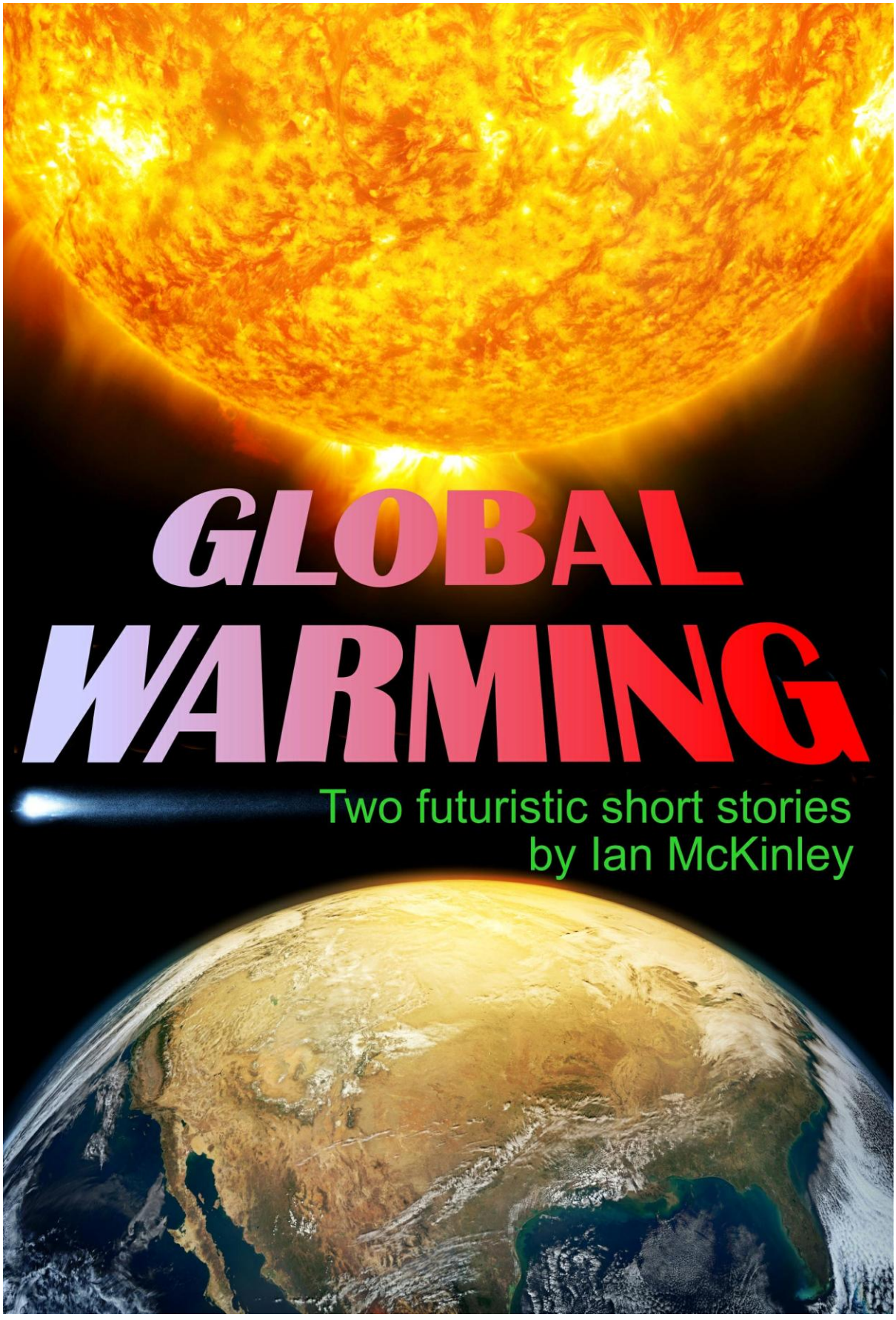
GLOBAL
WARMING
Two futuristic short stories
by Ian McKinley

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Table of Contents

Science Fiction Activism

Science fiction authors are a motley crew, which includes a small number of professional scientists but also many others with no particular background in science or technology. There is certainly no correlation between the quality of the literature produced and the technical background of the author – for every example of individuals who excel in both fields, there are dozens of SF masterpieces produced by non-scientists and rather dreadful efforts by highly qualified boffins.

Personally, being involved in the rather esoteric area of radioactive waste management, one could consider that most of what I write in my day job is a form of fiction – discussing and evaluating what would happen to such stuff over the next million years or so. Over the last three decades, I've produced screeds of text for books, technical literature and articles for more general audiences. With this background, why write science fiction?

Well, undoubtedly I get pleasure out of writing fiction. Despite that, there is also a serious reason, which harks back to a common response I get whenever I talk to non-specialists about radioactive waste. Almost everyone has an idea about what radwaste is – but it seems to come from films, novels and, increasingly, comics, manga and anime. The green glowing sludge that guarantees a horrific death – or transformation into a bizarre mutant – is a far cry from the mundane reality. The biggest risk associated with the material I deal with is dropping heavy packages onto someone's foot. It's worrying when politicians try to pass the buck on difficult decisions, by asking the general public to decide on highly complex issues like the future of nuclear power or siting of a waste disposal facility. How can they do this when they haven't the foggiest idea about what is involved?

This is true in my own specialist area, but I also see similar effects if I discuss even more critical technical issues that will have major effects on our society over the next few decades – like climate change, economic unbalance, runaway developments in biotechnology, increasing dependence on computer infrastructure. Films such as Blade Runner and Total Recall have more of an impact in building mental images of what the future will be like than the entire outpourings of academia and the "popular science" literature. Many technical communicators find this frustrating and complain about the inaccurate portrayal of science in arts and the media. However, this is the real world. If you believe sincerely that there are important messages to be made – as I do – then maybe more of us have to forget about conventional approaches and try to penetrate media that has a real impact.

The important thing, of course, is the story. The plot, setting and characters have to grab the target audience – any messages should lurk in the background, at an almost subliminal level. You can't talk down to readers or attempt to force your own opinions on them. You can, however, introduce some issues that may well be the defining problems of the mid-21st century. If, at the end of the novel, readers are left pondering some question that hadn't occurred to them previously, then my efforts have been a success. This will only happen, of course, if the story gets read and enjoyed.

"Extremophile" (www.twbpress.com/extremophile) looks at longevity. I introduce the

extreme variant of an effective cure for aging – but this is just one end of a spectrum of developments, all of which are moving ahead rapidly at present. The promise of a longer life – that's got to be a good thing, surely? It sounds great, until you think of it in the context of a world already strained to the breaking point by overpopulation and facing up to the additional pressures of climate change, which could pass a tipping point at any time. Immortality may be the dream of the rich, but it could end up the nightmare of governments and other organisations trying to provide a reasonable standard of living to the poor. Think about it! You may worry today about Genetically Modified crops and cloning – but these may well not be where the huge global problems arise in coming decades. Such issues are covered further in the coming novels "Chemotroph" and "Allochthon", which consider just how far the mega-rich would go to have a chance to live forever.

My books feature a dystopian future that portrays a society characterised by casual sex and gratuitous violence, aimed to increase the drama and hold the interest of the reader. However, is this really the future we have in front of us? I suspect so. In many communities, the definition of what is "acceptable" sexually has evolved dramatically in the last 50 years, and there is no reason to think this progression will change in the future – especially in the light of probable medical developments (cures for AIDS and other STDs) and the access to alternative lifestyles provided by the internet. Violence in society is more easily predictable, as this correlates well with social inequality – particularly when those at the bottom of the heap are constantly exposed to the excesses of those at the top. The changes in the world during the coming century will, in the absence of a complete rethinking of international politics, inevitably lead to an even greater and better-publicised gulf between the haves and have-nots. Does this worry you? It certainly should!

This takes us to the short stories presented here. These inherently present fewer opportunities to illustrate the global impacts of changes facing us in the near future, but can highlight key messages as a backdrop to the stories. We are constantly exposed to a barrage of news that claims global warming is occurring: increased numbers of stronger hurricanes and typhoons, record temperatures and resulting wildfires, rising sea levels and melting glaciers. Building the worldwide support needed to respond to this threat has been limited by two issues: on a year-by-year basis the changes are very small, and as expected with something as complex as a planetary ecosystem, there is controversy amongst scientists and other professionals on which potential drivers are to blame.

I certainly don't know what the balance is between natural and anthropogenic contributions to the climate change we are now experiencing, but I am aware of how little understanding there is on the cumulative impacts of small changes given the risks of hitting a "tipping point". This threshold results when positive feedbacks between coupled processes result in a runaway reaction. For example, seawater warms enough to destabilise methane clathrates in sediments, causing releases that increase the greenhouse effect. This, in turn, melts permafrost, releasing even more methane, warming things even further. And so it goes...

The consequences of hitting a tipping point form the backdrop to "The Blame Game" in which a number of experts caught up in the chaos resulting from sudden environmental collapse argue about the root cause. The bottom line is that that there are so many interacting factors that it's impossible to disentangle them. However, after a tipping point has been

reached, there is nothing we can do but try to find a way to survive. Here is new territory where the experts have little to contribute.

As a counter-balance to the dystopia of The Blame Game, it's worth considering that even global catastrophes tend to be self-limiting when negative feedbacks eventually kick in. If global warming is, indeed, caused by over-population, then an apocalyptic die-off will solve that problem, and a slow return to equilibrium will occur. "The Ag-108m lining" is set further in the future, in the post-apocalyptic recovery phase. Ag-108m is a long-lived radioisotope of silver and one of the major concerns in the damaged reactors of Fukushima Daiichi.

From the present perspective, the reactor meltdowns are an unmitigated catastrophe and a focus for a huge cleanup action. However, compared to global warming, it's a trivial local accident with negligible health effects. If a tipping point is reached, the impending disaster will become clear, and the site will be abandoned to the rising seas and, within a short time, maybe even forgotten about. This might seem implausible, but the most similar accident to Fukushima Daiichi was not Chernobyl; it happened in Northwest England in the 1950s and contaminated what is now one of the most popular tourist destinations in the country – the Lake District. Ever heard of this accident? I thought not!

Okay, maybe in an environmentally devastated world, the hazard of a few very contaminated old reactors will not be a worry, but surely they could never have a positive impact? Here I return to a theme within "Extremophile", the incredible tolerance of microbes to high radiation levels. This evolves naturally in exactly the kind of feedback process that allows life to adapt and recover from catastrophes. So, indeed, there could be a silver lining to this accident.

The future is a very frightening place, particularly because it is being defined by decisions made today without a thought for long-term consequences. If science fiction can introduce a degree of caution, which guides history to avoid some of the scariest possibilities, then it has served humanity very well indeed.

Thus I'm giving fiction a try and, though I'll never know if my minor contribution does any good, I'm sure that writing about the future is better than just sitting around complaining about what it would be like.

And if anyone should happen to enjoy reading my books, that'll make the entire effort worthwhile, regardless.

The Blame Game

The Shinkansen was on its last legs and, as such, a good metaphor for the entire planet. The battered Nozomi train was making maybe thirty km/h, well less than a tenth of what it managed in its prime. Nevertheless, the onboard fuel cells still functioned, and its duck-like beak of a front end, combined with the hardened sloped windows of the cockpit, were just what we needed to push aside the debris that had accumulated on the empty tracks and in the abandoned stations.

Yoshi was driving, still taking his job as minder seriously. The surviving Think Tank members were sprawled in the Green Car behind the locomotive, seats turned so that we were facing each other, four and four, silently drinking a rather industrial saké out of thermos flasks. The flickering lights lit our faces as we sat back in the shabby seats and watched the dark, faintly moonlit countryside slowly roll by. I looked at the postures and clocked the furtive glances to see who would kick off, knowing that the Blame Game would start soon.

I smiled as Jenny coughed and got ready to launch into a spiel, only to be pipped at the post by Gerd, who had certainly been waiting for this further chance to annoy his ex. "Well, to me there is no question about it. We can see that global warming was the initiating factor, so it has got to be the metanational industrial complex that—"

"Crap." Jenny, shoulders shaking with emotion, broke in before the bearded German economist got any further. "Global warming was a symptom, not the cause. Runaway capitalism driven by greedy bankers and complicated by green nutters who blocked any technology that could have sorted out the problems being created...that's what really screwed things up."

I sank deeper into my seat and smiled. *Poor little Jenny; a Nobel geneticist from a working class background in Wales. Pretty as a picture and sharp as a razor blade, but useless in a debate. She tries to hit too many targets at the same time*. Of course, the fact that she had abandoned her boyfriend to hitch up with our open lesbian, added an extra frisson to her fights with Gerd.

"This green stuff, this is shit. You know it is all the shit of the mega bull crap." Jordi was on his feet, the floor swaying in time to the rattle of the wheels, and seemed to be literally foaming at the mouth. *Probably something to do with the rotgut we were drinking.* "You scientists do all this shit stuff, screwing up our environment and poisoning our children. We try to stop you and we are the devils."

Jenny blushed in an incredibly attractive manner. "No, that's not what—"

"Goddam green raghead terrorists. All you mothas got to take the blame that you rightfully deserve."

I didn't know if it was possible to grimace and roll one's eyes at the same time but, if so, I was sure that I did. It was a mystery to me how this redneck – despite PhDs in astrophysics, philosophy and biochemistry – ever managed to get chosen for this group. *You can take the boy out of Texas…*

James came in, right on cue. "Steve, old chap, a bit of decorum if you please."

If I closed my eyes, I would have thought he had spent his entire life in the Eton-Henley-City triangle, but he came from Bangalore and, before his ill-fated trip to Nippon, had

only once set foot outside of India. This lack of travel experience was not matched by a shortage of imagination, with a list of literary prizes that was amazing in its diversity. Booker to Hugo: nobody had ever managed that before, much less picking up just about everything else between. Our second Nobel laureate, his previous foreign trip having been to Stockholm. "Now, who has the talking stick?" He referred to the instrument that he had introduced to bring some order into these debates, reducing the tendency of these prima donnas to constantly interrupt each other.

I tossed over the latest incarnation of this venerable object, a short plastic branch decked out in somewhat bedraggled pink nylon cherry blossom, but Gerd snatched it from the air and brandished it to emphasise his points. "Look at the facts, for God's sake. We could see the writing on the wall by the tens and twenties. Despite all the promises at the start of the century, not only were greenhouse gas emissions still increasing, but the rate of the increase was climbing. Everyone knew that destabilisation of marine methane clathrates was inevitable, so how can anyone possibly say that the climate catastrophe, not to mention the associated coastal shelf collapse by mega-tsunamis, can't be taken as the root cause for everything that happened thereafter?"

"Good points, good points indeed." James was, as ever, accepted as chairman and allowed to pry the talking stick from Gerd's still shaking fist. "Now, Brit, what do you say to that?"

Brit solemnly accepted the twig, careful to keep it well away from the big Texan.

Steve looked like he was ready to grab it from the slim Danish journalist and filmmaker, and I half-hoped that he would try. The boor was over two-metres of solid corn-fed manhood, but I had often seen the small blonde working through some form of martial art kata when I took my habitual sunrise strolls, and I had a feeling that she would be well able to handle herself.

"Nobody would claim that global warming was not a key factor, but what was the actual driving force that caused continued expansion of fossil fuel combustion? As we passed the peaks of natural gas and easily accessible oil, we just moved to horribly inefficient oil from deep waters and tar sands, methane from fracked shale and clathrates. Why was that accepted by the public and politicians, while they blocked nuclear power, genetically-engineered biofuels, other carbon capture methods and any form of geo-engineering? Why was it that our communication efforts were so ineffective?"

This beautifully enunciated presentation moved the blame towards Brit's own area of expertise, which was a rather unusual occurrence amongst the Blame Game participants. Or, more accurately, the current participants. We were originally twenty: a special multi-disciplinary team set up by the Japanese Mori Foundation, in collaboration with the Universities of Tokyo, Oxford, Harvard and the ETH in Zurich. *Eight out of twenty's not bad, actually, considering the chaos of the first few weeks and the daily reports of further disasters that convinced many to attempt to head home, regardless of bans on international commercial flights*. Despite such quarantine attempts, the pandemic was already unstoppable in Japan, and things went downhill rapidly after it decimated Tokyo. Yoshi up front was the sole representative of the army of Japanese minders, flunkeys, facilitators and media representatives who had travelled to Hakone with us for the kick-off session of the *Environmental Remediation Task Force*.

“Now, Father Tino, I think you are next.” Our chairman presented the talking stick to the chubby Mexican cleric and Peace Prize laureate, who looked at it for a moment as if it was imbued with some kind of power to help him organise his thoughts.

“Yeah, she is kinda right.” He nodded in the direction of the smiling Dane. We had been together now for more than six months, but the catholic clergyman still could not remember anyone’s name. “The people jus’ didn’ believe anybody no more. All the politicians was corrupt, the police was even more corrupt, the bankers and all the men with big money...they was really corrupt. You don’t ever get a hold that kinda cash honestly.” He hesitated, seeming to have lost his line of thought, then rushed on when it looked like James was about to reclaim the stick. “No more trust, no more culture...so no way that the people could make a change. We had all the revolutions last century, starta this one, but they made no difference for the people. What you say, new faces, same ol’ shit?”

I groaned quietly as the next speaker rose to his feet. “Well, Reverend, for a Dago, you ain’t all totally wrong. The thing is, what caused all this here loss of trust? Could it just be a co-in-see-dence,” he made this sound like four words, “that most of the green wackos that blocked everything were getting funded by ay-rabs? Just a co-in-see-dence that, the day after that tsunami took out Northern Europe, the ay-rabs released bioweapons in the EU and nuked Israel? A co-in-see-dence was it?”

Surprisingly the American meekly passed on the talking stick to Jordi and sat back with crossed arms and a smile on his round face, clearly convinced by his killer arguments.

“This is such shit, such total shit. This was one scandal, Saudi petro-dollars to one shit Green...” The Spaniard ground to a halt.

Steve moved closer to him and brandished four fingers in front of his nose, adding in a stage whisper, “All of the big four, including the loony-tune mob you represent.”

I felt sorry for Jordi as the fiery young man tried to reorganise his arguments. His English wasn’t up to the cut-and-thrust of real-time argumentation. When speaking Spanish with Father Tino, he was much more fluent and controlled. He finally slumped in his seat, shrugged his shoulders and passed the stick to Jenny who was waving wildly at him.

“Although I’m not saying that there weren’t any bioweapons, the flu pandemic was clearly the main killer, and that was already well established before the first shelf tsunami. It was just that the loss of ability to isolate breakouts occurred exactly at the time when a series of natural disasters exposed huge numbers to the normal diseases that follow destruction of sanitation infrastructure. If we hadn’t all travelled to this high profile shindig, would we have been on the list to receive the vaccine? There just wasn’t enough to go round. And, also, there’s no proof that any Arab countries were nuclear aggressors. Jerusalem seems to have been hit during a first strike from Pakistan, and the major regional damage resulted from the retaliations by India and Israel.”

Yet again, the geneticist managed to spread her targets so widely that she was rewarded only by a grin from the big American. “Yeah, all ‘cause of a bunch of mad ragheads,” he muttered below his breath.

Now Gerd was back in action. “This just proves my point. Blatantly allowing global warming to advance was a result of the drive by the global industrial complex to maximise short-term profits. Expanding fossil fuel production made money, building flood defences made money, developing medication for new diseases and new crops for changed climate

conditions made money. It was just about money with no concern about consequences."

James accepted the talking stick and, typically, his own input moved towards consensus, as if this would ever be possible for our diverse team. "The arguments presented raise many key issues, but the root question, the one that this group was actually set up to address, involves identification of possible solutions. It was indeed most unfortunate that the day of our plenary session coincided with the North Sea mega-tsunami, which seems to have been the straw that set the disaster dominoes toppling. There must have been a veritable horde of apocalyptic horsemen just waiting in the wings to be unleashed, which indicates that a tipping point had been reached. Our society was so finely poised that, if not a tsunami, some other event would have started the snowball rolling and resulted in a similar chain of coupled catastrophes."

As always, the non-native English-speakers struggled with the little Indian's mixed metaphors and literary allusions. Steve was thus first to raise his hand and received the stick. "Tipping point, yeah that's clear enough. So what're we seein' in this twenty-first century o' ours? Loss of control by the nations that created science, technology and democracy to this damn Third World: that's where all the problems o' pollution, weapons o' mass destruction, damn Hong Kong flus come from. That's where the blame lies."

Clearly considering everywhere outside the borders of the USA as Third World, the American handed the stick directly back to James, the representative of this demonised grouping.

"Well, Steve, loss of control of science and technology is certainly a critical issue. Nevertheless, the nations responsible for establishing and nurturing such fields, and democracy also for that matter, had certainly lost control of these volatile concepts very long before the twenty-first century. Usurping and manipulating the power of science and the political control offered by democracy have classical precedents and particular characteristics of the West since the industrial revolution, while their enforced propagation during the various phases of colonial expansion is what created the Third World in the first place. Whether gunboat diplomacy or softer hamburgerisation, the end product was the same, a global culture driven by dog-eat-dog expansionism, regardless of the inherent constraints set by local, regional or even global resources."

Even the Spanish-speakers realised that our chairman had, without actually disagreeing, neatly reversed the thrust of his opponent's argument. The American scowled, but was unable to formulate one of his usual sotto voce jibes before the stick passed on to Jenny.

"I think Brit was right or, at least, more right than Steve. It wasn't really control of technology, it was inability to build consensus to use it. Or, at least, develop and implement the right technology fast enough. As James pointed out, our group was supposed to look at the problems that everyone knew about...and we started work on the very day that things started to go completely tits-up. Why wasn't this all started decades ago? It isn't as if any of the individual issues involved were unknown then. Although, even if the tsunamis and wars and plagues had held off for another couple of decades, would we have been able to propose any solutions? And, even if we had, would anybody have acted on them?"

James drew circles in the air with the talking stick. "Yes, Jenny my dear, a lot of apposite observations there. How do we find the head of this Ouroboros Worm? Even though

it's all a bit post hoc, we've had the best part of six months to glean what we can from our annus horribilis. Do we yet know what the actual tipping point was: fossil fuel combustion or the tsunamis, water shortages or nuclear arsenals on hair triggers, pandemic threats or terrorist bioweapons? If we could nail that down, could we see any way of minimising consequences? What do you think, Ell? You are silent throughout these regular debates, but I see fire in your eyes that implies to me that you are far from disinterested. Please let us know what you think, even if just this once."

They call me Ell because my name is unpronounceable for them. I am a Ukrainian nuclear engineer specialising in knowledge management, in a world that probably has few, if any, functioning nuclear power plants and a rapidly imploding knowledge inventory. I could feel all eyes on me and my face felt warm. Then Jenny squeezed my arm and whispered, "Go on, Ell, tell them."

I spent five years at UCL, so my English is reasonably fluent, but it takes me a while to get it going – which makes me even more reluctant to speak. *But there's no way out of it now.* "Okay, the tipping point was sometime in the 1960s. After that we have been, how do you say it, shifting deckchairs on the Titanic." I glanced at James, worried that I had already broken the taboo and mentioned the elephant in the room.

"That is very specific, I must say." He seemed pleased.

I breathed a sigh of relief.

"So can you say more? Would there be a number associated with your date; about three billion?"

I was sure that James was, by far, the smartest of this very clever club. He actually knew the substance of everything that we discussed, but he worked to draw it out of others rather than just simply cut straight to the answer himself.

"Yes, I think so, about three billion. That would be around the carrying capacity of the planet, with all inhabitants having a standard of living typical of the developed countries at that time." I stopped, waiting for a barrage of counter-arguments, but everyone was silent. *Probably not so much that they agree, more the novelty of me contributing anything at all to the discussion. Or maybe it's just that I'm getting very close to the taboo elephant.*

"So the problem was over-population?" James nudged me further.

"Certainly not just the number of people at that time. It was continually increasing populations, encouraged by religious and ethical positions, combined with technological drivers that made the inequalities of living standards obvious to the underprivileged. This caused the..." I clicked my fingers, searching for the English term I was looking for.

"Red Queen's race?" James suggested. "The constant fire-fighting of resulting crises, every time straining technology to the limit, further depleting non-renewable resources and leading to more serious future problems. That kind of thing?"

"Exactly. After you have passed a certain point, catastrophe is inevitable. The longer you hold it off, the greater the effect will be when you eventually slip up. Technology could probably have coped with any of the individual triggers that you listed, but they become more strongly coupled with time so that, eventually, it leads to a failure cascade that is unstoppable." I could feel my English come together as I finally enunciated the thoughts I had been brooding over for the last few months.

"That seems very convincing," our chairman said, seeming to notice for the first time

that he had retained the speaking stick for the entire time. “So, we develop the technology to stave off disasters one by one, but, after a point of no return, we are simply increasing our vulnerability to common mode failures, combinations of initiators that lead to runaway chain reactions. Dominoes, snowballs, positive feedbacks, however you want to describe it, it all seems to hang together. So, no matter what we had done, the great population cull was inevitable.”

This was our taboo topic. Over the last six months we had become inured to death, but, as a group, our focus was entirely on survival. Probably this was inevitable, otherwise we would not have lasted this long.

To my surprise it was Father Tino who broke the silence. “You say three billion left? That’s it? We lose internet months ago, when they talk about a billion peoples dead. But it’s gonna be six, seven billions dead? Seven billions.”

This is the question I dreaded. The one we tiptoe around, not wanting to think about the answer.

I intended to play dumb, but James handed me the stick. “You’ve been thinking a lot about this, I see. Since the EMPs took out the satellites, we’ve been flying blind. We have been wagging our chins and scoring debate points in an information vacuum, but you have spent these months thinking. So, tell us now, what will the result be? Will our global population crash to three billion?”

“No, three billion was the carrying capacity a century ago. This doesn’t apply now.”

Our community breathed a sigh of relief, with one notable exception.

“So, what is the best case? What kind of world will our children and grandchildren inherit?” James looked directly into my eyes, and I could see that he was well aware of the direction I was going in.

“A world with a hell of a lot less than three billion living in it,” I conceded quietly. “Runaway global warming is unstoppable. When the pandemics finally burn themselves out, the population will already have dropped below the requirements to maintain services and infrastructures, especially in the big conurbations. The coastal areas not already devastated by tsunamis will be drowned by rising seas. Some inland areas will be dried out by rising temperatures, made much worse by polluted or mined-out aquifers. Others will be devastated by supercharged typhoons and hurricanes, with flooding and landslides in summer and blizzards and avalanches in winter. Yes, a lot less than three billion.”

The shock was palpable.

I don’t think even James expected such a bad prognosis.

Jenny pulled on my arm. “Is it really so bad. Is it the end for us, gone the way of the dinosaurs?”

“Not at all.” I forced a weak smile. “There will still be millions, maybe even a billion or so people. By Red Book standards, we wouldn’t even qualify for protection, much less endangered species listing. The big question is, will we stabilise at that level, or will populations grow again as the ecosystem recovers?”

James grabbed the stick and passed it to a rather pale Gerd. “So this is it? We just accept loss of ninety percent of our population? We conclude that there is nothing we can do about it?”

Everyone was looking at me, so I had to respond. “Potentially, this catastrophe could

have been prevented a century ago, if the risks had been taken seriously back then. Maybe there could have been some form of damage limitation if we really got our act together decades ago, maybe around the turn of the century. Now, even if we could immediately coordinate all recovery efforts...” I pointedly glanced out of the window of the shabby train to indicate how likely that might be. “...it really would make little difference. James talked about snowballs. This started off last century as a small snowball on a gentle slope, something that could be stopped. Then it became a very big snowball on a steep slope, the best you can do is maybe divert it, to influence its final impact. Now it’s a large mountain avalanche. There is absolutely nothing that you can do until it has run its path...and then it’s just a case of pulling what you can from the wreckage.”

That’s it. After months of tap-dancing around the issue, I’ve said what everyone must be increasingly aware of, that our little group was not only impotent, but was pointless from the very start.

“So what do we do now?” James asked me, as if I had suddenly become group leader.

I shrugged. “Stick to the plan. Keep heading south and try to make our way to somewhere like Australia. An isolated land with low population density should have suffered less and will recover quicker.”

The Indian nodded. “So we see what remains of Hiroshima. If we are unable to find a ship there, we just continue south along the shore. Pulling what we can from the wreckage en route. The team conceived to produce global solutions reduced to lowly beachcombers.”

I said nothing, but it was clear that even the brilliant James still could not get his head around the new world order. *We’re a bunch of academics and dilettantes, the kind of people that caused the problems in the first place. If I was building a team to recover from this, I’d be looking instead for medics, builders, farmers and fishermen.*

I squeezed Jenny’s hand as I remembered a childhood dream to be a sailor, a goal lost in the treadmill of career progression. *This will be my focus for the future, because I’ve been less than honest. I am sure that we could maintain a billion souls on this ravaged planet, but things will get an awful lot worse before we recover to that stage. The message everyone wants to hear is that we’re through the worst, the apocalyptic death rate is tailing off, we’re moving towards rebuilding. Such wishful thinking helps to get us through the day, just like it allowed us to ignore warning signs for a century.*

The silence was becoming uncomfortable when Gerd finally rose. “Ell may be right, but might also be wrong. If we consider that the key factor was global warming…”

Jenny seemed ready to jump to my defence, but I grinned and whispered into her ear. “Okay, forget about Ell, from now you can call me Cassandra.”

“But Cassandra was never believed.”

“Look at that bunch. They have all the brains needed to see what I do, but they just don’t want to look. They are stuck in the rut of trying to find someone to blame, spreading the net wide enough to capture everyone from near-omnipotent oligarchs with their obscene greed to starving peasants and their drive to produce yet more starving children. They will never find a solution, because they’re all looking top-down, seeking roles for themselves. They’re specialist dinosaurs that will disappear quickly when the extinction really kicks in.”

“So what do we do then, Cass? Are you going to tell them this?” Jenny grinned mischievously.

“You know that there’s absolutely no point. Keeping together as a group is sensible, at least for as far as we can get on this train. After that, we lose this bunch and look for a boat. I’m fairly sure that Yoshi would come with us. He is originally from Okinawa and that would be a good point to aim for first. Also, his family are fishermen, so he almost certainly knows his way around boats.”

“How do you know all this? Have you been talking to Yoshi?”

“Not talking, listening. I let the others do the talking. While they’re cataloguing the woes released from Pandora’s Box, I’m looking for hope.”

Jenny’s smile widened. “First Cassandra, now Pandora...you’re going mythological all of a sudden.”

I smiled back. “Helps you see the bright side of an on-going apocalypse. Even if nobody else is facing up to the truth of things, our knowledge could help us steer our way through the next decade and maybe even help rebuild things in a more sensible way thereafter. Isn’t that hope enough?”

Our resolution was sealed with a kiss, but nobody else noticed. They were all too enthralled in the cut and thrust of the Blame Game.

The Ag-108m Lining

It was a couple of days since the last mega-typhoon had blasted through; the fourteenth of the season already, although it was only early July. The sky was cloudless, searing the northeast coast of Honshu in an actinic glare, with the heavy swell the only remaining trace of the monster storm. Despite my protective skinsuit, I stayed in the shade of the canopy of the little RIB until its autonomous control system brought it onto site and held it in place, plentiful solar power feeding the MHD-thrusters that made an anchor unnecessary.

The shoreline was kilometres distant, a wasteland of drowned forests and abandoned dwellings. Farther beyond stood the gleaming domes that covered villages on hilltops, well above any likely tsunami or storm surge. I had expected warning buoys or some kind of naval cordon, but all I had to do was download my entry permit into the boat's memory, and that was it. Actually, the main characteristic of this location was not what was there, but what wasn't – the absence of the multi-coloured floats on lobster pots and other fishermen's kit that were ubiquitous elsewhere along this coast.

I hooked up the 'lung' and rolled backwards into the warm, clear water. This was my first dive on Fukushima Daiichi, known to the local fishermen as Ichi-effu, *1F*. I was momentarily disoriented while I tried to match up memories of an ancient video of the disaster with the indistinct mounds below, thickly covered by soft coral, fields of seaweed and partially masked by shoals of colourful fish. On a sub-vocal command, a luminous outline ghosted into view within my mask, identifying the cavern below as lying between the remnants of reactor units two and three. The upper secondary containment structures were completely gone, ripped away by storm surges and hurricanes after this entire coast was abandoned to the rapidly rising seas. However, as indicated by an initial sonic survey, the lower levels of units one to four seemed to be intact.

It was hard to believe that, less than a century ago, this had been one of the large nuclear plants that formed the basis of the Japanese industrial powerhouse and supported the profligate energy use of cities such as Tokyo – the largest megalopolis of the day. The accident had an impact on electricity generation, not only in Japan but also worldwide, with fossil fuels replacing closed nuclear plants. This was only intended as a temporary measure, carbon dioxide being increasingly recognised as a much greater concern than the risks associated with reactor accidents. The reactors eventually came back on line to support a wide range of sustainable power options, but it was already too late. Japan's drive to exploit methane from deep marine clathrates, the country's one significant source of hydrocarbons, was already unstoppable.

I finned towards unit one, the oldest and smallest of the destroyed reactors. Like its two larger neighbours, it still contained corium, the fossil of nuclear fuel that had melted through the pressure vessel and reacted with the concrete of the base of the primary containment. For years after the accident, huge efforts were made to clean up the surroundings that were contaminated by the released radioactivity. It was easy to forget that, in fact, almost all the radioactivity was successfully contained within the reactor buildings – with most of that immobilised within the corium itself. This should have been removed and conditioned for geological disposal decades ago but, of course, this disposal was overtaken

by other concerns. When destabilisation of methane clathrates passed a tipping point, became auto-catalytic, and global warming entered its runaway phase, a few defunct reactors were the least of anyone's worries.

I needed a cutter to remove the rusted door into the reactor but, once inside, the structure seemed reasonably intact. My dosimeter climbed as I wormed my way through the labyrinth of mangled pipes, walkways and other debris, gradually approaching the hatch giving me access to the bottom of the primary containment. This was the route used by robots to explore the basement in the decades after the accident and, cleared to the side, I could see several carcasses of those who had succumbed to high radiation doses during the process.

To my surprise, I didn't need the cutter for the access hatch, which I could undog and drag open with muscle-power alone. I peered cautiously in. Unlike the drab coatings of surfaces that I encountered in the perpetual darkness of the reactor basement, the area within, termed the *dry well* according to my schematics, was covered with purple furry growths that sparkled in the light of my head torch.

There had been enough time for shorter-lived nuclides to decay, but the corium was still extremely radioactive. As an experiment, I turned off my torch and the heads-up display. After my eyes adjusted, I could faintly discern a spooky blue Cherenkov glow, which was brightest at the base of the pressure vessel. Despite the shielding provided by the water, this was not a place to hang about in.

I quickly switched my torch back on and clamped another to a convenient pipe so I could assemble the long grab I would use for sampling the organisms that grew on top of the corium. This was my goal, the extremophile microbes that had adapted over decades to survive under enormous radiation doses, living in a warm, nutrient-rich environmental niche where they had no competition.

With three filled sample bottles, I beat a hasty retreat from the bowels of the reactor and its deadly contents. Radiation is clearly dangerous and fear of it, fanned by the scaremongering of anti-nuclear groups and lobbying by the oil and gas industry, contributed to decisions that led directly to the catastrophic conditions during the latter half of the 21st Century.

Global warming – the name was one of the fundamental problems. It sounded innocuous, maybe even attractive if you lived somewhere cold and miserable. *Global environmental Armageddon* would have been better, which might have communicated how serious the situation was. The tipping point had already passed before any serious measures to reduce greenhouse gas emissions were attempted. Then it was too late. A rise of fifty metres in sea level, plagues, famine and now the destruction of the ozone layer being the latest twist in the story.

It seemed likely that nobody died as a result of radiation exposure after Fukushima. Even Chernobyl, which was much worse, killed only dozens directly, though from statistical analysis, maybe a few thousand others suffered from cancers resulting from doses they experienced. Nowadays, the death toll was in the hundreds of thousands a year – that from a very much smaller global population than we had at the beginning of last century. But it wasn't the alphas, betas and gammas that were doing the damage; sunlight with its high UV content was now frying us.

Although the host of resulting skin cancers was a concern, this wasn't the big

problem. People – and even animals – could be brought into shelter or given protective coverings or creams, but we couldn't do that for crops. During the first decades of runaway warming, decimation of populations outpaced the fall in agricultural productivity, so this wasn't a concern. Now things had stabilised and we could think about recovery, rebuilding. That's why I was here, searching for radiophilic bugs so I could transfer this trait to crops requiring UV protection.

After I clambered back into the boat and loaded my precious booty into the small refrigerator, the incongruity of the situation hit me. Over-population was the trigger that opened a Pandora's Box of environmental evils, which acted in a Gaia-esque manner to effectively remove the irritant. Now we were battling to ensure that this wouldn't result in complete human extinction. The Ichi-effu disaster could now be seen to have a silver lining, although one that could never have been envisioned at the time.

How strange that a nuclear catastrophe could provide a ray of hope for the future.

An Excerpt:

Day 1 ...take a walk on the wild side

As usual in greenhouse Glasgow, it was hot and extremely humid. There were only two types of weather in Glasgow these days: about to rain and raining. Dr. Bruce Roberts reckoned that it was just about to progress from the former to the latter, giving him another reason to regret his decision to walk through the Combat Zone, the CZ as the locals called it, rather than simply take the metro from the docks to his hotel.

It was about nine-thirty in the evening, he estimated. In mid-May, it should still have been fairly light outside. However, the overcast sky reflected only a faint reddish glow from some of the smarter parts of the waterlogged city that still boasted streetlights. Here, in Partick, the only lights were the signs for bars, pachinko parlors and brothels, which huddled together as if for mutual protection around the bases of the few relatively intact blocks of flats. These islands of garish neon and raucous karaoke only emphasized the deep gloom of the bombsites that separated them. *Bloody typical!* he mused. *Shortage of accommodation causes continual conflict between the original residents and environmental refugees, so what do the fuckwits do – blow each other up, which just makes water-tight digs even rarer!*

It would probably have been okay if he had just walked straight through at seven-thirty, but the temptation to stop for a beer had been too strong. A Guinness in the Glasgow Hilton would certainly cost as much as it did back home in Switzerland. This contrasted with the CZ, where drinks were cheaper by a factor of ten or more. Also, the bar entertainment was definitely a consideration. Many of the strippers and pole dancers were stunningly beautiful, reflecting the ethnic mixing pot that the West of Scotland had become.

Despite buying a number of colorful cocktails for the bar girls while they hooked their wares, it had been a very cheap evening. Indeed, one of them had not only been incredibly cute, but had made him a proposal that he had seriously considered. Only when he noticed the time on a small watch, which hung from her left nipple ring like a micro taximeter, did he decide that it was past time to make tracks.

On balance, it's probably just as well. He grinned wryly. *Although almost all the viral diseases that I might encounter in Scotland are readily curable, some of the new fungal VDs in the CZ could really fuck up my love life for a while.*

There used to be a police control point at the bottom of Byres Road, but now he discerned only a burnt-out shell in the gloom. *SFA* was scrawled on the wall in two-meter high luminous letters—whether a comment on life or a claim of responsibility for the attack, he wasn't sure.

He had left the bars behind and now saw the lights from the wall around the Uni

compound and began to relax. Once through the access gate, he'd be safe in a controlled area the entire way to the Gilmore hotel complex. Unfortunately, this bit of no-man's land between the red-light district and civilization was particularly desolate, and nobody else was in sight.

A rustling noise from the ruins of the control point caught his attention. In Glasgow, natural sounds reflected the constant dampness: drips, splashes and squelches. The rustling noise came again. There was a sharp click, and then light flared from the doorway as a piece of paper caught fire. The flame revealed two kids, one still chewing whatever the burning paper bag had previously contained. Without breaking step, Bruce continued walking as if he had noticed nothing out of the ordinary. The burning paper was thrown into the back of the ruined building, landing with a hiss as the flames expired. Now the kids were only grey shapes against a black background.

"Hey, Jim, got any Blues?" The voice was hoarse, probably due to the detergents, polishes and cosmetics that had been drunk or inhaled in the search for nirvana. Despite this, the kid sounded only to be in his early teens.

"Old boring farts don't do Blues," the other shadow contributed in a throaty stage whisper. "Let's just roll the fucker."

Why fucking now? Why fucking here? Even more to the point, why fucking me?

Bruce crossed the street, turned his back to the wall of a long-abandoned tenement block and, still trying to betray no external sign of concern, chose his spot to make a stand. He kicked a space clear of the largest pieces of sodden rubbish that cluttered the pavement.

The two shadows emerged from the doorway and took on more substance as they stalked across the potholed street. Although it was too dim to make out their features, the yobs were typical street shit: thin with spiked hair and dressed in ragged shorts, stained vests and heavy boots. The taller of the two pulled something from his belly-bag while the other detached a chain that he wore like a belt around his shorts.

"Ho, you, cunt-features," called the ned with the chain. "Drop the fuckin' jaekit and the shorts and we'll no bother carvin' yeh." Even his wrecked voice couldn't hide the insincerity of this offer.

This pair of psychopaths would pulp their baby sisters for the sheer fun of it. Drop my shorts here and I'd well deserve the serious buggering that I would certainly get. Before, or while, they sliced me up.

He stood still. Sweat ran down his face, trickled down his back, and pooled under his armpits. Chains were bad enough, but please don't let this other fucker be carrying a malky. The cutthroat razors that had always been popular with Weegie muggers scared him shitless. Something to do with not feeling the cut—just the rush of blood and the slack feeling as part of his anatomy was sliced off.

Life's too short to worry about the cost. It's time to even up the odds with some chemical help. He carefully extracted a tab of SLOWDOWN from the pouch under his left jacket lapel and slipped the pill into his mouth.

A sharp click and then the taller thug lunged at Bruce with a long knife.

Not much chance here to surrender quietly.

He didn't like knives either, but at least the stabbing and slashing moves made it clear where the weapon was going. The SLOWDOWN kicked in, making the psycho's jab appear

slow, as if the air had turned to treacle.

I may be an old fart... He grinned. *...but I am definitely not boring. These poor bastards are just about to find out what state-of-the-art designer drugs are all about.*

He swept the blade aside, took his assailant's wrist in his left hand and punched him hard in the groin with his right. As Bruce moved under the punk's lifted arm, his high-pitched scream became even higher when the twisting wristlock brought the would-be mugger to his toes. Continuing to spin, he swung the frantically struggling punk round to use as a shield against the whistling chain.

So far, everything felt like a standard workout in the dojo, but a smooth tatami mat was a world away from the slimy morass of a Glasgow CZ street. As he turned, his foot slipped on something unknown and probably unmentionable. He dropped heavily to one knee and heard a wet smacking noise before the screams from his captive cut-off with a choking gurgle.

Regardless of the fact that his buddy was in the way, the chain-wielding nutcase had let loose, and it was a very long chain. The knife fighter fell to his knees, the chain looped once round his shoulders and several times round his neck. Before the chain could be worked free, Bruce lunged over the struggling figure and head-butted his other attacker in the stomach while pulling at the back of the kid's knees. He fell heavily onto his arse with a grunt of pain. Giving his opponent no chance to recover, Bruce dropped on top of him, grabbed his ears and smashed his skull repeatedly off the wet macadam.

SLOWDOWN was widely advertised to be at the cutting edge of combat pharmaceuticals. It not only sped up reflexes to the point that attacks appeared to come in slow motion, but also enhanced all other senses. If not for this, he couldn't have heard the intake of breath behind him, which caused him to flatten himself heavily on top of his luckless assailant. The incoming kick was close enough to his head to brush the ends of his closely cropped hair. Rolling forward under the kicking leg, which seemed to be moving fast even in slowtime, he pistoned both feet into the crotch of his new attacker. As the small body flew into the air, with a scream indicating more rage than pain, Bruce shoulder-flipped himself onto his feet.

In the faint, ruddy light, he could make out little detail of the compact form crouched before him. As it feinted to the left and then let loose with a back-roundhouse kick that arched towards his head, he countered with a low sweep that should have taken out the figure's supporting leg. Despite his chemically enhanced reactions, he was not even close to making contact. In a move reminiscent of the levitation practiced by top ballet dancers, the attacking kick had transmogrified into a floating aerial twist that touched down as lightly and silently as a feather. Whether due to an enhancement of some chemical or biophysical sort—or just plain natural ability—it was evident that he was completely outmatched in terms of nitty-gritty street-fighting skill.

Without conscious thought, he instinctively threw himself at the crouched form, arms spread wide. This unconventional move clearly confused his aggressor, and as the body started a backwards flip, Bruce's hand caught hold of an ankle. While rolling over his shoulder and onto his feet, he grabbed a small bare foot with his other hand and twisted hard.

A scream, definitely of pain this time, quickly cut off as Bruce swung round, which lifted his attacker clear of the ground. The flailing body, which couldn't have weighed more

than half his hundred kilos, accelerated through the air before smashing hard against a wall. He pulled the leg between his calves, twisted round to establish a lock on the vulnerable knee and dropped heavily on top of the squirming body. Reaching forward to grab the spiked hair, he became suddenly aware that he was lying on a slim girl who appeared to be wearing nothing other than a leather bodice.

Taking advantage of his momentary distraction, the girl arched her back and managed to smash her head against his chest, painfully bumping his chin on the return movement.

Chivalry is all very well, but there's a time and a place for everything. I was taught never to raise a hand against a woman, but I guess there are exceptions to every rule.

He dropped his weight forward, simultaneously putting full pressure on the girl's knee joint and pushing her face into a soggy pile of rubbish. The mixture of muffled screams and curses quickly turned to choking noises, as her nose and mouth were forced deeper into the slimy filth. He slipped his hand round her neck, found the carotid artery, and gradually applied pressure until the writhing ceased and slumping relaxation replaced the tension in her small body.

The fight had probably lasted about thirty seconds clock-time, although his sped-up metabolism made it seem much longer. One Blue-head had suffered a minimum of a very severe concussion. Bruce had no inclination to find out what state the one with the chain round his neck was in, but he didn't seem to be breathing, which might indicate that the simple chain was not all it seemed.

He pressed on the luminous panel on the pocket of his jacket and turned over the girl's body. In the light, he could now see that she was wearing more than he thought, although the leather thong couldn't have an area of more than a few square centimeters, so he hadn't been far wrong.

Unlike the neds, the girl's features did not have the wrecked look seen on the posters warning of the consequences of substance abuse. Her bare feet showed the patterns of emplaced carbon fiber inserts and, when he looked closer, he also saw traces of armored points on her hands, knees and elbows. If she had managed to make contact with any of her attacking moves, he would have been in very bad shape. Under the layer of muck, which might have been mud but was probably dog shit, her face seemed to indicate an age in her mid-teens, although her figure indicated that she might be older. Given that she could afford combat implants, however, it was clear that physical appearance couldn't be considered a reliable indicator of her age.

Something's not kosher here.

The feeling of wrongness was palpable, but he couldn't quite pin it down. Nothing else for it, time to bite the bullet. He pulled out his wallet and selected a blue rhomboid of CLEARUP from the selection of pills in its back section. He grimaced in anticipation before placing it on his tongue, swallowing and walking quickly along the road.

He did not get more than five meters before his stomach cramped and he lost the three pints of Guinness from the CZ bar. The retching felt as if it extended from his stomach to the back of his head, dredging the deepest sources of bile from his duodenum and ripping neurons loose from his hindbrain. All the gains from a minute of slowtime were compensated by several minutes of the worst possible hangover, which lasted for at least a century of perceived time.

Wiping his mouth on the sleeve of his jacket, he looked round but saw no sign of movement from the punks on the ground, who had again become shadows. His attention was drawn to the smallest of the forms and the previous vague aura of uncertainty crystallized into the clear incongruity presented by the girl.

Lowlifes with cheap and nasty weapons were the natural denizens of this area. Odd idiots like myself, who'd been too long away from the city or had abandoned what little common sense they once possessed in the CZ bars and brothels, were the typical prey of such predators. But what the hell was a high-grade martial artist dressed like a hooker doing here? It didn't make any sense at all.

The obvious course of action was clear, get into a secure zone asap and forget about the entire episode. Nevertheless, he walked back and checked out the slim girl. She was breathing regularly, but showed no signs of coming to. Rustling noises in the gloom caused him to look around. He could make out gliding shapes in the deepest shadows: hyenas and other scavengers drawn by the noise of the fight.

The chances of this semi-naked female waking up in time to get herself together before these fuckers pounce are negligible. But, if I wake her up, there's a distinct risk that she'll kick seven shades of shit out of me, regardless of my Good Samaritan gesture.

"This is not a good idea," he said, as if speaking aloud would stop something stupid from happening.

Completely ignoring his own good advice, however, he carefully took a patch of LIGHTSOUT derm from his wallet and slapped it against her left buttock. He then removed the drawstring from his jacket and cut it in two with the largest blade of his Swiss army knife, using the smaller piece to tie the girl's thumbs together and the larger to bind her ankles. Then, with a grunt, he heaved her over his shoulder in a fireman's hoist. After a first staggering step, he started to march steadily up Byres Road towards his hotel, which lay within the Gilmour Hill campus of Glasgow University.

The wall around the Uni compound was a stark contrast to the rubble behind him. It seemed to grow from the ground with the appearance of fine porcelain, whiter than white in the light of the high-power globe lamps that protruded from the wall at fifty-meter intervals. A flash of his ID card at the holo-reader caused the outer gate to unlock with a loud click. In the security check cubical, Bruce looked towards the retinal scanner so that he could be identified as the owner of the card.

It's very easy to steal a card, but a lot more difficult to present the appropriate retinal pattern. Not a very sophisticated system, but enough to keep the scruff out.

To Bruce's surprise, but considerable relief, the security software seemed to be unbothered by the unconscious body slumped over his shoulder. He guessed this was not an eventuality considered when the designers were training the system's neural network. The inside gate drew back and he emerged into something more like his expectation of twenty-first century civilization: clean, bright and safe. However, being Glasgow, still hot and humid.

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Author's note to the reader:

Thanks for reading this excerpt from my novel "Extremophile". I offer this preview and the "Global Warming" short stories in the hope your interest in my writing is piqued enough to buy either the ebook or paperback versions of this and the upcoming volumes of the trilogy.
Go to www.twbpress.com/extremophile to watch the video trailer and find the links to purchase this novel from TWB Press, Amazon Kindle, and other online booksellers.

"Cheers from beautiful autumnal Switzerland."
Ian
October 2017

About the Author

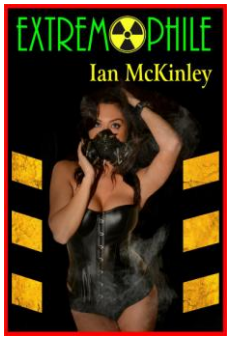
This snap was taken in the Fukushima evacuated zone in the first winter after the accident, when we were testing different clean-up approaches. The Japanese are very cautious when it comes to radiation, hence the protective clothing. In this particular village, however, the dose rates were not very different to the fallout levels when I was growing up in Scotland in the 60s (from atmospheric bomb testing). Levels then were, of course, much higher in places like Nevada! Something to think about next time you visit Las Vegas...

I am a Scot, living in Switzerland, working in the rather esoteric field of radioactive waste management. I've looked at everything from the safety of disposal sites a million years in the future to evidence that can be gained from the Oklo natural reactors that operated two billion years ago – which may be classified by many as a kind of science fiction.

This experience ensures sound technical backdrops to my hard, near-future science fiction. Adult action thrillers showcase the evolution of society in the face of major technological advances and a degrading natural environment. All extrapolations over the next century are credible - maybe frighteningly so, given their dystopian nature.

My international work means that I travel a lot, which is also reflected in the Extremophile trilogy, providing a global perspective of the future that we may well be facing.

I have three other published novels that focus on further future threats: collapse of the internet, emergence of artificial intelligence and the impact of a mega-rich oligarchy who live beyond the law.



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