply sat and listened, and when Renfrew was done--when he had said his piece--the man would unlace his fingers and start playing something.

Now and then the man did speak, but he never seemed to be addressing Renfrew so much as a larger unseen audience. He'd introduce the songs, tell a few jokes between numbers, throw out an offer to take requests. Renfrew sometimes answered, sometimes tried to persuade the pianist to play one of the songs he'd already performed, but nothing he said seemed to reach through to the man.

But still: it was better than nothing. Although the style of the music never varied greatly, and one or two of the songs began occasionally to chafe at Renfrew's nerves, he was generally happiest when the music was playing. He liked A Song For Guy, I Guess That's Why They Call It The Blues, Tiny Dancer. When the piano man was playing, he did not feel truly alone.

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Renfrew made a point of tending to Solovyova's grave. He cared about the other dead, but Solovyova mattered more: she'd been the last to go, the last human being Renfrew would ever know in his life. It would be too much work to keep the dust from covering the mass burial site, but he could at

least do something for Solovyova. Sometimes he detoured to clean her grave when he was outside on the antenna duty; other times he pre-breathed and suited up just for Solovyova, and always when he returned to the base he felt cleansed, renewed of purpose, determined that he could get through the days ahead.

That feeling didn't last long. But at least tending the grave kept the darkness at bay for a while.

There were moments when his stratagems failed, when the reality of his situation came crashing back in its full existential horror, but when that happened he was able to slam a mental door almost as soon as the scream had begun. As time had passed he had found that he became more adept at it, so that the moments of horror became only instants, like blank white frames spliced into the movie of his life.

When he was outside, he often found himself watching the sky, especially when the cold sun was low and twilight stars began to stud the butterscotch sky. A thought occurred to him, clean and bright and diamond hard: humanity might be gone, but did that necessarily mean he was the last intelligent creature in the universe? What if there was someone else out there?

How did that change the way he felt?

And what if there was in fact no one else out there at all: just empty light years, empty parsecs, empty megaparsecs, all the way out to furthest, faintest galaxies, teetering on the very edge of the visible universe?

How did that make him feel?

Cold. Alone. Fragile.

Curiously precious.

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Part Two

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Weeks slipped into months, months slipped into a long Martian year. The base kept functioning, despite Renfrew's grimmest expectations. Certain systems actually seemed to be more stable than at any time since Solovyova's death, as if they'd grudgingly decided to cooperate in keeping him alive. For the most part, Renfrew was glad that he did not have to worry about the base failing him. It was only in his darkest moments that he wished for the base to kill him, swiftly, painlessly, perhaps when he was already asleep and dreaming of better times. There'd be nothing undignified about going out that way; nothing that violated the terms of his vow with Solovyova. She wouldn't think badly of him for wishing death on those terms.

But the fatal failure never came, and for many days in a given month Renfrew managed not to think about suicide. He supposed that he had passed through the anger and denial phases of his predicament, into

something like acceptance.

It helped to have someone to talk to.

He spoke to the piano man a lot now, quite unselfconsciously. The odd thing was that the piano man spoke back, too. On one level, Renfrew was well aware that the responses were entirely in his imagination; that his brain had started filling in the other half of the one-sided conversation, based around the speech patterns that the piano man used between songs. On another level the responses seemed completely real and completely outside his own control, as if he no longer had access to the part of his brain that was generating them. A form of psychosis, perhaps: but even if that were the case, it was benign, even comforting, in its effects. If the thing that kept him sane was a little self-administered madness, confined solely to the piano man, then that seemed a small price to pay.

He still didn't know the man's real name. It was nearly there, but Renfrew could never quite bring it to mind. The piano man offered no clues. He introduced his songs by name, often spinning elaborate stories around them, but never had cause to say who he was. Renfrew had tried to access the rec system's software files, but he'd given up as soon as he was confronted by screen after screen of scrolling possibilities. He could have delved deeper, but he was wary of breaking the fragile spell that had brought the piano man into existence in the first place. Renfrew reckoned it was better not to know, than lose that one flicker of companionship.

"It's not exactly a rich human life," Renfrew said.

"Probably not." Piano Man glanced at the window, out towards the point where the others had been buried. "But you have to admit. It's a hell of a lot better than the alternative."

"I suppose so," Renfrew said doubtfully. "But what am I meant to do with the rest of my life? I can't just mope around here until I drop dead."

"Well, that's always one possibility. But what about doing something a little bit more constructive?"

Piano Man fingered the keys, sketching a tune.

"Learn to play the piano? No point, is there? Not while you're around."

"Don't count on me always being here, luv. But I was thinking more along the lines of a bit of reading. There are books, aren't there? I mean real ones."

Renfrew imagined Piano Man miming the opening of a book. He nodded in return, without much enthusiasm. "Nearly a thousand."

"Must have cost a bomb to bring them here."

"They didn't--not most of them, anyway. They were printed locally, using recycled organic matter. The printing and binding was totally automatic, and you could ask for a copy of just about any book that had ever been printed. Of course it doesn't work now ... the thousand is all we've got left."

"You already know this, Renfrew. Why are you telling me?"

"Because you asked."

"OK. Fair enough." Piano Man pushed his glasses back onto the bridge of his little nub of a nose. "A thousand books, though: that should keep you going for a while."

Renfrew shook his head. He had already glanced through the books and he knew that there were a lot less than a thousand that were of any interest to him. Most of the books had been produced purely for recreational value, since the technical journals and documentation had always been available for consultation via the optic implants or handhelds. At least two hundred volumes were children's books or juvenile material. Another three hundred were in Russian, French, Japanese or some other language he did not understand. He had time, but not that much time.

"So there are how many left--what? Five hundred or so that you might want to read?"

"It isn't that easy either," Renfrew said. "I tried reading fiction. Bad mistake. It was too depressing, reading about other people going about their lives before the accident."

Piano Man peered at him over the rims of his glasses. "Fussy bugger aren't you. So what's left if we throw out the fiction?"

"It doesn't get much better. Travelogues ... historical biographies ... atlases and books on natural history ... all any of it does is remind me of what I'm never going to see again. Never another rainstorm. Never another bird, never another ocean, never another..."

"OK, point made. Fine: throw out the coffee table books--guests are going to be a bit thin on the ground anyway. What does that leave us with?"

Renfrew had done exactly that, his pile of books becoming smaller. There were philosophical texts: Wittgenstein's *Philosophical Investigations*; Sartre's *Being and Nothingness*; Foucault's *The Order of Things*; a dozen others.

"Who had those printed?"

"I don't know."

"Must have been a right lonely sod, whoever he was. Still; did you make any progress with them?"

"I gave them my best shot."

Renfrew had flicked through them, allured and at the same time appalled at the density of the philosophical speculation within them. On one level, they dealt with the most fundamental of human questions. But the books were so detached from anything that Renfrew considered mundane reality that he could consult them without triggering the episodes of loss and horror that came with the other books. That was not to say that he dismissed the arguments in the books as irrelevant, but because the books dealt with

human experience in the mass there was far less than pain than when Renfrew was forced to consider a specific individual other than himself. He could deal with the thought of losing the rest of humanity.

It was the idea of losing anyone specific that cut him open.

"So the heavy German guys weren't a total waste of time. All right. What else?"

"Well, there was a Bible," Renfrew said.

"Read it much?"

"Religiously." Renfrew shrugged. "Sorry. Bad joke."

"And now ... after the accident?"

"I must admit I've started thinking about some things I never thought about before. Why we're here. Why I'm here. What it all means. What it'll all mean when I'm gone. That doesn't mean I expect to find any useful answers."

"Maybe you're not looking in quite the right place. What else was left in your pile?"

"Scientific stuff," Renfrew said. "Mathematics, quantum theory, relativity, cosmology..."

"I thought you told me all that stuff was available on the handhelds?"

"These are more like textbooks. Not bang up to date, but not horribly out of date either. Someone's idea of light reading."

"Looks like you're stuck with them, in that case. They shouldn't be too daunting, should they? I thought you were a scientist as well."

"A geologist," Renfrew told him. "And you don't need much tensor algebra to study rocks."

"You can always learn. You've got plenty of time. And--let's face it--it has to be easier than Japanese, doesn't it?"

"I suppose so. You still haven't told me why I should bother."

Piano Man looked at him with sudden seriousness, the mirrored facets of his glasses like holes punched through to some burnished silver realm.

"Because of what you just said. Because of the questions you want answered."

"You think a load of physics books is going to make a difference?"

"That's up to you. It's all a question of how much you want to understand. How deep you want to go."

Piano Man turned back to the keyboard and started playing Saturday Night's All Right for Fighting.

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Piano Man was right. It was a question of how deep he wanted to go.

But surely there was more to it than that. Something else was spurring him on. It felt like a weird sense of obligation, an onus that weighed upon him with pressing, judicial force. He was certain now that he was the last man alive, having long since abandoned hope that anyone was left on Earth. Was it not therefore almost required of him to come to some final understanding of what it meant to be human, achieving some final synthesis of all the disparate threads in the books before him? There could only be one witness to his success, he knew, but it seemed that if he were to fail he would be letting down the billions who had come before him. He could almost feel the weight of their expectation reaching to him from the past, urging him to come to that difficult understanding that had always eluded them. They were dead but he was still alive, and now they were looking over his shoulder, anxiously waiting to see how he solved the puzzle that had bettered them.

"Hey, genius?" Piano Man asked, a week into his study. "Solved the mysteries of the universe yet?"

"Don't be silly. I've only just begun."

"OK. But I take it you've made at least a smidgeon of progress." Piano Man wore a sparkling white suit and enormous star-shaped spectacles. He was grinning a lot and playing some of his weaker material.

"Depends what you mean by progress," Renfrew said. "If you mean absorbing what I've read, and not being thrown by anything so far..." He shrugged. "In that case, so far it's been a piece of piss."

"Ah-ha."

"But I'm under no illusions that it's going to stay that way. In fact I'm well aware that it's going to get a lot harder. So far all I'm doing is catching up. I haven't even begun to think about moving beyond the existing theories."

"All right. No point trying to run before you can crawl."

"Precisely."

Piano Man swept his fingers down the keys in an exuberant glissando. "But you can still tell me what you've learned, can't you?"

"Are you sure you're interested?"

"Of course I'm interested, luv. Why else would I ask?"

* * * *

He told Piano Man what he had learned so far.

He had read about the dual histories of cosmology and quantum mechanics, two braids of thought that had their origins in the early twentieth century. The one dealt with the vast and ancient, the other with the microscopic and

ephemeral. Cosmology encompassed galaxies and superclusters of galaxies, Hubble flows and the expansion of the universe. Quantum mechanics dealt with the fizzing, indeterminate cauldron of subatomic reality, where things could be in more than one place at once and where apparently rock-solid concepts like distance and the one-way flow of time became almost obscenely pliant.

Handling the concepts of classical cosmology required an imaginative leap, and the ability to think of space and time as facets of the same thing. But once he had made that mental adjustment, which became slightly easier with practise, Renfrew found that the rest was merely a question of elaboration of scale and complexity. It was like holding the architecture of a vast, dark cathedral in his skull. At first it required a supreme effort of will to imagine the basic components of the building: the choir, the nave, the transepts, the spire. Gradually, however, these major architectural elements became fixed in his mind and he was able to start concentrating on the embellishments, the buttresses and gargoyles. Once he was comfortable with the classical cosmological model he found it easy enough to revise his mental floor plan to accommodate inflationary cosmology and the various models that had succeeded it. The scales became vaster, the leaps of perspective all the more audacious, but he was able to envisage things within some kind of metaphoric framework, whether it was the idea of galaxies painted on the skin of an expanding balloon, or the 'phase transition' of water thawing in a frozen swimming pool.

This was not the case with quantum mechanics. Very quickly, Renfrew realised that the only tool for understanding the quantum realm was mathematics; all else failed. There were no convenient metaphors from everyday human experience to assist with the visualisation of wave-particle duality, the Heisenberg principle, quantum non-locality, or any of the other paradoxical properties of the microscopic world. The human mind had simply not evolved the appropriate mental machinery to deal with quantum concepts in the abstract. Trying to 'understand' any of it in workaday terms was futile.

Renfrew would have found this hard to accept had he not been in good company. Almost all of the great thinkers who had worked on quantum mechanics had been troubled by this to one degree or another. Some had accepted it, while others had gone to the grave with the nagging suspicion that a layer of familiar, Newtonian order lay beneath the shifting uncertainties of QM.

Even if quantum physics was 'correct', how did that fuzzy view of reality join up with the hard-edged concepts of General Relativity? The two theories were astoundingly successful at predicting the behaviour of the universe within their own specified areas of application, but all attempts to unify them had collapsed in failure. QM produced absurd results when applied to the kinds of macroscopic objects encountered in the real world: cats, boxes, Bösendorfer grand pianos, galactic superclusters. GR collapsed when it was used to probe the very small, whether it was the universe an instant after the Big Bang, or the infinitely dense, infinitely compact kernel of a black hole.

Thinkers had spent three quarters of a century chasing that fabled

unification, without success. But what if all the pieces had been in place at the time of the Catastrophe, and all that was needed was someone to view them with a fresh eye?

Some chance, Renfrew thought to himself. But again he smiled. Was it arrogant to think that he could achieve what no one had managed before? Perhaps: but given the uniqueness of his situation, nothing seemed improbable. And even if he did not succeed in that task, who was to say that he would not pick up one or two useful insights along the way?

At the very least it would give him something to do.

Still, he was getting ahead of himself. He had to understand QM before he could demolish it and replace it with something even more shiny and elegant, something which at the same time would be utterly consistent with every verified prediction of GR and at the same time nicely resolve all the niggling little details of observational mismatch ... while at the same time making testable predictions of its own.

"Are you sure you still want to go through with this?" Piano Man asked.

"Yes," Renfrew told him. "More than ever."

His companion looked out toward the burial zone. "Well, it's your funeral."

And then started playing Candle in the Wind.

* * * *

Renfrew powered up the antenna again. Once more it laboured into life, gears crunching against the resistance of infiltrated dust as it steered onto target. It was twilight and Earth was a bright star a few degrees above the horizon. The antenna locked on, Renfrew sighting along the main axis to confirm that the device really was pointed at the planet, and wasn't misaligned due to some mechanical or software fault. As always, as near as he could judge, the dish was aimed at Earth.

He waited to see the lights on the status board, never quite able to kill the hope that the flickering signal LED would harden into a steady, insistent green, indicating that the antenna had picked up the expected carrier transmission.

Never quite able to kill the hope that someone was still sending.

But the board told him the same thing it always did. No dice: it wasn't hearing anything beyond the random snap and crackle of interplanetary static.

Renfrew tapped the buttons to tell the dish to stow itself until his next visit. He stood back from the operating panel as the machinery moved, waiting to see it stow itself safely in readiness for his next dutiful visit.

Something shone on the panel: a momentary brightening of the LED. It only lasted an instant, but it caught Renfrew's attention like a glint of gold in a prospector's stream. He'd seen the antenna slew back countless times before, and he'd never seen more than a glimmer from the LED. It had been

too hard, too clear, to be caused by random contamination, and he certainly hadn't imagined it.

He told himself to be calm. If the LED had brightened when the antenna was locked onto Earth--well, that might be worth getting excited about. Might. But as it slewed back to stow, the antenna was just sweeping over empty sky.

All the same: plenty of cosmic radio signals out there, but none of them should be outputting in the narrow frequency range that the antenna was built to sniff. So maybe it had picked up something, unless the electronics were finally going south.

One way to tell.

Renfrew told the dish to track back onto Earth. He watched the board carefully this time, for he hadn't been paying attention the first time the antenna had moved.

But there it was again: that same brightening. And now that he'd seen it twice, he saw that the LED brightened and dimmed in a systematic fashion.

Exactly as if the dish was tracking across a concentrated radio source.

Exactly as if something was out there.

Renfrew backed up and repeated the cycle, using manual override to guide the antenna onto the signal. He wagged the dish until he judged that the LED was at its brightest, then watched the steady green light with a growing and cautious amazement.

He noted the coordinates of the source, remembering that he had only chanced upon it by accident, and that the same slew operation wouldn't necessarily pick up the mystery signal a day or a week from now. But if he recorded the position of the source now, and kept an eye on it from hour to hour and then day to day, he should at least be able to tell if it was an object moving inside the solar system, rather than some distant extragalactic radio source that just happened to look artificial.

Renfrew dared not invest too much hope in the detection. But if it was local, if it was coming from something within the system ... then it might have serious implications.

Especially for him.

* * * *

Renfrew's excitement was tempered with caution. He vowed not to speak of the matter to Piano Man until he could be certain that the object was all that he hoped it might be: some tangible sign that someone had survived.

He'd expected that the discovery might make it hard for him to keep his mind on his studies, like a student distracted by something more interesting out the window. But to his surprise exactly the reverse was the case. Spurred on by the possibility that his future might hold surprises, that it was not necessarily pre-ordained that he would die alone and on Mars,

Renfrew found that his intellectual curiosity was actually heightened. He redoubled his efforts to understand his predicament, gulping down pages of text that had seemed opaque and impenetrable only days before, but which now seemed lucid, transparent, even childlike in their simplicity. He found himself laughing, delighted with each tangible instance of progress towards his goal. He barely ate, and neglected some of the less pressing matters of base maintenance. And as the radio source refused to away--as it looked more and more like something approaching Mars--Renfrew was gripped by the sense that he was engaged in a race; that he was in some way obliged to complete his task before the source arrived, that they would be waiting to hear what he had to say.

By night he dreamed cosmology, his dreams becoming ever more epic and ambitious as his knowledge of the science improved. With a fever-like sense of repetition he recapitulated the entire history of the universe, from its first moment of existence to the grand and symphonic flourishing of intelligence.

At the beginning there was always nothingness, an absence not only of space and time but of existence itself, and yet at the same time he was aware of a trembling pre-potential, a feeling that the nothingness was poised on the cusp of an awesome instability, as if the unborn universe was itching to bring itself into being. With nightly inevitability it came: less an explosion than a kind of delicate clockwork unravelling, as cunningly-packed structures unwound with inflationary speed, crystallising out into brand new superluminally expanding vacuum. He dreamed of symmetries snapping apart, mass and energy becoming distinct, force and matter bootstrapping into complex structures. He dreamed of atoms stabilising, linking to form molecules and crystals, and from those building blocks he dreamed the simple beginnings of chemistry. He dreamed of galaxies condensing out of gas, of supermassive young suns flaring brilliantly and briefly within those galaxies. Each subsequent generation of stars was more stable than the last, and as they evolved and died they brewed metals and then coughed them into interstellar space. Out of those metals condensed worlds--hot and scalding at first, until comets rained onto their crusts, quenching them and given them oceans and atmospheres.

He dreamed of the worlds ageing. On some the conditions were right for the genesis of microbial life. But the universe had to get very much older and larger before he saw anything more interesting than that. Even then it was scarce, and the worlds where animals stalked ocean beds before flopping and oozing ashore had a precious, gemlike rarity.

Rarer still were the worlds where those animals staggered toward self-awareness. But once or twice in every billion years it did happen. Occasionally life even learned to use tools and language, and look towards the stars.

Toward the end of one particularly vivid cosmological dream Renfrew found himself focussing on the rarity of intelligence in the universe. He saw the galaxy spread out before him, spiral arms of creamy white flecked here and there by the ruby reds of cool supergiants or the dazzling kingfisher blues of the hottest stars. Dotted across the galaxy's swirl were candles, the kind he remembered from birthday cakes. There were a dozen or so to start

with, placed randomly in a rough band that was not too near the galactic core nor too close to the outer edges. The candles wavered slightly, and then--one by one--they began to go out.

Until only one was left. It was not even the brightest of those that had been there to begin with.

Renfrew felt a dreadful sense of that solitary candle's vulnerability. He looked up and below the plane of the galaxy, out toward its neighbours, but he saw no signs of candles elsewhere.

He desperately wanted to cradle that remaining candle, shelter it from the wind and keep it burning. He heard Piano Man singing: And it seems to me you've lived your life...

It went out.

All was void. Renfrew woke up shivering, and then raced to the suiting room and the airlock, and the waiting antenna, seeking contact with that radio signal.

* * * *

"I think I understand," he told Piano Man. "Life has to be here to observe the universe, or it doesn't have any meaning. It's like the idea of the observer in quantum mechanics, collapsing an indeterminate system down to one possibility, opening the box and forcing the cat to chose between being dead or alive..."

Piano Man took off his glasses and polished them on his sleeve. He said nothing for at least a minute, satisfying himself that the glasses were clean before carefully replacing them on his nose. "That's what you think, is it? That's your big insight? That the universe needs its own observer? Well, break out the bubbly. Houston, I think we have a result."

"It's better than nothing."

"Right. And do how did this universe manage for fifteen billion years before we dropped by and provided an intelligent observer? Are you seriously telling me it was all fuzzy and indeterminate until the instant some anonymous caveman had a moment of cosmic epiphany? That suddenly the entire quantum history of every particle in the visible universe--right out to the furthest quasar--suddenly jumped to one state, and all because some thicke in a bearskin had his brain wired up slightly differently to his ancestor?"

Renfrew thought back to his dream of the galactic disk studded with candle light. "No ... I'm not saying that. There were other observers before us. We're just the latest."

"And these other observers--they were there all along, were they? An unbroken chain right back to the first instant of creation?"

"Well, no. Obviously the universe had to reach a certain minimum age before the preconditions for life--intelligent life--became established. But once that happened..."

"It's bollocks, though, isn't it, luv? What difference does it make if there's a gap of one second where the universe is unobserved, or ten billion years? None at all, as far as I'm concerned."

"Look, I'm trying, all right? I'm doing my best. And anyway..." Renfrew felt a sudden lurch of intuitive breakthrough. "We don't need all those other observers, do we? We have observed the entire history of the universe, just by looking out at higher and higher redshifts, with increasing look-back times. It's because the speed of light is finite. If it wasn't, information from the very further parts of the universe would reach us immediately, and we'd have no way of viewing earlier epochs."

"Fuck me man, you almost sound like a cosmologist."

"I think I might have become one."

"Just don't make a career of it," Piano Man said. He shook his head exasperatedly, then started playing Benny and the Jets.

* * * *

A week later he told him the news. Renfrew's companion played the tentative ghost of a melody on the keyboard, something that hadn't yet crystallised into true music.

"You waited until now to tell me?" Piano Man asked, with a pained, disappointed look.

"I had to be certain. I had to keep tracking the thing, making sure it was really out there, and then making sure it was something worth getting excited about."

"And?"

Renfrew offered a smile. "I think it's worth getting excited about."

Piano Man played an icy line, dripping sarcastic bonhomie.

"Really."

"I'm serious. It's a navigation signal, a spacecraft beacon. It keeps repeating the same code, over and over again." Renfrew leaned in closer: if he'd been able to lean on the phantom piano, he would have. "It's getting stronger. Whatever's putting out that signal is getting closer to Mars."

"You don't know that."

"OK, I don't. But there's the Doppler to consider as well. The signal's changing frequency a little from day to day. Put the two things together and you've got a ship making some kind of course correction, coming in for orbital insertion."

"Good for you."

Renfrew stepped back from the piano, surprised at his companion's dismissive reaction.

"There's a ship coming. Aren't you happy for me?"

"Tickled pink, luv."

"I don't understand. This is what I've been waiting for all this time: news that someone's survived, that it doesn't all end here." For the first time in their acquaintance, Renfrew raised his voice with Piano Man. "What the hell's wrong with you? Are you jealous that you won't be all the company I'm ever going to have?"

"Jealous? I don't think so."

Renfrew plunged his fist through the white nothingness of the piano. "Then show some reaction!"

Piano Man lifted his hands from the keyboard. He closed the keyboard cover very gently and then sat with his hands in his lap, demurely, just the way he'd been when Renfrew had first witnessed him. He looked at Renfrew, his expression blank, whatever message his eyes might have conveyed lost behind the star-shaped mirrors of his glasses.

"You want a reaction? Fine, I'll give you one. You're making a very, very serious mistake."

"It's no mistake. I know. I've double-checked checked everything..."

"It's still a mistake."

"The ship's coming."

"Something's coming. It may not be all that you expect."

Renfrew's fury boiled over. "Since when have you the faintest fucking idea what I expect or don't expect? You're just a piece of software."

"Whatever you say, luv. But remind me: when was the last time software encouraged you to take a deep interest in the fundamental workings of the universe?"

Renfrew had no answer for that. But he had to say something. "They're coming. I know they're coming. Things are going to get better. You'll see when the ship comes."

"You're going to do yourself a lot of harm."

"As if you cared. As if you were capable of caring."

"You've found a way to stay sane, Renfrew--even if that means admitting a tiny piece of piano-playing madness into your world. But there's a cost to that sanity, and it isn't moi. The cost is you can't ever allow yourself an instant of hope, because hope is something that will always be crushed, crushed utterly, and in the crushing of hope you will be weakened forever, just as surely as if you'd mainlined some slow-acting poison." Piano Man looked at Renfrew with a sudden, scholarly interest. "How many instants of defeat do you think you can take, big guy? One, two, three? From where I'm sitting I wouldn't bet on three. I think three might easily kill you. I think

two might get you on a shitty day."

"Something's coming," Renfrew said, plaintively.

"I thought for a while you had the balls to get through this. I thought you'd banished hope, learned to keep it outside in the cold. I was wrong: you've let it in again. Now it's going to stalk you, like a starved, half-crazed wolf."

"It's my wolf."

"There's still time to chase it away. Don't let me down now, Renfrew. I've counting on you not to screw things up."

* * * *

That night Renfrew dreamed not of cosmology, but of something stranger and more upsetting. It was not one of the dreams he used to have about the past, for he had trained himself not to have those any more; the sense of sadness and loss upon waking almost too much to bear. Nor was it one of the equally troubling ones about visitors, people coming down out of cold blue skies and landing near the base. When then came through the airlock they arrived with flowers--Hawaiian luas--and utterly pointless but lovingly gift-wrapped presents. Their faces were never familiar at first, but by the end of each visitation, just before he woke, they would always start to transmute into old friends and loved ones. Renfrew hadn't yet trained himself not to have that kind of dream, and given the news about the radio signal he was sure at least one of them would haunt his sleep in the days ahead.

It was not that kind of dream. What happened in the dream was that Renfrew rose like a sleepwalker from his bed in the middle of the night and crept through the base to the same medical lab where Solovyova had died, and placed his head into one of the functioning scanners, conjuring a glowing lilac image of his skull on the main screen, and then emerged from the scanner and examined the readout to learn that his optic implants had been dead for years; that there was no possible way it was picking up the Bösendorfer, let alone the talking ghost that played it.

In the morning, when he woke from the dream, Renfrew couldn't bring himself to visit the medical lab, in case he had already been there in the night.

* * * *

By day he kept a weather eye on the radio signal. It strengthened and Dopplered, moving quickly against the stars as it fell into the grasp of Mars. Then the signal altered, switching to a different, equally meaningless burst of repeating binary gibberish. Renfrew knew that it meant something, and intensified his vigil.

A day later, a meteor flared across the twilight sky, etching a fire trail, and dropped behind the closest range of hills under a dark umbrella of parachutes.

"I'm going out to find where they came down," Renfrew said.

"How far?"

"I don't know how far. Can't be all that far beyond the western marker."

"That's still twenty kilometres away."

"I'll take the car. It still works."

"You've never driven it alone. It's a long walk home if something goes wrong."

"Nothing's going wrong. I won't be alone."

Piano Man started to say something, but Renfrew wasn't listening.

He pre-breathed, suited up, climbed onto the skeletal chassis of the buggy, then went out to meet the newcomers. As the mesh-wheeled vehicle bounced and gyred its way to the horizon, Renfrew felt a thrilled elation, as if he were on his way to a date with a beautiful and mysterious woman who might be his lover by the end of the evening.

But when he crested the hills and saw the fallen ship, he knew that nobody had ridden it to Mars. It was too small for that, even if this was just the re-entry component of a larger ship still circling the planet. What had come down was just a cargo pod, a blunt cylinder the size of a small minibus. It was tangled up with its own parachutes and the deflated gasbags it had deployed just before impact.

Renfrew parked the buggy, then spent ten minutes clearing fabric away from the cargo pod's door. The re-entry had scorched the decals, flags and data panels on the pod's skin to near-illegibility, but Renfrew knew the drill. Back when the base was inhabited, he'd occasionally drawn the short straw to drive out to recover a pod that had fallen away from the usual touchdown beacon.

He was sorry it wasn't a crewed ship, but the pod was the next best thing. Maybe they were still getting the infrastructure back up to speed. Sending out a manned vehicle was obviously too much of a stretch right now, and that was understandable. But they'd still had the presence of mind not to forget about Mars, even if all they could muster was a one-shot cargo pod. He would not be ungrateful. The pod could easily contain valuable medicines and machine parts, enough to relieve him of several ever-present worries. They might even have sent some luxuries, as a token of goodwill: things that the synths had never been very good at.

Renfrew touched a hand against the armoured panel next to the door, ready to flip it open and expose the pyrotechnic release mechanism. That was when one of the scorches caught his eye. It was a data panel, printed in spray-stencilled letters.

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HTCV-554

Hohmann Transfer Cargo Vehicle

Scheduled launch: Kagoshima 05/38

Destination: Tharsis Base, Mars

Payload: replacement laser optics

Property: Mars Development Corporation--

According to the data panel, the cargo pod had been scheduled to lift from Kagoshima spaceport one month before the virus hit. Maybe the panel was wrong; maybe this pod had been prepared and sprayed and then held on the pad until the virus had passed and the reconstruction had begun...

But why send him glass?

Renfrew knew, with an appalling certainty, that the vehicle had not been delayed on the pad. It had launched just as its owners had intended, on time, with a consignment of precision glassware that might just have been useful back when the base was fully inhabited and they'd needed a steady supply of laser optics for the surveying work.

But somewhere between Earth and Mars, the cargo pod had lost its way. When the virus hit, the pod would have lost contact with the Earth-based tracking system that was supposed to guide it on its way. But the pod hadn't simply drifted into interplanetary space, lost forever. Instead, its dumb-as-fuck navigation system had caused it to make an extra fuel-conserving loop around the sun, until it finally locked onto the Mars transponder.

Renfrew must have picked it up shortly afterwards.

He stumbled back to the buggy. He climbed into the openwork frame, settled into the driver's seat and didn't bother with the harness. He kept his breathing in check. The disappointment hadn't hit yet, but he could feel it coming, sliding toward him with the oiled glide of a piston. It was going to hurt like hell when it arrived. It was going to feel like the weight of creation pushing down onto his chest. It was going to squeeze the life out of him; it was going to make him open that helmet visor, if he didn't make it home first.

Piano Man had been right. He'd allowed hope back into his world, and now hope was going to make him pay.

He gunned the buggy to maximum power, flinging dust from its wheels, skidding until it found traction. He steered away from the cargo pod, not wanting to look at it, not even wanting to catch a glimpse of it in the buggy's rear view mirrors.

He'd made it to within five kilometres of the base when he hit a boulder, tipping the buggy over. Renfrew tumbled from the driver's seat, and the last thing he saw--the last thing he was aware of--was an edge of sharp rock rising to shatter his visor.

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Part Three

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And yet Renfrew woke.

Consciousness came back to him in a crystal rush. He remembered everything, up to and including the last instant of his accident. It seemed to have happened only minutes earlier: he could almost taste blood in his mouth. Yet by the same token the memory seemed inhumanly ancient, calcified into hardness, brittle as coral.

He was back in the base, not out by the crashed buggy. Through narrow, sleep-gummed eyes he picked out familiar décor. He'd come around on the same medical couch where he had seen Solovyova die. He moved his arm and touched his brow, flinching as he remembered the stone smashing through the visor, flinching again as he recalled the momentary contact of stone against skin, the hardening pressure of skin on bone, the yielding of that pressure as the edge of the stone rammed its way into his skull like a nuclear-powered icebreaker cracking hard arctic pack-ice.

The skin under his fingers was smooth, unscarred. He touched his chin and felt the same day's growth of stubble he'd been wearing when he went out to meet the pod. There was stiffness in his muscles, but nothing he wouldn't have expected after a hard day's work. He eased himself from the couch, touched bare feet to cold ceramic flooring. He was wearing the one-piece inner-layer that he'd put on under the spacesuit before he went outside. But the inner-layer was crisper and cleaner than he remembered, and when he looked at the sleeve the tears and frays he recalled were absent.

Gaining steadiness with each step, Renfrew padded across the medical lab to the window. He remembered seeing Solovyova's face reflected in the glass, the first time he'd seen the piano. It had been twilight then; it was full daylight now, and as his eyes adjusted to wakefulness, they picked out details and textures in the scenery with a clarity he'd never known before.

There were things out there that didn't belong.

They stood between the base and the foothills, set into the dust like haphazardly placed chess pieces. It was hard to say how tall they were--metres or tens of metres--for there was something slippery and elusive about the space between the forms and the base, confounding Renfrew's sense of perspective. Nor could he have reported with any certainty on the shapes of the objects. One moment he saw blocky, unchanging chunks of crystalline growth--something like tourmaline, tinted with bright reds and greens--the next he was looking at stained-glass apertures drilled through the very skein of reality, or skeletal, prismatic things that existed only in the sense that they had edges and corners, rather than surfaces and interiors. And yet there was never any sense of transition between the opposed states.

He knew, instantly and without fear, that they were alive, and that they were aware of him.

Renfrew made his way to the suiting room, counted the intact suits that were hanging there, and came up with the same number he remembered

before the buggy accident. No sign of any damage to the racked helmets.

He suited up and stepped out into Martian daylight. The forms were still there, surrounding the base like the weathered stones of some grand Neolithic circle. Yet they seemed closer now, and larger, and their transformations had an accelerated, heightened quality. They had detected his emergence; they were glad of it; it was what they had been waiting for.

Still there was no fear.

One of the shapes seemed larger than the others. It beckoned Renfrew nearer, and the ground he walked upon melted and surged under him, encouraging him to close the distance. The transformations became more feverish. His suit monitor informed him that the air outside was as cold and thin as ever, but a sound was reaching him through the helmet that he'd never heard in all his time on Mars. It was a chorus of shrill, quavering notes, like the sound from a glass organ, and it was coming from the aliens. In that chorus was ecstasy and expectation. It should have terrified him; should have sent him scurrying back inside, should have sent him into gibbering catatonia, but it only made him stronger.

Renfrew dared to look up.

If the aliens gathered around the base were the crew, then the thing suspended over the base--the thing that swallowed three fifths of the sky, more like a weather system than a machine--had to be their ship. It was a vast frozen explosion of colours and shapes, and it made him want to shrivel back into his skull. The mere existence of the aliens and their ship told him that all he had learned, all the wisdom he had worked so hard to accrue, was at best a scratch against the rock face of reality.

He still had a long, long way to go.

He looked down, and walked to the base of the largest alien. The keening reached a shrill, exultant climax. Now that he was close, the alien's shape-and-size shifting had subsided. The form looming over him was stable and crystalline, with the landscape behind it faintly visible through the refracted translucence of the alien's body.

The alien's voice, when it came, felt like the universe whispering secrets into his head.

"Are you feeling better now?"

Renfrew almost laughed at the banality of the question. "I'm feeling ... better, yes."

"That's good. We were concerned. Very, very concerned. It pleases us that you have made this recovery."

The keening quietened. Renfrew sensed that the other aliens were witnesses to a one-on-one conversation between him and this largest entity, and that there was something utterly respectful, even subservient, in their silence.

"When you talk about my recovery ... are you saying..." Renfrew paused,

choosing his words with care. "Did you make me better?"

"We healed you, yes. We healed you and learned your language from the internal wiring of your mind."

"I should have died out there. When I tipped the buggy ... I thought I was dead. I knew I was dead."

"There were enough recoverable patterns. It was in our gift to remake you. Only you, however, can say whether we did a good enough job."

"I feel the same way I always did. Except better: like I've been turned inside out and flushed clean."

"That is what we hoped."

"You mind if I ask..."

The alien pulsed an inviting shade of pink.

"You may ask anything you like."

"Who are you? What are you doing here? Why have you come now?"

"We are the Kind. We have arrived to preserve and resurrect what we may. We have arrived now because we could not arrive sooner."

"But the coincidence ... to come now, after we've been waiting so long ... to come now, just after we've wiped ourselves out. Why couldn't you come sooner, and stop us fucking things up so badly?"

"We came as fast as we could. As soon as we detected the electromagnetic emanations of your culture ... we commenced our journey."

"How far have you come?"

"More than two hundred of your light years. Our vehicle moves very quickly, but not faster than light. More than four hundred years have passed since the transmission of the radio signals that alerted us."

"No," Renfrew said, shaking his head, wondering how the aliens could have made such a basic mistake. "That isn't possible. Radio hasn't been around that long. We've had television for maybe a hundred years, radio for twenty or thirty years longer ... but not four hundred years. No way was it our signals you picked up."

The alien shifted to a soothing turquoise.

"You are mistaken, but understandably so. You were dead longer than you realise."

"No," he said flatly.

"That is the way it is. Of course you have no memory of the intervening time."

"But the base looks exactly the way it did before I left."

"We repaired your home, as well. If you would like it changed again, that is also possible."

Renfrew felt the first stirrings of acceptance; the knowledge that what the alien was telling him was correct.

"If you've brought me back..."

"Yes," the alien encouraged.

"What about the others? What about all the other people who died here--Solovyova and the ones before her? What about all the people who died on Earth?"

"There were no recoverable forms on the Earth. We can show you if you would like ... but we think you would find it distressing."

"Why?"

"We did. A lifecrash is always distressing, even to machine-based entities such as us. Especially after such a long and uninterrupted evolutionary history."

"A lifecrash?"

"It did not just end with the extinction of humanity. The agent that wiped out your species had the capacity to change. Eventually it assimilated every biological form on the planet, leaving only itself: endlessly cannibalising, endlessly replicating."

Renfrew dealt with that. He'd already adjusted to the fact that humanity was gone and that he was never going to see Earth again. It did not require a great adjustment to accept that Earth itself had been lost, along with the entire web of life it had once supported.

Not that he was exactly thrilled, either.

"OK," he said falteringly. "But what about the people I buried here?"

Renfrew sensed the alien's regret. Its facets shone a sombre amber.

"Their patterns were not recoverable. They were buried in caskets, along with moisture and microorganisms. Time did the rest. We did try, yes ... but there was nothing left to work with."

"I died out there as well. Why was it any different for me?"

"You were kept cold and dry. That made all the difference, as far as we were concerned."

So he'd mummified out there, baked dry under that merciless sterilising sky, instead of rotting in the ground like his friends. Out there under that Martian sun, for the better part of three hundred years ... what must he have looked like when they pulled him out of the remains of his suit, he wondered? Maybe a bleached and twisted thing, corded with the knotted remains of musculature and tissue: something that could easily have been

mistaken for driftwood, had there been driftwood on Mars.

The wonder and horror of it all was almost too much. He'd been the last human being alive, and then he had died, and now he was the first human being to be resurrected by aliens.

The first and perhaps the last: he sensed even then that, as Godlike as the Kind appeared, they were bound by limits. They were as much prisoners of what the universe chose to allow, and what it chose not to allow, as humanity, or dust, or atoms.

"Why?" he asked.

A pulse of ochre signified the alien's confusion.

"Why what?"

"Why did you bring me back? What possible interest am I to you?"

The alien considered his remark, warming through shades of orange to a bright venous red. Like an echo, the shade spread to the other members of the gathering.

"We help," the leader told Renfrew. "That is what we do. That is what we have always done. We are the Kind."

* * * *

He returned to the base and tried to continue his affairs, just as if the Kind had never arrived. Yet they were always out there whenever he passed a window: brighter and closer now as evening stole in, as if they had gathered the day's light and were now re-radiating it in subtly altered shades. He closed the storm shutters but that didn't help much. He did not doubt that the ship was still poised above, suspended over the base as if guarding the infinitely precious thing that he had become.

Renfrew's old routines had little meaning now. The aliens hadn't just brought the base back to the way it had been before he crashed the buggy. They had repaired all the damage that had accrued since the collapse of Earthside society, and the base systems now functioned better than at any point since the base's construction. As mindless as his maintenance tours had been, they had imposed structure on his life that was now absent. Renfrew felt like a rat that'd had his exercise wheel taken away.

He went to the recreation room and brought the system back online. Everything functioned as the designers had intended. The aliens must have repaired, or at least not removed, his implant. But when he cycled through the myriad options, he found that something had happened to Piano Man.

The figure was still there--Renfrew even knew his name, now--but the companion he remembered was gone. Now Piano Man behaved just like all the other generated personalities. Renfrew could still talk to him, and Piano Man could still answer him back, but nothing like their old conversations was now possible. Piano Man would take requests, and banter, but that was the limit of his abilities. If Renfrew tried to steer the conversation away from the strictly musical, if he tried to engage Piano Man in a

discussion about cosmology or quantum mechanics, all he got back was a polite but puzzled stare. And the more Renfrew persisted, the less it seemed to him that there was any consciousness behind that implant-generated face. All he was dealing with was a paper-thin figment of the entertainment system.

Renfrew knew that the Kind hadn't 'fixed' Piano Man in the sense that they had fixed the rest of the base. But--deliberately or otherwise--their arrival had destroyed the illusion of companionship. Perhaps they had straightened some neurological kink in Renfrew's brain when they put him back together. Or perhaps the mere fact of their arrival had caused his subconsciousness to discard that earlier mental crutch.

He knew it shouldn't have meant anything. Piano Man hadn't existed in any real sense. Feeling sorrow for his absence was as ridiculous as mourning the death of a character in a dream. He'd made Piano Man up; his companion had never had any objective existence.

But he still felt that he had lost a friend.

"I'm sorry," he said, to that polite but puzzled face. "You were right, and I was wrong. I was doing fine just the way things were. I should have listened to you."

There was an uncomfortable pause, before Piano Man smiled and spread his fingers above the keyboard.

"Would you like me to play something?"

"Yes," Renfrew said. "Play Rocket Man. For old time's sake."

* * * *

He allowed the Kind into Tharsis Base. Their crystalline forms were soon everywhere, spreading and multiplying in a mad orgy of prismatic colour, transforming the drab architecture into a magical lantern-lit grotto. The beauty of it was so startling, so intoxicating, that it moved Renfrew to tears with the knowledge that no one else would ever see it.

"But it could be different," the leader told him. "We did not broach this earlier, but there are possibilities you may wish to consider."

"Such as?"

"We have repaired you, and made you somewhat younger than you were before your accident. In doing so we have learned a great deal about your biology. We cannot resurrect the dead of Earth, or your companions here on Mars, but we can give you other people."

"I don't follow."

"It would cost us nothing to weave new companions. They could be grown to adulthood at accelerated speed, or your own ageing could be arrested while you give the children time to grow."

"And then what?"

"You could breed with them, if you chose. We'd intervene to correct any genetic anomalies."

Renfrew smiled. "Mars ain't the kind of place to raise your kids. At least, that's what a friend of mine told me that once."

"Now there is nowhere but Mars. Doesn't that make a difference? Or would you rather we established a habitable zone on Earth and transplanted you there?"

They made him feel like a plant: like some incredibly rare and delicate orchid.

"Would I notice the difference?"

"We could adjust your faculties so that Earth appeared the way you remembered. Or we could edit your memories to match the present conditions."

"Why can't you just put things back the way they were? Surely one runaway virus isn't going to defeat you."

The alien turned a shade of chrome blue that Renfrew had learned to recognise as indicative of gentle chiding. "That's not our way. The runaway agent now constitutes its own form of life, brimming with future potential. To wipe it out now would be akin to sterilising your planet just as your own single-celled ancestors were gaining a foothold."

"You care about life that much?"

"Life is precious. Infinitely so. Perhaps it takes a machine intelligence to appreciate that." The chrome blue faded, replaced by a placatory olive green. "Given that Earth cannot be made the way it was, will you reconsider our offer to give you companionship?"

"Not now," he said.

"But later, perhaps?"

"I don't know. I've been on my own a long time. I'm not sure it isn't better this way."

"You've craved companionship for years. Why reject it now?"

"Because..." And here Renfrew faltered, conscious of his own inarticulacy before the alien. "When I was alone, I spent a lot of time thinking things through. I got set on that course, and I'm not sure I'm done yet. There's still some stuff I need to get straight in my head. Maybe when I'm finished..."

"Perhaps we can help you with that."

"Help me understand the universe? Help me understand what it means to be the last living man? Maybe even the last intelligent organism, in the universe?"

"It wouldn't be the first time. We are a very old culture. In our travels we have encountered myriad other species. Some of them are extinct by now, or changed beyond recognition. But many of them were engaged on quests similar to your own. We have watched, and occasionally interceded to better aid that comprehension. Nothing would please us more than to offer you similar assistance. If we cannot give you companionship, at least let us give you wisdom."

"I want to understand space and time, and my own place in it."

"The path to deep comprehension is risky."

"I'm ready for it. I've already come a long way."

"Then we shall help. But the road is long, Renfrew. The road is long and you have barely started your journey."

"I'm willing to go all the way."

"You will be long past human before you near the end of it. That is the cost of understanding space and time."

Renfrew felt a chill on the back of his neck, a premonitory shiver. The alien was not warning him for nothing. In its travels it must have witnessed things that caused it distress.

Still he said: "Whatever it takes. Bring it on. I'm ready."

"Now?"

"Now. But before we begin ... you don't call me Renfrew any more."

"You wish a new name, to signify this new stage in your quest?"

"From now on, I'm John. That's what I want you to call me."

"Just John?"

He nodded solemnly. "Just John."

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Part Four

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The Kind did things to John.

While he slept, they altered his mind: infiltrating it with tiny crystal avatars of themselves, performing prestigious feats of neural rewiring. When he woke he still felt like himself: still carried the same freight of memories and emotions that he'd taken with him to sleep. But suddenly he had the ability to grasp things that had been impenetrably difficult only hours earlier. Before the accident, he had explored the inlets of superstring theory, like an explorer searching for a navigable route through a treacherous mountain range. He had never found that easy path, never dreamed of conquering the dizzying summits before him, but now,

miraculously, he was on the other side, and the route through the obstacle looked insultingly easy. Beyond superstring theory lay the unified territory of M-theory, but that, too, was soon his. John revelled in his new understanding.

More and more, he began to think in terms of a room whose floor was the absolute truth about the universe: where it had come from, how it worked, what it meant to be a thinking being in that universe. But that floor looked very much like a carpet, and it was in turn concealed by other carpets, one on top of the other, each of which represented some imperfect approximation to the final layer. Each layer might look convincing; might endure decades or centuries of enquiry without hinting that it contained a flaw, but sooner or later one would inevitably reveal itself. A tiny loose thread--perhaps a discrepancy between observation and theory--and with a tug the entire fabric of that layer would come apart. It was in the nature of such revolutions that the next layer down would already have been glimpsed by then. Only the final carpet, the floor, would contain no logical inconsistencies, no threads waiting to be unravelled.

Could you ever know when you'd reached it, John wondered? Some thinkers considered it impossible to ever know with certainty. All you could do was keep testing, tugging at every strand to see how firmly it was woven into the whole. If after tens of thousands of years, the pattern was still intact, then it might begin to seem likely that you had arrived at final wisdom. But you could never know for sure. The ten thousand and first year might bring forth some trifling observation that, as innocent as it first seemed, would eventually prove that there was yet another layer lurking underneath.

You could go on like that forever, never knowing for sure.

Or--as some other thinkers speculated--the final theory might come with its own guarantee of authenticity, a golden strand of logical validation threaded into the very mathematical language in which it was couched. It might be in the nature of the theory to state that there could be no deeper description of the universe.

But even then: it wouldn't stop you making observations. It wouldn't stop you testing.

John kept learning. M-theory became a distant and trifling obstacle, dwarfed by the daunting unified theories that had superseded it. These theories probed the interface not just of matter and spacetime, but also of consciousness and entropy, information, complexity and the growth of replicating structures. On the face of it, they seemed to describe everything that conceivably mattered about the universe.

But each in turn was revealed as flawed, incomplete, at odds with observation. An error in the predicted mass of the electron, in the twenty-second decimal place. A one-in-ten-thousandth part discrepancy in the predicted bending of starlight around a certain class of rotating black hole. A niggling mismatch between the predicted and observed properties of inertia, in highly charged spacetime.

The room contained many carpets, and John had the dizzying sense that

there were still many layers between him and the floor. He'd made progress, certainly, but it had only sharpened his sense of how far he had to go.

The Kind remade him time and again, resetting his body clock to give him the time he needed for his studies. But each leap of understanding pushed him closer to the fundamental limits of a wet human brain wired together from a few hundred billion neurons, crammed into a tiny cage of bone.

"You can stop now, if you like," the Kind said, in the hundredth year of his quest.

"Or what?" John asked mildly.

"Or we continue, with certain modifications."

John gave them his consent. It would mean not being human for a little while, but given the distance he had come, the price did not strike him as unreasonable.

The Kind encoded the existing patterns of his mind into a body much like one of their own. For John the transition to a machine-based substrate of thinking crystal was in no way traumatic, especially as the Kind assured him that the process was completely reversible. Freed of the constraints of flesh and scale, his progress accelerated even more. From this new perspective, his old human mind looked like something seen through the wrong end of a telescope. Compared to the mental mansion he now inhabited, his former residence looked as squalid and limiting as a rabbit hutch. It was a wonder he'd understood anything.

But John wasn't finished.

A thousand years passed. Always adding new capacity to himself, he had become a kilometre-high crystalline mound on the summit of Pavonis Mons. He was larger by far than any of the Kind, but that was only to be expected: he was probing layers of reality that they had long since mapped to their own satisfaction, and from which they had dutifully retreated. Having attained that understanding once, the Kind had no further need for it.

There were other people on Mars now. John had finally acquiesced to the Kind's offer to bring him companions, and they had created children who had now grown to become parents and grandparents. But when John agreed to the coming of other humans, it had little do with his own need for companionship. He felt too remote from other humans now, and it was only because he sensed that the Kind wished to perform this exercise--that it would please the aliens to have something else to do--that he had relented. But even if he could not relate to the teeming newcomers, he found it pleasing to divert a small portion of his energies to their amusement. He rearranged his outer architecture--dedicated to only the most trivial data-handling tasks--so that he resembled an ornate crystalline fairy palace, with spires and domes and battlements, and at dusk he twinkled with refracted sunlight, throwing coloured glories across the great plains of the Tharsis Montes. A yellow road spiralled around his foot slopes. He became a site of pilgrimage, and he sang to the pilgrims as they toiled

up and down the spiral road.

Millennia passed. Still John's mind burrowed deeper.

He reported to the Kind that he had passed through eighteen paradigmatic layers of reality, each of which had demanded a concomitant upgrade in his neural wiring before he could be said to have understood the theory in all its implications, and therefore recognised the flaw that led to the next layer down.

The Kind informed him that--in all the history that was known to them--fewer than five hundred other sentient beings had attained John's present level understanding.

Still John kept going, aware that in all significant respects he had now exceeded the intellectual capacity of the Kind. They were there to assist him, to guide him through his transformations, but they had only a dim conception of what it now felt to be John. According to their data less than a hundred individuals, from a hundred different cultures, all of them now extinct, had reached this point.

Ahead, the Kind warned, were treacherous waters.

John's architectural transformations soon began to place an intolerable strain on the fragile geology of Pavonis Mons. Rather than reinforce the ancient volcano to support his increasing size and mass, John chose to detach himself from the surface entirely. For twenty six thousand years he floated in the thickening Martian atmosphere, supported by batteries of antigravity generators. For much of that time it pleased him to manifest in the form of a Bösendorfer grand piano, a shape reconstructed from his oldest human memories. He drifted over the landscape, solitary as a cloud, and occasionally he played slow tunes that fell from the sky like thunder.

Yet soon there came a time when he was too large even for the atmosphere. The heat dissipation from his mental processes was starting to have an adverse effect on the global climate.

It was time to leave.

In space he grew prolifically for fifteen million years. Hot blue stars formed, lived and died while he gnawed away at the edges of certain intractables. Human civilisations buzzed around him like flies. Among them, he knew, were individuals who were engaged in something like the same quest for understanding. He wished them well, but he had a head start none of them had a hope of ever overtaking. Over the years his density had increased, until he was now composed mostly of solid nuclear matter. Then he had evolved to substrates of pure quark matter. By then, his own gravity had become immense, and the Kind reinforced him with mighty spars of exotic matter, pilfered from the disused wormhole transit system of some long-vanished culture. A binary pulsar was harnessed to power him; titanic clockwork enslaved for the purposes of pure mentation.

And still deeper John tunnelled.

"I ... sense something," he told the Kind one day.

They asked him what, fearing his answer.

"Something ahead of me," he said. "A few layers down. I can't quite see it yet, but I'm pretty sure I can sense it."

They asked him what it was like.

"An ending," John told them.

"This is what we always knew would come to pass," the Kind told him.

They informed him that only seven other sentient beings had reached John's current state of enlightenment; none in the last three billion years. They also told him that to achieve enlightenment he would have to change again; become denser still, squeezed down into a thinking core that was only just capable of supporting itself against its own ferocious gravity.

"You'll be unstable," they told him. "Your very thought processes will tend to push you into your own critical radius."

He knew what they meant, but he wanted to hear them spell it out. "And when that happens?"

"You become a black hole. No force in the universe will be able to prevent your collapse. These are the treacherous waters we mentioned earlier."

They said 'earlier' as if they meant 'earlier this afternoon,' rather than 'earlier in the history of this universe.' But John had long since accustomed himself to the awesome timescales of the Kind.

"I still want you to do it. I've come too far to give up now."

"As you wish."

So they made him into a vast ring of hyperdense matter, poised on the edge of collapse. In his immense gravitational field, John's lightning thought processes grew sluggish. But his computational resources were now vast.

Many times he orbited the galaxy.

With each layer that he passed, he sensed the increasing presence of the ending; the final, rock-hard substrate of reality. He knew it was the floor, not another mirage-like illusion of finality. He was almost there now: his great quest was nearing its completion, and in a few thoughts--a few hours in the long afternoon of the universe--he would have arrived.

Yet John called a halt to his thinking.

"Is there a problem?" the Kind asked, solicitously.

"I don't know. Maybe. I've been thinking about what you said before: about how my own thought processes might push me over the edge."

"Yes," the Kind said.

"I'm wondering: what would that really mean?"

"It would mean death. There has been much debate on the matter, but the present state of understanding is that no useful information can ever emerge from a black hole."

"You're right. That sounds an awfully lot like death to me."

"Then perhaps you will consider stopping now, while there is still time. You have at least glimpsed the final layer. Is that not enough for you? You've come further than you could ever have dreamed when you embarked on this quest."

"That's true."

"Well, then. Let this be an end to it. Dwell not on what is left to be done, but, yes, on what you have already achieved."

"I'd like to. But there's this nagging little thing I can't stop thinking about."

"Please. To think about anything in your present state is not without risk."

"I know. But I think this might be important. Do you think it's coincidence that I've reached this point in my quest, at the same time that I'm teetering on the edge of collapsing into myself?"

"We confess we hadn't given the matter a great deal of thought, beyond the immediate practicalities."

"Well, I have. And I've been thinking. Way back when, I read a theory about baby universes."

"Continue..." the Kind said warily.

"How they might be born inside black holes, where the ordinary rules of space and time break down. The idea being that when the singularity inside a black hole forms, it actually buds off a whole new universe, with its own subtly altered laws of physics. That's where the information goes: down the pipe, into the baby universe. We see no evidence of this on the outside--the expansion's in a direction we can't point; it isn't as if the new universe is expanding into our own like an explosion--but that doesn't mean it isn't happening every time a black hole forms somewhere in our universe. In fact, it's entirely possible that our universe might well have been budded off from someone else's black hole."

"We are aware of this speculation. And your point being?"

"Perhaps it isn't coincidence. Perhaps this is just the way it has to be. You cannot attain ultimate wisdom about the universe without reaching this point of gravitational collapse. And at the moment you do attain final understanding--when the last piece falls into place, when you finally glimpse that ultimate layer of reality--you slip over the edge, into irreversible collapse."

"In other words, you die. As we warned."

"But maybe not. After all, by that point you've become little more than pure information. What if you survive the transition through your own singularity,

and slip through into the baby universe?"

"To become smeared out and re-radiated as random noise, you mean?"

"Actually, I had something else in mind. Who's to say that you don't end up encoding yourself into the very structure of that new universe?"

"Who's to say that you do?"

"I admit it's speculative. But there is something rather beautiful and symmetric about it, don't you think? In the universes where there is intelligent life, one or more sentient individuals will eventually ask the same questions I asked myself, and follow them through to this point of penultimate understanding. When they achieve enlightenment, they exceed the critical density and become baby universes in their own right. They become what they sought to understand."

"You have no proof of this."

"No, but I have one hell of a gut feeling. There is, of course, only one way to know for sure. At the moment of understanding, I'll know whether this happens or not."

"And if it doesn't..."

"I'll still have achieved my goal. I'll know that, even as I'm crushed out of existence. If, on the other hand, it does happen ... then I won't be crushed at all. My consciousness will continue, on the other side, embedded in the fabric of space and time itself." John paused, for something had occurred to him. "I'll have become something very close to..."

"Don't say it, please," the Kind interjected.

"All right, I won't. But you see now why I hesitate. This final step will take me as far from humanity as all the steps that have preceded it. It's not something I'm about to take lightly."

"You shouldn't."

"The others..." John began, before trailing off, aware of the fear and doubt in his voice. "What did they do, when they got this far? Did they hesitate? Did they just storm on through?"

"Only three have preceded you, in all of recorded history. Two underwent gravitational collapse: we can show you the black holes they became, if you wish."

"I'll pass. Tell me about the third."

"The third chose a different path. He elected to split his consciousness into two streams, by dividing and reallocating portions of his architecture. One component continued with the quest for ultimate understanding, while the other retreated, assuming a less-dense embodiment that carried no risk of collapse."

"What happened to the component that continued?"

"Again," the Kind said, with the merest flicker of amusement at John's expense, "we'd be delighted to show you the results."

"And the other half? How could he have preserved the understanding he'd achieved, if he backtracked to a simpler architecture?"

"He couldn't. That's exactly the point."

"I don't follow. Understanding required a certain level of complexity. He couldn't have retained that understanding, if he stripped himself back."

"He didn't. He did, however, retain the memory of having understood. That, for him, was sufficient."

"Just the memory?"

"Precisely that. He'd glimpsed enlightenment. He didn't need to retain every detail of that glimpse to know he'd seen it."

"But that's not understanding," John said exasperatedly. "It's a crude approximation, like the postcard instead of the view."

"Better than being crushed out of existence, though. The being under discussion seemed adequately content with the compromise."

"And you think I will be, too?"

"We think you should at least consider the possibility."

"I will. But I'll need time to think about it."

"How long?"

"Just a bit."

"All right," the Kind said. "But just don't think too hard about it."

* * * *

It passed that, much less than a million years later, John announced to the Kind that he wished to follow the example of the third sentient being they had mentioned. He would partition his consciousness into two streams, one of which would continue towards final enlightenment, the other of which would assume a simpler and safer architecture, necessarily incapable of emulating his present degree of understanding. For John the process of dividing himself was as fraught and delicate as any of the transformations he had hitherto undergone. It required all of the skill of the Kind to affect the change in such a way as to allow the preservation of memories, even as his mind was whittled back to a mere sketch of itself. But by turns it was done, and the two Johns were both physically and mentally distinct: the one still poised on the edge of gravitational annihilation, only a thought away from transcendence, the other observing matters from a safe distance.

So it was that Simple John witnessed the collapse and infall of his more complex self: an event as sudden and violent as any natural stellar

catastrophe in recent galactic times. In that moment of understanding, he had pushed his own architecture to the limit. Somewhere in him, matter and energy collapsed to open a howling aperture to a new creation. He had reached the conclusion of his quest.

In the last nanoseconds of his physical existence however--before he was sucked under the event horizon, beyond which no information could ever emerge--Complex John did at least manage to encode and transmit a parting wave of gravitational energy, a message to his other half.

The content was very brief.

It said only: "Now I get it."

* * * *

That might have been the end of it, but shortly afterwards Simple John took a decision that was to return him to his starting point. He carried now the memory of near-enlightenment, and the memory was--as the Kind had promised, despite John's natural scepticism--very nearly as illuminating as the thing itself. In some ways, perhaps, more so--it was small and polished and gemlike, and he could examine it from different angles; quite unlike the unwieldy immersiveness of the experience itself, from which the memory had been expertly distilled.

But why, he wondered, stop there? If he could revert back to this simplified architecture and still retain the memory of what he had been before, why not take things further?

Why not go all the way back?

The descent from near-enlightenment was not a thing to be rushed, for at every stage--as his evolved faculties were stripped back and discarded--he had to be assured that the chain of memory remained unbroken. As he approached being human again, he knew on an intellectual level that what he now carried was not the memory of understanding, but the memory of a memory ... a pale, diminished, reflected thing, but no less authentic for that. It still felt genuine to John, and now--as they packed his wet, cellular mind back into the stifling cage of a Homo sapiens skull--that was all that truly mattered.

And so it came time for him to return to Mars.

Mars by then was a green and blue marble of a world much like old Earth. Despite the passage of time the rekindled human civilisation had spread no further than the solar system, and--since Earth was out of bounds--Mars remained its capital. Sixteen million people lived there now, many of them gathered into small communities scattered around the gentle foot slopes of Pavonis Mons. Deep inside Mars, a lattice of artificial black holes created a surface gravity indistinguishable from that of old Earth. Mammoth sunken buttresses kept the ancient landscape from falling in on itself. The seas were soupy with life; the atmosphere thick and warm, brimming with insects and birds.

Certain things had been preserved since John's departure. The spiralling

yellow road, for instance, still wormed its way to the summit of Pavonis Mons, and pilgrims made the long but hardly arduous ascent, pausing here and there at the many pennanted tea houses and hostels that lined the route. Though they belonged to different creeds, all remembered John in some form or another, and many of their creeds spoke of the day when he would come back to Mars. To this end, the smooth circular plateau at the top of the volcano had been kept clear, awaiting the day of John's return. Monks brushed the dust from it with great brooms. Pilgrims circled the plateau, but none ventured very far inwards from the edge.

John, human again, dropped from the sky in a cradle of alien force. It was day, but no one witnessed his arrival. The Kind had arranged an invisibility barrier around him, so that from a distance he resembled only a pillar of warm air, causing the scene behind him to tremble slightly as in a mirage.

"Are you sure you're ready for this?" the Kind asked. "You've been gone a long time. They may have some trouble dealing with your return."

John adjusted the star-shaped spectacles he had selected for his return to Mars, settling them onto the small nub of his nose.

"They'll get used to me sooner or later."

"They'll expect words of wisdom. When they don't get any, they're likely to be disappointed. 'I get it now' isn't likely to pass muster."

"They'll get over it."

"You may wish to dispense some harmless platitudes: just enough to keep them guessing. We can suggest some, if you'd like: we've had considerable practise at this sort of thing."

"I'll be fine. I'm just going to be straight with them. I came, I saw, I backed off. But I did see it, and I do remember seeing it. I think it all makes sense."

"I think it all makes sense'," the Kind repeated. "That's the best you're going to give them?"

"It was my quest. I never said it had to measure up to anyone else's expectations." John ran a hand over his scalp, flattening down his thin auburn thatch against the air currents in the invisibility field. He took a step forward, teetering on the huge red boots he had selected for his return. "How do I look, anyway?"

"Not quite the way you started out. Is there any particular reason for the physiological changes, the costume?"

John shrugged. "None in particular."

"Fine, then. You'll knock them out. That is the appropriate turn of phrase, isn't it?"

"It'll do. I guess this is it, then ... I step through here, and I'm back with people. Right?"

"Right. You have plans, we take it?"

"Nothing set in stone. See how things go, I thought. Maybe I'll settle down, maybe I won't. I've been on my own for a long time now: fitting back into human society isn't going to be a breeze. Especially some weird, futuristic human society that half thinks I'm some kind of god."

"You'll manage."

John hesitated, ready to step through into daylight, into full visibility.
"Thanks, anyway. For everything."

"It was our pleasure."

"What about you, now?"

"We'll move on," the Kind said. "Find someone else in need of help. Perhaps we'll swing by again, further down the line, see how you're all doing."

"That would be nice."

There was an awkward lull in the conversation.

"John, there is one thing we need to tell you, before you go."

He heard something in the Kind's tone that, in all their time together, was new to him.

"What is it?"

"We lied to you."

He let out small, involuntary laugh: it was the last thing he had been expecting. He did not think the Kind had ever once spoken an untruth to him.

"Tell me," he said.

"The third sentient being we spoke about ... the one that split itself into two consciousness streams?"

John nodded. "What about it?"

"It didn't exist. It was a story we made up, to persuade you to follow that course of action. In truth, you were the first to do such thing. No other entity had reached such a final stage of enlightenment without continuing on to final collapse."

John absorbed that, then nodded slowly. "I see."

"We hope you are not too angry with us."

"Why did you lie?"

"Because we had grown to like you. It was wrong ... the choice should have been yours, uncontaminated by our lies ... but without that example, we

did not think you would have chosen the route you did. And then we would have lost you, and you would not be standing here, with the memories that you have."

"I see," he said again, softer this time.

"Are you cross with us?"

John waited a little while before answering. "I should be, I suppose. But really, I'm not. You're probably right: I would have carried on. And given what I know now--given the memories I have--I'm glad this part of me didn't."

"Then it was the right thing to do?"

"It was a white lie. There are worse things."

"Thank you, John."

"I guess the next time you meet someone like me--some other sentient being engaged on that quest--you won't have to lie, will you?"

"Not now, no."

"Then we'll let it be. I'm cool with the way things turned out." John was about to step outside, but then something occurred to him. He fought to keep the playful expression from his face. "But I can't let you get away without at least doing one final favour for me. I know it's a lot to ask after you've done so much..."

"Whatever it is, we will strive to do our best."

John pointed across the mirror-smooth surface of the plateau, to the circling line of distant pilgrims. "I'm going to step outside in a moment, onto Pavonis Mons. But I don't want to scare the living daylights out of them by just walking out of thin air with no warning."

"What did you have in mind?"

John was still pointing. "You're going to make something appear before I do. Given your abilities, I don't think it will tax you very much."

"What is it that you would like?"

"A white piano," John said. "But not just any old piano. It has to be a Bösendorfer grand. I was one once, remember?"

"But this one would be smaller, we take it?"

"Yes," John said, nodding agreeably. "A lot smaller. Small enough that I can sit at the keyboard. So you'd better put a stool by it as well."

Swift machinery darted through the air, quick as lightning. A piano assumed startling solidity, and then a red-cushioned stool. Across the plateau, one or two pilgrims had already observed its arrival. They were gesticulating excitedly, and the news was spreading fast.

"Is that all?"

John tapped the glasses back onto the bridge of his nose. "There's one final thing. By the time I reach that stool, I need to be able to play the piano. I made music before, but that was different. Now I need to do it with my fingers, the old way. Think you can oblige?"

"We have much knowledge of music. The necessary neural scripting can be implemented by the time you arrive at the Bösendorfer. There may be a slight headache..."

"I'll deal with it."

"It only remains to ask ... is there anything in particular you want to play?"

"Actually," John said, stretching his fingers in readiness for the performance, "there is one song I had in mind. It's about Mars, as it happens."