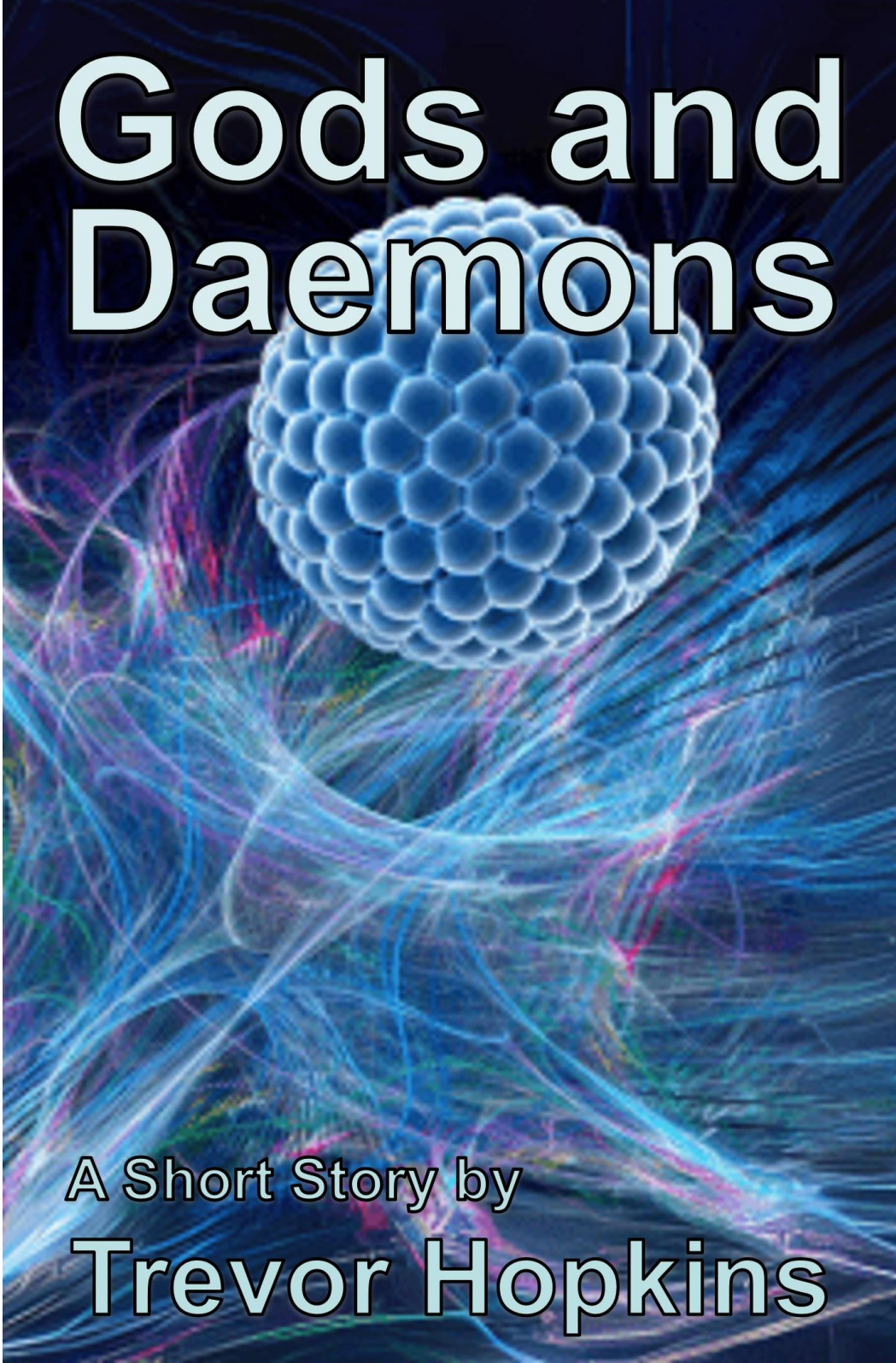


Gods and Daemons

The background of the cover is a dark, deep blue. In the center, there is a large, glowing sphere composed of many smaller, rounded, bubble-like segments, giving it a textured, crystalline appearance. Radiating from this sphere and filling the lower half of the image are numerous thin, wispy, fiber-like lines in various colors, including light blue, purple, pink, and green. These lines create a sense of dynamic energy and complexity, resembling a network or a nebula.

A Short Story by
Trevor Hopkins

Gods and Daemons

A short story by Trevor Hopkins

I had been coopted, whether I liked it or not, into a nameless government facility in orbit. The purpose of the facility was to identify and, if possible, counteract the technology-suppressing effects of systems - spread everywhere in the world - thought to be implemented by unknown aliens, often referred to as 'the gods' just for want of some better words to describe them.

The reason I had been coopted was two-fold: first, I had had positively identified the existence of Nano-suppressors - tiny devices, smaller than viruses, which actively interfered with my attempts to construct functional nanotechnology - and second, the accidental revelation that this was not the only example of technical developments being suppressed, by active means which implied the existence of intelligent action.

Someone, or something, out there wanted to limit technological development, with a particular emphasis, it seemed, on solutions which would allow humans to travel to other stellar systems and, perhaps, colonise the worlds which might be found there. Apart from advanced nanotechnology, inertial cancellation - effectively, artificial gravity - was deliberately crippled; space warps, which would give the effect of faster-than-light travel, seemed to be impossible, and advanced genome modification - complex DNA rewrites which would allow for humans to live on otherwise inhospitable worlds - were consistent failures.

I was not quite a prisoner, although my ability to travel or even communicate with the rest of the world was severely limited. Still, it was not all bad: the entire contents of my laboratory at the University of Hawaii had been shipped here, and it was much easier to get new equipment with only minimal effort to justify the necessity. There is an old adage which says 'if it is inevitable, relax and enjoy it'; I certainly intended to do just that.

The facility had far too many staff for me to be able to remember more than a tiny fraction of the names and, in many ways, it was very much like being an undergraduate again. Everybody had their own tiny bedroom, very much like those in the dormitories I remember from my youth, even if the beds were a lot more comfortable, even if not much bigger. There were several communal dining areas, with several different choices for breakfast, lunch and dinner, as well as a well-stocked, and well-staffed bar called 'The Cave' for after-hours socialising. Lunch options, for example, varied from 'grab a sandwich/burger/sushi box and return to your desk/lab/cubicle' to a 'two-hour fine dining experience in what might have been mistaken for a well-tended and sunlit garden'.

I was standing in the lunchtime queue for sushi, still mentally immersed in some problem I was struggling with back in the lab, when I was approached by somebody I knew slightly, a man called Mario.

"Joe, can I introduce you to somebody?" he said.

I blinked twice, dragging my attention back to the here and now. "Sure. Who is it?"

Mario stepped to one side. "Joe, let me introduce Professor Maeve Cooper, a theoretical physicist. Maeve, this is Doctor Joseph Momoa, nanotechnology engineering."

I found myself shaking hands with a slightly-built woman with translucently pale skin, long auburn hair and startlingly green eyes which looked me up and down in a distinctly appraising way. This was not an entirely unfamiliar experience. I am more than averagely tall, my shoulders are broad and my hair is very dark and slightly unruly. This was not the first time that a woman had made her interest in me very plain on first meeting.

"Pleased to meet you," I said, smiling, adding, "What area are you currently looking at?"

"I'm working on induced gravity formation of space-time warps," she replied, smiling back.

This was an area I knew almost nothing about, although it could always be fun to learn, especially from a charming and enthusiastic teacher.

"How can I help?"

"I want to pick your brains about using nanotech for building hyper-dense structures to generate the necessary gravitational fields," she said, suddenly serious.

"Ah," I replied, thinking hard, "That might be possible. I'd have to think about it a little."

"Great! Could we meet for coffee sometime? Say tomorrow?"

Of course I agreed immediately. The coffee lounge is large and often busy, and so would be an excellent place for an informal discussion without any pressure on anybody.

"Great! 10am?" I nodded. She turned on her heel and bounced off; I might not have caught the glance over her shoulder if I had not been looking out for it.

*

I watched the retreating form of the professor, smiling to myself, then turned back to collect my sushi order and make my way back to my lab.

I had been set the task of identifying a way to disrupt or disable the Nano-suppressors, although I had recently focussed on ways of detecting them without the inconveniently huge and expensive vacuum chamber and assorted electron emitters I had reassembled in my laboratory.

My working hypothesis was that, when Nano-suppressors are quiescent, there is nothing to detect: they are just a bunch of complex molecules, not reacting with anything, not moving or changing and effectively inert. When they move, I reasoned, atoms and molecules are in motion relative to one another, the

charges in their electron shells interacting with one another and therefore creating moving electromagnetic fields, also known as radio waves.

The inside of my vacuum chamber, when operating, is an immensely electrically noisy environment, with all kinds of electric fields and electron beams and so on operating at high power. Still, I had acquired a very sensitive spectrum analyser, thanks to the ready availability of research funds this establishment enabled; it is, effectively, a radio receiver capable of listening to a huge range of radio frequencies simultaneously and visualising the result on a screen.

I had long since perfected the technique of provoking a Nano-suppressor - or at least one kind of them - to appear and take action, and now I was in a position to sample whatever radio waves they might be producing. I had introduced a small broadband radio antenna inside my vacuum chamber - it was getting pretty crowded in there - and, once I had confirmed using the Scanning Electron Microscope that the Nano-suppressor was up and about, I turned off the SEM and every other piece of equipment I thought I could do without, and watched closely the spectrum analyser screen.

Actually, I had performed this particular experiment many times before. The results had been highly consistent; I was not really expecting anything different on this occasion. Still, I went through the motions, recording the spectrum analyser output, as well as enabling a function which provided an audio output, so I could effectively hear the Nano-suppressor in action. I listened to the *chuff, chuff, chuff* noise which I thought corresponded to the movement of the sprockets they used for motion, followed by the creaks and groans which I imagined meant molecular destruction.

I thought that I now had enough samples to identify a characteristic radiation signature for Nano-suppressors, or at least the kind which I had been working with, and I wondered if I could find a simpler way of detecting the things in operation. Picking at my sushi, I thought about what it would take to build a portable detector. I would need a sensitive radio receiver, with some computation to perform analytics to identify the specific nano signature, and a display to communicate the results to a person, all powered from a rechargeable battery.

I suddenly realised that such hardware was widely available; in fact, almost everybody in the world now has a general-purpose and immensely powerful computation and communication platform in their pocket although, for some reason, we still call them mobile phones.

I could build an app, I thought while dipping the last piece of fish-and-rice into soy sauce. I would have to coop the signal processing chip in the device, so it would no longer actually function as a phone; this would not be a big problem since, as many people do, I had a second, older phone which I no longer use and retained for no very good reason. Any one of the several computers I had in the lab would support the necessary software development and there were, I already knew, many software programs which would provide an excellent starting point, although I might have to beg a few hours supervised Internet access to download all the tools I might need. It would take me several weeks, at the very least, and I

would have to jail-break that old phone, but I suddenly could see a clear path to building a Nano-suppressor detector I could fit in my pocket.

The following morning, after a night without much sleep, but with the creation of large numbers of notes on the Nano-detector I was proposing to build, I made my appointment with Professor Cooper almost on time. When I arrived at the coffee shop, perhaps only four minutes late, she was already sitting at a small table, a large beaker of a delicious-smelling beverage in front of her. She turned and smiled when she saw me stumble in, then shifting to genuine concern as she took in my slightly dishevelled appearance and, no doubt, the dark bags under my eyes.

"Maeve, I'm so sorry I'm late," I stuttered, subsiding into the other chair.

"You look terrible," she said, "What have you been doing to yourself, Joe?"

"I had an epiphany in my own research," I said simply, "I've been up most of the night trying to make notes of everything before I forget."

"Ah. Been there, done that," she replied sympathetically, "Let me get you a coffee."

"Large black," I muttered. Maeve slid off her chair and went to tackle the barista while I sat with my head in my hands.

After that rather shaky start, things went surprisingly well. Maeve presented me with a large strong coffee, which jolted me out of my somnambulant state, and I was soon able to ask pertinent questions while the Professor explained why her currently favoured - still highly theoretical - approach to space warps might require the use of - also still theoretical - nanotechnology to build asymmetric gravitational fields in order to fold space around a spacecraft and drive it at speeds which, from the outside, would look faster than light.

I spent some time explaining about my work to disable Nano-suppressors, which would of course be necessary to build the kind of space-drives she had in mind. For some reason, I omitted to say anything about my ideas for Nano-detection, possibly because I had just spent most of the last sixteen hours fretting over the details.

Our conversation, as good conversations do, veered over a wide range of topics. She told me about studying mathematics as an undergraduate at University College Cork, home of the only three-sided university quadrangle in the world, and sitting through lectures in the Sir George Boole lecture theatre - as in Boolean algebra, essential for modern computing - later moving to the University of Cambridge, Department of Applied Mathematics and Theoretical Physics for Ph.D work.

I countered with tales from growing up on Big Island Hawaii, spending days on the beach in between somewhat desultory schooling, the ratio of sports to study changing substantially as I moved to university and the subjects became more challenging and thus much more interesting. I moved from one island campus to another as I moved to postgraduate and then post-doctoral work, finally ending up in the university's Low Earth Orbit outpost.

She was clearly an extremely capable and intelligent physicist, while still managing to be witty and amusing with it. I could happily have sat there all day, chatting on an increasingly diverse selection of topics, but Professor Maeve was made of sterner stuff and made it clear there were other things she needed to do with her day; still, she did agree to meet again for dinner, the evening after next, which probably counted as A Real Date.

*

The next few weeks simply flew by. During the day, I spent long hours working on the software for the Nano-suppressor detector application. Like all such projects, there were failures and dead-ends: code needing refactoring or, in extreme cases, rewriting when I discovered more efficient ways of doing things. I also decided on adding more features, such as the ability to record the characteristic signals from the Nano-suppressors, or the ability to send an alert message when active suppressors were detected. All-in-all, though, I made good progress on a piece of moderately complex software.

At night, though, I spent much time in the company of Professor Maeve, to nobody's great surprise. We got along really well from our first date and, three or four nights a week, we squeezed ourselves into the single beds that the facility saw fit to provide in each room. She was enthusiastic and uninhibited in bed, willing to say what she did like and, very occasionally, what she did not.

Afterwards, or more precisely, between times, we talked and talked; an eclectic mix of personal anecdotes, gossip, scientific topics, philosophy and general morality. Maeve spoke about growing up in the country in County Wexford, always getting into trouble with her staid and rather dull relatives with her restless energy and wild ideas. She described how her great-grandma - who died when Maeve was still a small child - repeatedly describing her great-granddaughter as a changeling: the real girl taken away by elves or leprechauns or daemons, and a imposter installed in her stead.

Much to her family's surprise, and disappointment, she said, she secured a place at a local university, to study mathematics, of all things. She spoke of the strangeness of a farm girl going to university in 'the big city' - Cork's population, these days, is only 150,000 - although she agreed she had become significantly more worldly-wise, and well-travelled, since then. She also spoke of a rather strange experience in Schiphol airport of nearly encountering her doppelganger - a woman of identical appearance and very similar clothes - who somehow managed to disappear behind a concrete pillar before Maeve could catch up with her.

I countered with tales of my teens and early twenties as a Hawaiian beach bum: days on the beach and in the surf, and nights in the bars and nightclubs, interspersed with mountain hikes through ancient forests - some say still haunted by ghosts - to high-points and famous lookouts. Somehow I managed to find the time to do some actual studying - fortunately I was a quick learner - and increasingly intrigued by the natural world around me.

One particular midnight philosophical discussion stuck with me.

"Why have these, these gods left us alive at all?" Maeve asked, almost as speaking to herself, "Surely, a group or society or system with such capabilities could have arranged for us all to die, if their objective was to avoid having a lot of undisciplined humans running amok in the galaxy."

"Maybe they have a well-developed sense of morality," I answered sleepily, "I can imagine that they don't want us everywhere in the galaxy, getting into all kinds of mischief, no doubt, but they just can't bring themselves to kill us all."

"A sense of morality, then?"

"Yes, exactly. Like disciplining unruly children, for their own good, of course."

"Possible," she agreed, "But there's another possibility, a darker possibility."

"Go on," I said, suddenly much more wide awake.

"Suppose they tried to exterminate us all," she suggested, "But didn't quite manage it. Remember there are hundreds of Expansionist ships out there, heading in a myriad of directions. Could they be sure that they had tracked down every last one? Humans might be hard to kill; even we might hide out in the asteroids, or the Oort Cloud, even if the Earth was turned into a ball of incinerated slag."

"Well, what could a few isolated humans do, against an overwhelmingly advanced opponent?"

"I guess the question would be," she mused, "How long would they **remain** overwhelmingly advanced. We absolutely know sophisticated nanotechnology is possible - you've seen it in action. I'm almost certain faster-than-light travel is possible. It's right there, in the maths. Perhaps, sooner or later, the remnants of human society mastered such technologies, and started travelling widely. We would uncover evidence of what they attempted, quite probably. We would be angry, furious, vindictive and looking for revenge."

I was wide awake now.

"I can see the thrust of your theory," I said, intrigued, "But then what?"

"Then we would be a significant danger for them," she replied, adding enigmatically, "Especially if there are, actually, not very many of them."

"What do you mean?"

Maeve turned, pressing her naked body against mine and resting her head on my shoulder.

"Our evolutionary development, our basic biology permits us to breed quickly, to create new individuals who are different from their parents, from any other human. Remember how hard it was to slow down population growth in the last century?" she said, "Perhaps they can't do that. They cannot, for some reason, develop new individuals, so even if an existing personality can live forever, perhaps in a variety of physical forms, there are never any new people, just the same ones, forever reincarnated."

I thought for a moment. "So, you think that true AI is impossible?"

"Perhaps. Or unreliable. Or unsafe. Or expensive. Much easier to create new intelligences using an age-old and well-tested approach."

I snorted. But she had a point. With modern medicine, if there was a will, human population could double or more every twenty years. And what scientific and engineering miracles could we achieve in the same timeframe? An exponential growth, with the people and the technology to fill the galaxy with humans in, relatively speaking, the blink of an eye.

"Do you think that's really likely?"

But she did not answer; she had fallen asleep in my shoulder.

*

The testing of my prototype Nano-detector was going as well as could be expected: I was actually finding software bugs in the various subsystems I had assembled which evidently prevented the whole thing from working. Still, I kept plugging away, until came the day which I could try a live end-to-end test. I loaded the most recent version of the detector app into the old phone I was using as a test rig, and fired it up; there was a pause while my software initialised the signal processing chip to start listening, then a beep and a green indicator on the screen suggesting that the device was actively searching the airwaves.

I then started the by-now boringly familiar process of trying to build a nano-device of my own, which would always facilitate the appearance of a Nano-suppressor. My vacuum chamber is of course a solid piece of medical grade stainless steel, so it is also an effective Faraday cage for screening radio signals of all kinds. But it also had a couple of quartz glass observation ports - in practice, holes in the screening - through which I should be able to detect radio activity.

I ran the process to the point of provoking an appearance, then turned off my equipment and turned on the spectrum analyser, then held my old phone to one of the glass ports. The phone screen lit up, displaying the characteristic radio signatures in time with the spectrum analyser, and emitting the familiar **chuff, chuff** noises.

My other phone pinged; the one which still functioned as a proper phone. I had forgotten the Bluetooth link to my other phone, but even that seemed to be working; I had a message informing me that a Nano-suppressor had been detected. The signals detected decreased sharply and then disappeared entirely, presumably as the Nano-suppressor finished eating my creation and then destroyed itself. All-in-all, a successful test.

I repeated my tests several times that afternoon, all of which suggested my app was working at least adequately, although I made copious notes on possible additional functions and usability improvements at the user interface, which was presently pretty clunky, I admit. For the last test, I even repressurised and opened the vacuum chamber entirely - an expensive operation since it would take hours to re-purge and evacuate the chamber for future use - which allowed me to get an initial idea of the range of the Nano-suppressor detector. This was quite

interesting, indeed gratifying, since it suggested the range might well be greater than the dimensions of my laboratory.

So, I was feeling extremely positive and, only slightly, smugly pleased with myself when I left the lab that evening. Without really thinking about it, I put both phones in my pocket when leaving to take a shower and change my clothes; carrying around mobile communications devices is an instinct which we humans have grown familiar with over the decades.

I was going out to meet Maeve for dinner and, later on, yes, sex this evening; again, I put both phones in my pocket more or less on autopilot, perhaps subconsciously expecting to show off later on. As it was, I must have decided that showing my girlfriend a nerdy gadget project, even one as technically literate as Maeve, was probably a step in the wrong direction and, in any case, our conversations rapidly explored other topics, as they often did.

Over a glass of wine, Maeve asked: "how long do you suppose have these aliens, these Gods been interfering in human activity?"

I thought for a moment; I had found it was always worth giving serious consideration to any question the Professor asked.

"Since the middle of the twentieth century," I suggested eventually, "Actively slowing down the development of spaceflight after the first moon landings."

"I agree that might well have been one of their actions," she agreed, "But perhaps they have been having indirect influence for much longer. Look at that long period called the Dark Ages in Europe, a period of perhaps a thousand years where little or no technical advancement was made."

"While Hawaii, for example, was managing fairly intensive farming," I interjected, "Like much of the rest of the world."

"Indeed so," she agreed, "Perhaps their influence goes right the way back into pre-history. The European enlightenment, and the scientific and industrial revolutions represented a failure, for them."

I could not disagree with her reasoning although, at the time, I was unsure why our conversations kept veering onto this topic. The evening flew by, soon reaching the the ritual 'your place or mine?' line, which had become something of a private joke between us, given that the little rooms - cells might be a more apt word - provided by the facility were substantially identical. We elected for 'my place'.

The following morning, after Maeve had left, I pottered about my room with a dumb smile on my face, showering and dressing and generally tidying up. I found the two phones still in my trouser pocket; idly I unlocked the one I had modified and was startled to be confronted by hundreds, thousands of alerts. Nano-suppressors had been extremely active in my room all night; not just one or two, but a great many, some with signatures different from the ones I had encountered in my lab, but still within the detection tolerances I had built into my software.

The alerts had stopped now; nothing was being detected. But when I looked at the records, it seemed that the cessation of nanotechnology activity

corresponded exactly with Maeve leaving my room. I was forced to the conclusion that her body was infested with millions of the devices, judging by the strength of the signals my device had picked up.

I sat on the edge of the bed for a few minutes, thinking. I could not imagine a reason why Maeve's body should harbour so many nanodevices, although of course I could not know if other people were similarly infected. But it did occur to me that I might be able to use the equipment in my lab to image these devices; there must be some left behind. A forensic analysis would immediately reveal that Maeve had been in my room, and it was easy enough for me to collect some of the more obvious samples: a long hair here, a paper handkerchief there.

I hurried off to the lab and prepared the samples as best I could, then fixed the mount inside the vacuum chamber. I waited impatiently as the pumps clattered away sucking the last vestiges of atmosphere from within. Finally, I could fire up the scanning electron microscope, set the scanning resolution - effectively, magnification - to a wide setting and scrolled up and down until I found Maeve's hair.

*

At the scale at which I was usually working, a human hair is huge, with a diameter easily a thousand times larger than the nano-devices I was trying to build. The SEM's current magnification was still within reach of a good-quality optical microscope, and I could easily make out the plate-like scales - essentially dead cells - which make up the outer layers.

I zoomed in closer, a single scale now filling the field of view on the screen. Despite the keratinization process, the remnants of the once-living cell were clear enough, although there seemed to be a certain graininess which at first I thought was some kind of imaging defect on my microscope. I refocussed my microscope further; the graininess suddenly resolved itself into a familiar form, one that I was utterly shocked to see.

The entire surface of the 'keratinous' surface of the hair scale was formed by nanomachines, with the same ellipsoidal form as the ones I had been provoking in my experiments, although without the spherical head. The same toothed sprockets bound the nano-devices together in a rigid framework, presumably to mimic the tough structure of the hair strand. I scanned up and down the fragment of hair: every scale was the same: at low magnification, plausible scale; higher magnification, nano machines.

I looked at every sample I had found in my bedroom. Everything I could find which was once part of Maeve's body was nanotechnology. Oh, she had cells of various kinds, just like everybody else but, instead of those cells being implemented by biochemical reactions and the catalytic self-assembly effects of RNA and the like, the whole biochemical world inside her cells was emulated by nanotechnology. She was, at one level, entirely human - a functioning collection of trillions of cells - but at another level, built upon a machine capable of simulating that biological complexity to the smallest detail.

After several hours frantic work, I sat with my head in my hands, thinking about what I should do. What I ought to do, of course, was talk to the security service - military, really - which ran the orbital facility, explain what I had learned and put the problem firmly in their hands. But then I would never find out something which I thought was important: does Maeve even know who, or what, she actually is?

In the end, I did something I almost never did: visit Maeve while she was working, in her office. When I arrived, the door was open; a good sign, since it suggested she was open to interruptions. I tapped on the door and stepped inside, quietly closing the door behind me.

"Joe! What a surprise," she exclaimed, looking up from her computer, "What brings you here?"

"There's some things I should show you," I said without preamble, "I should have shown you last night, but, well, I forgot."

She frowned but said nothing.

"I built a Nano-suppressor detector application," I went on, "It turns out it can detect other kinds of active nanotechnology as well."

I showed her the phone with my prototype Nano-suppressor application running, which was now chuffing and clicking away furiously. I held it closer to her; the noises got louder and merged into a continuous buzz.

She looked at me quizzically.

"I used the equipment in my lab," I went on, "To take a look at some of your cells, in great detail."

I showed her several high-resolution images from the scanning electron microscope, which I had loaded onto my other phone. She glanced at them, as if confirming what she had already expected to see.

"You appear to be entirely made of alien nanotechnology, emulating a human being at the cellular level." I leaned forward over the desk, looking directly into her eyes. "Did you know that?"

She did not answer for a moment, then looked directly into my eyes. She raised one hand and said: "You need to examine your loyalties, Joe. Do you really want a conflict, a war against a powerful and mostly unseen enemy, a war which will cost livelihoods and perhaps lives, with generations of people forever looking over their shoulders, justifiably paranoid?"

She lifted the other hand. "Or would you, and all the peoples of this world, prefer to live in peace and plenty, surrounded by the beauty and bounty of nature, until the end of time. You should think about it."

She lowered her hands, a look of grim determination on her face.

"And now I must go," she said, swinging around in her swivel chair and standing up. Before I could move, she let out an ear-splitting scream; her entire body disappeared in a flash of heat and light which nearly blew me over; the

singed fabric of her clothes fluttered to the floor. There was nothing of her body left at all; the nanodevices had triggered what looked very much like spontaneous combustion.

I was stunned for a moment, both from her words and the force of the blast of her self-destruction. I thought about what I should do, now. The facility security chose not to put surveillance devices in private rooms - bedrooms, offices - but all the corridors and public spaces were heavily monitored by cameras and other sensors. Security would have seen Maeve enter her own office, and later me entering and leaving the same one. I had no option but to turn myself in.

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Now it seems I have incurred the displeasure of the security services, again, although slightly mollified by both the fact that I had created a demonstrably effective alien nanotechnology detector and also plainly demonstrated the existence of aliens in our midst. They were annoyed that I had allowed Maeve to get away, as they put it, although I believe I have convinced them that they could not have contained Maeve anyway.

Still, I think about Professor Maeve's last words all the time. Is it really that important that we humans have the ability to leave the planet, or at least the solar system? Perhaps we should just accept the inevitable and enjoy the bounty available to us all?