

One



Simon Bartlett
writing as Yuan Wen



ADDAX

"The book addresses all sorts of interesting issues and is full of intriguing ideas all packed into well told, fast-paced stories"

*Steve Finamore
Principal, Bristol Baptist College*

"I have never before read a fiction book that wrestles with the painful and frightening question of forcing the world to address catastrophic climate change within the confines of a conscience shaped by Christ. The Good Terrorist does so creatively, brilliantly, and if I may phrase it so, even beautifully. I read it at one sitting because I simply had to know what would happen next ... at every page!"

*Mary Morris
Technical Specialist
Natural Environment and Climate Issues, World Vision*

"These are intelligent, thought-provoking stories that I thoroughly enjoyed. My late husband had a PhD in artificial intelligence and we edited an academic journal for climbing and walking robots together. Now, 20 years later, it is fascinating to consider just how artificial life forms might have evolved into sentient beings - even spiritual beings.

What amazes me, and what I enjoy most about these stories is how the author knows so much about all kinds of things, from genetics to engineering, to theology and military manoeuvres. I really like intelligent books! The concept for 'Triple-Sim' is excellent and in fact it would make a brilliant film in the genre of 'The Hunger Games' or a sci-fi thriller. Perfect for airport waits!"

*Emma Randall
Project Manager*

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Preface

A hundred years ago, sentients didn't exist. The world has changed a great deal in that time. Not only do sentients exist, but species that were thought to be extinct are being regenerated and totally new species are being developed thanks to the wonders of genetics.

The past century has been a time of crisis as we suffer the effects of climate change. On our over-crowded globe many people fear and resent sentients. But perhaps, as we reflect on the story of the first sentient, we will form a better opinion of them.

One was created principally by my grandfather, Yuan Ming, albeit with much help from others, especially his father, Yuan Wei. One could have been the product of a large corporation, but instead she came into being in a family. Not only that, Yuan Ming was taking part in an unusual longevity competition. One didn't think this was either irrelevant or a coincidence. She believed that a greater power had brought these events together for more than one purpose.

One lived with Yuan Ming and his family until his death. Their stories cannot be untwined. So although this is first and foremost One's story it must also be Yuan Ming and my grandmother, Jetticke's, story. As we look back on history we recognize how profoundly Bob Peterson shaped the 21st century. His story, as far as it impacts our story, could not be omitted.

I take the opportunity to express my gratitude to my mother, née Dani Burchell. My mother did not feel her story was worth telling, least of all alongside One's, Yuan Ming's and Bob Peterson's stories. My publisher and I disagreed and eventually my mother gave in. Thanks, Mum.

Our story starts in 2005, when Yuan Ming was seven years old.

Yuan Wen
Anqing, China
17 May, 2115

Chapter 1

Yuan Ming always looked forward to visiting his grandparents. One reason was his grandfather's workshop. His grandfather, Yuan Dong, repaired televisions, video-recorders and almost anything else electronic. In his workshop there was a long heavy table with a large magnifying glass, a soldering iron, a lamp and an oscilloscope. In every corner there were boxes of transistors, circuit-boards and other parts. It was all fascinating to Yuan Ming. He had lots of questions and Yuan Dong enjoyed answering them.

Another reason Yuan Ming liked visiting his grandparents was because they always gave him a present. On this occasion they had bought him a slot-car racing set. Before long the set was assembled on the carpet and the family was playing with it.

Yuan Ming put the car on the track and pressed the control.

"Don't go too fast!" Yuan Dong warned. "Go too fast and you'll come off the track."

"Go too slow, you lose the race!" Yuan Ming replied.

Yuan Ming's father Yuan Wei smiled to himself. The likelihood of his son going too slow was zero.

Yuan Dong and his wife Soong Xue were members of a small house church. When Yuan Dong was younger many of his friends had served prison sentences for being Christians. The government and police were now more tolerant of unregistered churches although there were still sometimes arrests. But there had been no trouble in Maanshan. When his grandson was born a rather strange event had happened. Yuan Dong had never told his son about it but this evening he felt he should do so. After Yuan Ming was in bed and the elder and younger Yuans had made themselves comfortable, he broached the subject.

"There's something I'd like to tell you about", he said. "It happened when Ming was born. A number of us in the church got together to thank God and pray for God's blessing on him. As we were praying, Wu Yi, one of the brothers, saw a picture.

'I can see a line. It means something. It's something to do with your grandson, I'm sure of it', he said.

'What sort of a line?' I asked.

'It's a straight line, going left to right,' Wu Yi answered. 'It looks just like a one.'

The younger Yuans looked rather blank.

"To be honest, people in church see pictures", Yuan Dong said. "Sometimes they mean something, sometimes they don't. I've kept it to myself all this time. But I thought I should tell you about it. Maybe it will make sense to you."

"It doesn't mean anything to us", Yuan Wei's wife Zheng Lily said. "But maybe it will one day. Thank you for telling us."

"Whether it actually means something or not is hard to say", Yuan Dong said. "But putting that aside, I think that Ming is exceptional. I've known a lot of children over the years but I've never met any seven year-old like Ming."

"I agree with Dong," Soong Xue, Yuan Ming's grandmother, added. "Ming is very special. But we're afraid that if he simply goes through a traditional school system, even if he goes to a key school, he won't develop his full potential."

Later that evening Yuan Wei and Zheng Lily talked about the conversation.

"I think your parents are right", Zheng Lily said.

“I do too”, Yuan Wei agreed. “But what should we do?”

“What’s the best school in Shanghai?” Zheng Lily asked.

“Well, if you equate best with most expensive, it would have to be one of the international schools.” Yuan Wei said. “Probably the British one, in fact.”

“Could we afford it?”

“You’re the accountant!”

Yuan Wei was Head of Research for Nanotech ZZA Ltd and earned a very good salary. But Zheng Lily managed the domestic finances. She took out a pad and started to jot down some numbers.

“We’d be spending more than half of our combined salary”, she said. “But we could do it.”

“All right then!” Yuan Wei said smiling.

“OK”, Zheng Lily agreed. “This should be interesting.”

A few evenings later Yuan Wei told Yuan Ming about the picture that Wu Yi had seen, of a line depicting one.

“None of us knows what the picture means”, he said, “although we can speculate. For example, to a mathematician, one is a very special number. It’s the first natural number, a perfect number’ – Yuan Wei hesitated momentarily as he said that – ‘a factor of every number, it’s...”

“Anything times one is itself”, Yuan Ming said, interrupting.

“That’s an important property too”, Yuan Wei agreed. “So the number one is very important, even though it’s a very small number. So perhaps the picture means that although you are one and in a sense very small you are still very significant.”

Yuan Ming was thoughtful for a moment.

“But that’s true of everyone, isn’t it?”

“Yes it is”, Yuan Wei agreed. “Maybe God will make it clear to us later.”

In the early 21st century it was not uncommon for Chinese parents, especially in a big city like Shanghai, to take their children out of the state system and enrol them in a private school. It was simply necessary to obtain permission from the Municipal Education Commission. The Yuans applied, permission was granted, and Yuan Ming obtained a place at an excellent international school.

From this point on Yuan Ming’s education took a dramatically different direction. The school followed an internationally-oriented version of the English curriculum and most lessons were taught in English. Although Yuan Ming’s life was not typical, it was not entirely unusual for a privileged Chinese child. His first class teacher was a Scot, Miss McTighe. She was a diligent and patient teacher. She was also demanding and completely intolerant of homework that was half done or late. When his parents asked him, Yuan Ming admitted that he was quite afraid of her. But the racially-mixed class whetted Yuan Ming’s competitive appetite and he needed no spurring on.

During his first year at the international school Yuan Ming made steady progress. The school gave him extra lessons to help him to catch up in English and before long he was fully integrated.

One evening as the Yuans were settling down to dinner Yuan Wei made an

announcement.

"I've got some interesting news."

"Oh yes?" Zheng Lily prompted.

"Well, we've been working with the Ministry of Industry on a strategy paper for development of nanotechnology in China. The Ministry of Industry submitted it to the State Council. It seems that it has been very well received. In fact, it looks pretty certain that the government will put some serious money into nanotechnology over the next five years or so."

"What do you mean by 'serious money'?" Zheng Lily asked.

"Oh, about half a trillion Yuan", Yuan Wei answered nonchalantly.

"Thirty billion US... That is serious", Zheng Lily agreed. "You think some of it will come in your direction?"

"I think so. There aren't so many nanotechnology firms in China."

"Well that's good news. And I've got some more. I made some dofu fa. Who wants some?"

As Yuan Wei expected, the State Council approved the huge investment, as did the Standing Committee. It was a year before Nanotech ZZA started to receive funds. But the day came when Yuan Wei came home and informed his family proudly: "I've got a new toy! Do you want to see it?"

"Of course!" said Yuan Ming.

"OK. I'll get the driver to pick you up from school tomorrow and bring you over to the lab."

Yuan Wei looked at his wife. "Feel like coming?"

"Sure, why not?"

The following day, after clearing security Yuan Wei led the way to his laboratory.

"Well, there it is!" he said. "Do you know what it is?"

"Some kind of electron microscope, I'd say", Yuan Ming replied, noting the tall column and the high-voltage warning signs.

"Pretty close", his father replied. "It's the latest in electron-beam lithography. We can literally move individual atoms around, or small groups of atoms. This is just one part of the total investment; this alone cost six million dollars."

"So what can you do with it?" Zheng Lily asked and then regretted asking as she got a torrent of technical detail.

"In short, you can build a really fast chip?" she said at the end.

"Yes."

"So will we have your ICs in one of our computers sometime in the future?" Yuan Ming asked.

"No, there's no real chance of that. We'll be able to produce some amazing ICs, but they are going to be way outside the means of the average person. Most of the chips we'll be making are going to be bought by the government and big corporations. But the thing that's getting me really excited is where this is all leading to. At the moment IT companies around the world are all working on producing a functioning quantum-effect processor. Right now, I'd say that the US, Japan and China are in the lead. The US was well ahead, but

cuts in defence spending over there have given the rest of us a chance to catch up. It's really difficult to know who's in the lead now. The big players are keeping their cards close to their chests."

"Do you design the chips?" Yuan Ming asked.

"Yes, in partnership with another company. But we don't do volume production; we're not set up for that."

Following his family's visit Yuan Wei started thinking further. He believed that nanotechnology had a tremendous future. That was why he had entered the field in the first place. It would be great if he could interest Yuan Ming in it. The two of them had always assembled their own computers rather than purchase ready-made computers. Assembling an ordinary PC was a straightforward undertaking and rarely required more than a day's work once they had all the parts. But what about something a little more challenging? The more Yuan Wei thought about it, the more he felt he'd like to put together a high-end graphical workstation with his son, something tailored for visualization. Maybe he could use the new chips; they would be perfect for that. If he could get them he could build a workstation that would run rings around most computers short of a serious mainframe. It would be a great education for Ming. But there would be a few people to persuade along the way. Yuan Zei knew that Nanotech ZZA would sell the new processor chips for far more than he could afford. But perhaps there was a way he could get hold of some. The following day he approached the CEO.

"I brought my wife and my son round to see the new lithography machine last night", he started off.

"What did they think of it?" the director asked.

"They were impressed."

"As they should be."

"I'd like to ask a favour. You know that after we fulfil an order we sometimes have a few chips left over. I was wondering if I could keep some of the GPU chips from our next order – you know, the one for Qarex? I'd need four."

The director thought for a moment. Four chips was nothing in terms of the total production run. Yuan Wei was a senior member of staff, intimately involved in producing these chips. It seemed reasonable to allow him to profit from his efforts in this way.

"Let me check the contract we have with them", he said. "But in principle I don't see a problem. Just let me know when you're taking them and I'll sign a release note so that security won't accuse you of stealing them."

That evening, Yuan Wei spoke to his wife.

"Sweetheart..." he started.

"Yes?"

"I want to spend some money."

"What on?"

"A new computer."

"Do we need a new computer?"

"I want to try out a few things with Ming."

"So how much do you want to spend?"

“About 20,000 dollars.”

Zheng Lily almost choked. “What on earth for? You want to buy a supercomputer?”

“No, no. Not a supercomputer. That would cost millions anyway. A high-end graphics workstation. And we wouldn’t buy it, we’d make it”, Yuan Wei answered. “Look, we’re spending more than 40,000 dollars a year on Ming’s education as it is. This is my field. I’d like to teach him something about what I do, give him some ideas about how I see my field developing. I think it could be money well spent.”

A few days later Zheng Lily agreed to her husband’s suggestion.

“But you owe me one”, she said.

“Deal”, Yuan Wei said.

The final person to persuade was Yuan Ming.

“Ming, I was thinking about building a more powerful computer”, Yuan Wei started.

“And I was wondering if you’d be interested in working together on it.”

“What kind of computer?” Yuan Ming asked.

“Well, in some ways it won’t be so much different from a good quality graphics workstation, at least not initially. But I think that we could both learn a lot from putting it together and I think it has the potential to grow. What I’d like to do is to try to create a high-quality virtual person.”

“It sounds interesting”, Yuan Ming said. “But running is taking up a lot of time.”

“Well Mum and I would both support you in that. And I know that I’m always on about focus, getting rid of extraneous objects and activities. But do you think there’s any way you could do both?”

Yuan Ming certainly did know about extraneous objects. ‘Extraneous’ was one of his father’s favourite words. When he was younger his father would come home from work and find toys, odd socks and all sorts of other junk scattered around the living room. They were all extraneous and had to be cleared up before anything else was done.

“You think it’s worth it?” Yuan Ming replied.

“I do”, Yuan Wei said.

“Let me think about it.”

Yuan Ming did think about it. He had two hobbies: chess and running. He thought about the pressure his chess teacher was putting on him. He thought about running and how much he was loving it. And he thought about his father’s suggestion. He couldn’t imagine it at all. But it sounded interesting. He came back to the subject over dinner one day.

“Dad, I’ve been thinking about what you were talking about. I’ve decided to keep up the athletics, but give up chess. If I do that I think I could put aside some time four or five evenings a week. I’d still have to do my homework, of course.”

“What do you think?” Yuan Wei asked his wife. “Ming and I will disappear upstairs for four or five evenings a week and work on our project.”

Zheng Lily thought for a moment.

“Well, I don’t see that you don’t need to do that”, she said. “Work in the living room. Maybe I can be part of the project too. I’ll supply the wontons.”

“Then we’ll have the perfect working environment!” Yuan Ming exclaimed.

So work began.

But a few days later Yuan Wei came back to the conversation.

“Ming, I can see that you’re very committed to the athletics. You’ve got real potential and I wouldn’t want this to prevent you from continuing with it.”

“I don’t think it will. I’ll still be able to run after school.”

“I was wondering if we could do any better than that.”

“What are you thinking?”

“Well, there are a lot of top athletes in Shanghai. I think we might be able to arrange some coaching for you.”

“That would be great”, Yuan Ming said. “And I can tell you another thing. There’s a competition coming up between the international schools in Shanghai. The school really wants me to take part.”

“Hmm. I wonder if that creates an opportunity?” Yuan Wei said thoughtfully.

A few days later Yuan Wei paid a visit to the school headmaster.

“I would like to try an idea out on you”, he said.

“OK, try me”, the headmaster replied.

“Ming is doing very well in his running. I’m not saying that he’s going to be an Olympic athlete, but he’s certainly good and I’d like to encourage him...”

“And we would too!” the headmaster said.

“I got in touch with the Institute of Physical Education and I’ve found a very good coach. He could coach Ming once a week. We thought Ming could go every Saturday morning.”

“Well, that wouldn’t affect us at all”, the headmaster said. Ming doesn’t have lessons on Saturdays.”

“I’ve spoken with the coach. He says that for Ming to really progress he should start to train twice a day.”

The headmaster raised his eyebrows. “That could be a bit difficult...”

“That’s what I wanted to talk to you about. I was wondering if you could let Ming off the lesson before lunch?”

“It would be unusual. But let me talk to some of my colleagues about it. Can I let you know in a couple of days?”

“Of course.”

The school decided that they could accommodate the arrangement and Yuan Ming started to train twice a day. His coach, a man of forty called Yi Tsai, told him that he should make his target that year, his 15th year, to run the 400m in under 54 seconds. Yuan Ming remembered how much he had struggled to bring his time down to 59.4 seconds the previous year. He thought it was impossible. But he didn’t say anything.

Chapter 2

Yuan Ming followed the routine he had worked out with his father and Yi Tsai. He went over to the school track at about noon and ran for about half an hour before going for lunch. After lessons finished he went back for another session which lasted almost an hour and a half. Twice-a-day training was tough but Yuan Ming could see that together with the better quality of his training he was making progress he had never expected.

After coming home he did his homework and then after dinner he and his father worked on their project.

Yuan Wei and Yuan Ming's first task was to design the workstation. Yuan Wei had definite ideas about the design – which was not surprising, as he had been very involved in the design of the chips. Yuan Ming had no experience in that area and so just accepted what his father suggested.

The heart of the workstation would be a six-processor blade with two off-the-shelf eight-core CPUs and four of Nanotech ZZA's new GPUs. Further items would be a 10 MP monitor, memory blades, the water cooling system, an I/O blade with a fibre-optic link and the power supply. They planned on all Open-Source software for the operating system and the real-time rendering which was the main application that they planned to run initially.

They ordered all the parts and then assembled them. Assembling the components for a workstation was more complicated than for a PC but there was no fundamental difficulty.

"Before very long, Ming", Yuan Wei said at one point, "we are going to need a model."

"I know. I've been thinking of asking one of the girls in my class."

"Have you now?" his father asked, with some interest. He was not aware that Yuan Ming had a girlfriend.

"There's someone who I think might agree to help us. Her name's Jetticke. She's Danish."

Jetticke, as Yuan Ming had expected, was agreeable.

"Private use only – no commercial or resale, right?" she asked, joking.

"That's right."

A few weeks later the Yuans' new workstation was running to their satisfaction. The time had come to try it out. Yuan Ming telephoned Jetticke.

"Hi, Jetticke. We're all set, if you're still up for it."

"Where should I come?"

"Take Line Nine to Songjiang Xincheng station. Just as you come out of the station there's a DigiMax studio. We'll do the scan there. How about 10 o'clock on Saturday?"

"That's fine for me. I'll see you then", Jetticke replied.

Yuan Wei looked forward with interest to meeting the girl his son had suggested for the modelling assignment. On the Saturday morning she arrived in good time at the studio. She was 15, the same age as Yuan Ming. Yuan Wei was expecting a blonde with blue eyes but in fact she had light brown hair and green eyes. Her hair was shoulder length, wavy at the end. She was not cover-girl beautiful but was certainly attractive.

The Yuans had selected the DigiMax studio as it had recently purchased a very good 3D scanner. For the next three hours they worked with Jetticke to record real-time scanned images of her face. First, she said every English phoneme and diphthong. Then they

recorded her conveying every expression they could think of: anger, relief, boredom and so on. At last they were finished and the Yuans' hard-drive could contain no more data. Jetticke made a good impression on Yuan Wei. She was intelligent, confident and fun and he mentally congratulated his son for having such a friend. She had lived in China for most of her life and spoke Mandarin fluently even if not always quite correctly.

Now the Yuans set to work. The first stage was to convert Jetticke's images into vector graphics. Then connect the graphics drivers. Then the talkbot program to the drivers. Then the expression heuristics. The two men poured their concentration into the task for two months. At the end of the time they had produced what they were aiming for: a photo-realistic programmable vector image of Jetticke which the workstation could render in real time. They were ready to try it out on Jetticke. The following day Yuan Ming invited her round to their house.

"It's fairly basic at the moment", he warned her.

Jetticke came over to the Yuans' house and the family settled down in front of the screen. It was 38 centimetres high and 25 centimetres wide, very much like the screen on a laptop. In the screen Jetticke saw a mirror image of herself with an extraordinary level of detail. Then the image spoke.

"I can hear you, but I can't see you yet. Say something to me and I'll repeat it back to you."

"Hallo, mig benævne er Jetticke."

"Hallo, mig benævne er Jetticke," the image repeated.

"Hvad er jeres benævne?"

"Hvad er jeres benævne?" The image's mouth moved in just the same way as Jetticke's had.

"Well, it's a good image", Jetticke commented, not overly wowed. "But it doesn't seem all that intelligent yet."

"Ah, but you haven't really tried her out yet", Yuan Ming said.

"One", he asked, "what is pi to ten decimal places?"

Yuan Wei and Zheng Lily started when they heard Yuan Ming call the virtual person 'One'.

"You called it 'One'?" Yuan Wei asked his son, his mind going back to the picture in Yu Li's dream. He felt annoyed. He felt his son was showing a lack of respect for the vision but he said nothing.

"Yes. It's the first virtual person I've created", Yuan Ming said. "Sorry, One. We couldn't hear your answer. Say it again."

Over the next few minutes Jetticke and the Yuans quizzed One with some more maths problems which One solved easily. But on any other subject the answer was always the same: "I'm sorry. I don't know anything about that."

After twenty minutes or so the Yuans brought the test to a close and said goodbye to Jetticke.

After she had gone Yuan Wei asked his son about his choice of name.

"I certainly haven't forgotten Yu Li's dream", Yuan Ming said. "I've got a feeling that One's going to be very special."

Yuan Wei was still unhappy. "It never crossed my mind that the picture could relate to a computer", he said.

"You probably think that One's a bit of a dead loss after today's performance", Yuan Ming said.

"No, no. I certainly don't think that. It's true that she isn't very intelligent yet. But don't worry. No computer can do anything useful unless it has the right program. All we've done so far is prepare a great hardware platform and install a rendering program. One has incredible potential but what she achieves is going to depend on us. Now we have to give her the programs and make them work together. The real work is just beginning."

Over the following months the Yuans continued to work on One. Yuan Wei did not put pressure on his son and allowed him to work at a speed he was comfortable with. But the same could not be said of athletics: Yi Tsai was extremely demanding. Yuan Ming's days had become full from morning to night. He had hardly any social life and rarely watched television. He missed playing chess. But he could see his own progress and enjoyed being pushed. In addition the International Schools athletics competition was approaching and he was determined to do well in that.

The Yuans now set about the task of making One, if not very intelligent, at least a little bit intelligent.

"I suggest we start off by doing some fairly easy things", Yuan Wei said. "Why don't you get One some eyes and I'll set her up with a visual cortex, so to speak."

Yuan Ming bought two CCD cameras with pan/tilt/zoom functions which he positioned on top of the screen. They were about 10 centimetres high and long and had light-blue lenses at the front. One's laptop-like screen was supported on a very basic stand. A cable led away to the processor. It was quite straightforward to program the camera to respond to their voice commands: display; pan up and down, right and left; zoom in and out and so on. Yuan Wei installed OCR software and a text reader. All the necessary hardware and software was available off-the-shelf and it took the Yuans less than a month to reach the point where One could zoom into an object, a Mars bar, for example, recognize the text on it and say the word 'Mars'.

Next the Yuans installed Image Recognition Software. One's stereo camera allowed her to estimate the distance the object was away from her. A modest amount of work enabled One to trace and dimension objects. The Yuans now prepared a simple database which initially contained just three objects: a table-tennis ball, a key and an apple. The Yuans were able to bring One to the point where she could focus on one of the objects, dimension it, compare it to the objects in the database and identify it.

Yuan Ming then downloaded a list of all English nouns, more than half a million of them, and entered them as records in a database. He set a variety of properties: colour, size, weight and so on, as fields. All of these were initially empty. Yuan Wei wrote a program for One to do an Internet search on all those words, entering data into as many of the fields as she was able to. Over a period of months One's database increased. She found properties of the sun and moon, of a dog and a cat, of a table-tennis ball and a golf-ball and a huge number of other items. Now Yuan Ming could place an unknown object in front of One and ask her to identify it. One could identify many things, such as a peacock butterfly or an inlet

manifold, but there were still many objects for which she had no information. She struggled to distinguish an orange and a picture of the sun. The Yuans programmed One to ask further questions in order to help in her identification, for example, “Where is this butterfly found?”

Yuan Wei programmed One to locate where objects were. For example, “Where is the table-tennis ball?” was answered by “Behind the inlet manifold.” This quickly moved on to, “One, where are my keys?”, “One, where’s my phone?” and so on.

Yuan Wei felt it was time to move forward.

“I said that we should start off by doing the easy things and I think we’ve succeeded with those. But I think it’s time to move on to some more difficult tasks. I’ve been thinking about the next steps.”

“Go on”, Yuan Ming said.

“A baby learns to recognize faces, things and sounds. One can do that. But some time after that the baby gets to sort things by itself and also starts to understand concepts. For example, it understands that it is part of a family. It says, ‘Dada’ and ‘Mama’. One can’t do that.”

“I wouldn’t want One to call me Dada. It would be weird.”

“I’ve felt fairly comfortable with what we’ve been doing so far”, Yuan Wei said. “But AI isn’t my field. I think we should look for someone to point us in the right direction.”

“Do you know someone who could help?” Yuan Ming asked.

“I think I might. He’s doing a doctorate in Advanced Computing at Shanghai University.”

A week later Wang Deming came round to the Yuans’ home.

“Let me show you why we called you”, Yuan Wei said and switched One on. “My son and I have been putting together a virtual person. This is how far we’ve reached. We’ve called her ‘One’. But now, to be honest, we’re stuck. We were hoping that you would be able to give us some direction.”

The Yuans demonstrated One’s abilities for a few minutes. Wang Deming observed with interest.

“Yuan Wei, Yuan Ming, I have to congratulate you. The graphics are absolutely excellent; the best I’ve seen.”

“It’s been a really good experience so far. I thought I would be teaching Yuan Ming, but we’ve both learnt a huge amount.”

“And you have done very well with the object recognition”, Wang Deming continued. “Kudos to you both.”

Yuan Ming was starting to dislike Wang Deming’s patronizing tone.

“Now to the next steps. Quite a number of IT games companies and universities have brought virtual people to a similar stage of development as you have. What you need now is AI. And there, well... “

“Well?”

“Well, ‘we’, by whom I mean the scientific community, haven’t come as far as we had hoped. There are some very good expert systems around and there has been a lot of progress in neural networks. But there’s no software out there at the moment which would allow One to take a new concept and find a way to solve it herself. The computers are powerful enough now. It’s a programming issue.”

"You mean, we're stuck?" Yuan Ming asked.

"You can take things a little further. But I'm afraid the day when One can reason like a person is still some way off", Wang Deming said.

The Yuans digested this rather depressing assessment.

"What are you studying?" Wang Deming asked Yuan Ming.

Yuan Wei stepped in. "Yuan Ming's studying at the British school, following the English system", he explained.

"Oh yes?" Wang Deming answered. "Some of my friends have done that."

"I've just taken my GCSEs", Yuan Ming replied. "From next year I'll be taking computer science, maths and further maths and Mandarin Chinese. I'll be taking 'AS' levels next summer and 'A' levels the following year."

"Good choices. Well, AI is certainly a field you could go into at university."

After Wang Deming left, the Yuans felt quite deflated.

"There's no way I'm giving up on this", Yuan Ming said.

"Me neither", his father answered. "I suppose that if it was easy, someone would have done it by now. I think we need to look a little further."

"You don't think we're wasting our time, do you?" Yuan Ming asked.

"I don't think we're wasting our time at all!" Yuan Wei replied. "For one thing it's certainly not the case that only the big corporations make the big discoveries. You know how Andrew Wiles proved Fermat's last theorem. He worked for eight years, a lot of that time in secret, to come up with the proof. All he had was his brain and tenacity."

"Focus, focus, focus", Yuan Ming said, quoting something his father said only slightly less frequently than extraneous.

"Exactly!" his Yuan Wei agreed. "The same is true for Einstein and for a load of other people. Anyone could make a decisive breakthrough in this area. But let's suppose that One is not the first or the best virtual person. She'll still be original and that's valuable. And at the very least, we're having a lot of fun creating her and learning a lot in the process."

"We certainly are", Yuan Ming replied with feeling.

Chapter 3

The 25 international schools in and around Shanghai that had entered the Shanghai International Schools athletics competition took it very seriously. Yuan Ming was nervous. He had never run in such a big competition. Two confident looking African-American runners were inside him and just outside him was a muscular white lad with fair hair in a ponytail.

Yuan Ming's parents had come to watch, and Yi Tsai had come too.

For the first 200 metres it was a close race. But then Yuan Ming faded and the two African-American ran away from him. There was nothing he could do. He came third, almost 15 metres after the winner. He flopped down beside the track, feeling deflated.

His parents came over and congratulated him. Yi Tsai also hurried over, followed by the school headmaster.

"Great race!" Yi Tsai said.

"Rubbish race", Yuan Ming replied. "I went off too fast."

Yi Tsai smiled slightly. "Yeah, just a little bit. But that's curable. You know what your time was?"

"No."

"You hit the target. 54 seconds."

"I did?"

Yi Tsai smiled.

"You did! Third was a very good result. And you can do better."

Yuan Ming's expression changed slightly. Yi Tsai was not given to gratuitous praise.

"By the way", Yi Tsai asked, "are you thinking of going to the Golden Grand Prix?"

The Golden Grand Prix is a prestigious athletics event held at the end of the summer in Shanghai.

"Well, I'd like to..." Yuan Ming replied.

"Go to it!" Yi Tsai urged him. "You won't regret it."

Yuan Ming took Yi Tsai's advice and got tickets to the competition for himself and his parents and he also invited Jetticke.

The event was held over ten days of which the Yuans attended three. Jetticke was very happy to be invited. She liked the Yuan family and she enjoyed an outing and a chance to dress up. She gave careful thought to what to wear. Although the heat of August had passed it was still warm. Jeans would be too warm and besides, she had gone off denim. She selected a sleeveless white sundress for the first day. A bit passé but never mind. She knew she looked great in it and Zheng Lily would approve. On the second day she chose a light blue dress with a low-cut back. On the third day she risked a mini.

The Yuans all liked the fashionable addition to their family and Jetticke's feelings towards the Yuans were similarly warm. Conversation was relaxed and moved easily from English to Chinese to English again. In the past Jetticke had sometimes felt envious of Yuan Ming. His parents had done so much for him, much more, she felt, than her own parents had done for her. But for now she let go of that emotion and simply enjoyed their company and the event. Mostly the Yuans' company actually: there were few Danish athletes for her to cheer.

Yuan Ming saw Yi Tsai down near the side of the track and after a while made eye contact and waved at him. Yi Tsai waved back. Yuan Wei leaned over to his son.

“You think we might see you here one day?” he asked.

Yuan Ming had been wondering the same thing.

“Well, Yi Tsai’s getting me ready for the Shanghai schools competition. And if I do well in that I could go on to the National Youth Championships. I’ll still be eligible for that the following year too.”

“Something to aim for then”, Yu Wei commented.

“But that doesn’t mean that I’d compete here. The Youth Championships could be held anywhere in China. And realistically, I’m a long way from that standard. The guy who wins the 400m will probably need to run about 48 seconds”, Yuan Ming replied. “The record is 47. That’s a lot faster than I am now.”

“Just seven seconds”, his father said.

“That’s a lot.”

Yuan Wei was quiet for a moment. Then he said, “I think you could get into that range. Listen. Last year your best was 59.4. This year – the first year you’ve been trained by a pro – your time improved to 54.0. You said yourself that you’ll be a youth for another two years. It doesn’t seem totally impossible.”

Yuan Ming said nothing. But he was wondering if his father could be right.

At the start of the winter training program Yi Tsai gave Yuan Ming a book to read. Yuan Ming looked at it curiously.

“It’s a book for coaches”, Yi Tsai explained. “But you’ll get a lot out of it too. It will be very helpful if you understand what we’re trying to achieve. For next season I’m going to change your training routine a lot. We’re going to be training your lactic acid system. It’s going to hurt and I want you to understand why it needs to hurt. You need to train hard enough to improve but not so hard that you do damage. That can be a fine line. We need to plan the training through the season so you peak at just the right time. And there are a lot of other things like that.”

Chapter 4

One was stalled. The Yuans had hoped that Wang Deming would give them some ideas about how to proceed. Since he had not, they were temporarily at a loss.

“Look Ming”, Yuan Wei said to his son one day. “Here’s what I think. Let’s not be too ambitious about this AI. There’s a bunch of people out there who are really bright and they’re struggling to make it work. I think we should just focus on the things that we *can* do. I suggest that we work on game-playing, music and database design.”

“Sounds good to me”, Yuan Ming replied.

Yuan Wei was under no illusions about the task that he was setting for himself and Yuan Ming. They – and mostly he – were going to have their work cut out. Although commercial game-playing programs had been developing for thirty years or more, that was not the kind of programming that Yuan Wei was interested in. What the Yuans wanted to do was to teach One how to learn, and the first context in which they wanted her to learn was through playing a game. They wanted One to try out new things and develop strategies of her own. Yuan Wei spent months searching for and assimilating research that had been done in this area and he did his best to share what he was learning with Yuan Ming.

The Yuans started to program with very simple games and then moved on to xiangqi – Chinese chess. Each time they took One through a series of steps. What are the rules? What moves are allowed? What is the goal? The Yuans worked hard to improve the interface so that One could obtain information by asking questions. The challenge came to get One to evaluate positions. But slowly, as the Yuans worked through different games, One’s ability to generate, test and refine evaluation algorithms improved. The Yuans spent a year on this programming.

They were itching to try One out on chess. For the purpose of this exercise it was unnecessary for One to play against a strong program; they chose an old and inferior one. As she had been taught, One first generated a simple evaluation algorithm. Finding that it brought limited success One started to generate more complex algorithms. Her chess playing improved. The Yuans were jubilant.

Although most of the game-playing programs were not applicable to what the Yuans were trying to do, there was one area in which both Yuan Wei and Yuan Ming saw a use for them. They purchased a strategy-game engine – the kind that allows players to populate virtual environments with virtual people, and then entered real people: the Yuans and their family and friends, and a real environment: their home, their immediate neighbourhood and Shanghai, into the database. They then set One to be a virtual person in the game, as a member of the Yuan family. This allowed One to give informed answers to questions about who she was and where she lived.

The Yuans now turned to music. They tried out a music-creation program called Amaze and found that with it One could create, for example, a piano sonata in the style of a Mozart piano sonata. But Yuan Ming was not impressed.

“That is so *not* the way I want to go”, he said. “One hasn’t got a clue what is going on. We need to approach this in quite a different way.”

“Tell me what you’re thinking”, Yuan Wei said.

“I want to program One so that she has some framework to decide what is good music

and what is not good music – or what is not music at all. Then I want her to use that framework to compose something.”

Yuan Wei looked thoughtful.

“I follow you. But it raises an interesting question. You want to teach One what is good music. That means, presumably, that you will classify ‘good music’ as music that you or I like or that has stood the test of time.”

Yuan Ming was not ready for such a question but sensed where it was going.

“I suppose so...” he said.

“And that is quite subjective. An American or an African would choose something quite different from us. And someone might say, what about the song of a nightingale and someone else would say, what about the croaking of a bullfrog! Isn’t that music too?”

Now Yuan Ming looked thoughtful.

“So we’ll be teaching One our culture”, he replied. “We’ve been learning about something like that in school. The colonial powers introduced their culture into the colonies. Some people call it cultural imperialism. Basically what you’re saying is that we will be imposing our culture on One. Or, if you generalize, human culture on computer-kind.”

“Yes. This is the moment when we are not merely creating One, but creating her in our own image. I think we should at least acknowledge that it’s a watershed.”

“I see what you’re saying but I don’t see a problem”, Yuan Ming replied.

“Me neither”, his father agreed. “We can create her as we want.”

The Yuans read extensively about the mathematical rules that music follows and taught One to seek those patterns in a sound. It did not take One long to distinguish between musical and non-musical sounds. It wasn’t too difficult to teach One to recognize different styles either, in much the same way as she had learnt to recognize different chess openings.

Now the Yuans were close to their objective and it was not long before the Yuans could ask One to compose a piece in a particular style and in a particular key. One would generate a few random numbers to base her composition around and then compose instantly. The Yuans were aware that One was still a computer program, but she was starting to seem very creative.

To celebrate her progress the Yuans decided to get her a present - a new Yamaha Disklavier player-piano.

“There you are, One”, Yuan Ming said.

“It’s a piano?” One asked, looking at it through her binocular lenses.

“Yes. You’ll be able to play it yourself, once we hook you up.”

“Thank you”, One said.

The music sounded superb and the Yuans basked in their success.

The Yuans decided to add one more feature to One. In order to encourage One to compose music more to their taste they programmed her to respond to praise or criticism. One understood from, ‘Thanks, One, that was fantastic’, that the Yuans liked the style, or from, ‘It’s a bit slow’, that they would prefer something more lively. Although the Yuans thought nothing of it at the time, it was the first time that they had taught One to respond to praise or criticism.

Chapter 5

As he entered his final two years at school Yuan Ming was stretched to the limit. He was spending all his free time either running or working on One. His father didn't help, emphasizing that he would need good grades to enter a top university. Something would have to give, and Yuan Ming decided that it must be One. After all, he told himself, I can come back to One.

He told his mother and father his decision. But a few days later Yuan Wei asked him, "If you like, I could continue to do some work on One. It would be a shame if she lost two years."

That was an offer too good to turn down.

Yuan Ming went back to training at about the same time that school restarted. Over the previous year Yi Tsui had changed Yuan Ming's training substantially. He now did just four training sessions a week, but three of those sessions were seriously hard. Yuan Ming was always exhausted at the end of them.

They had one goal: the National Youth Championship the season after next.

"Your goal must be to win", Yi Tsui told Yuan Ming forcefully. "If winning is not your definite goal, you'll waste your time and mine. Do you agree?"

Yuan Ming agreed.

As winter drew to a close Yi Tsui gave Yuan Ming more distance work then, as the weather warmed further he increased the amount of time on the track. 50 kilometres per week increased to 60, and then 70. Yi Tsui included a lot of repetitions over 500m.

"Great for building up your tolerance to lactic acid" he told Yuan Ming.

"But killing", Yuan Ming answered.

"That too", Yi Tsui agreed cheerfully.

One day Yi Tsui called Yuan Ming aside.

"You know that I do most of my training at Shanghai Sports School."

"Yes."

"I don't do much private training. But your dad is very generous and I can't fault your commitment. So I'm very happy to train you."

Yuan Ming wondered where the conversation was going.

"In fact training you allows me some freedoms that I don't have with the kids at the Sports School."

"More freedom is usually a good thing", Yuan Ming said.

"Yes, well I hope it is in your case. I train sprinters", Yi Tsui started. "I'm passionate about it. Some sports matter more than others. People don't get passionate about shooting. But the 100m? The 4x400m? The whole world knows the top guys in those sports. Think back to Beijing. We got five golds in shooting! Great! But out of 150 medals on offer in track and field, we got two bronzes in Beijing! In London in athletics we got five bronzes and one gold – none of which was in a running event! That's not so good."

Yuan Ming knew the facts but he hadn't expected such an assessment from Yi Tsui.

"As a nation we're a sad story in athletics", Yi Tsui continued. "OK. So what has this got to do with you? Well, you need to know that I can't train you in the best way possible. The

results speak for themselves. So what do you need to do?"

"The US?" Yuan Ming suggested.

"Not a doubt about it", Yi Tsui said. "In the 400m they're in a league of their own."

Yuan Ming wasn't going to quibble about that.

"If you want to make much more progress you're going to have to get your nice dad to part with some more of his money", Yi Tsui said.

"That's a lot to ask", Yuan Ming said.

"I guess it is. But don't tell anyone I told you – apart from your family, of course."

"You got it."

Yuan Ming passed the conversation on to his dad.

"What Yi Tsui said makes sense to me", Yuan Wei said. "Would you like to go?"

"Of course!" Yuan Ming answered.

Yuan Wei and Zheng Lily had mixed feelings. Yuan Wei in particular, was keen that Yuan Ming should study abroad in a famous university and that would not happen if he didn't get the grades. But eventually they agreed to let him go. It would only be for a month, after all.

By the time the weather warmed up and the athletics season arrived Yi Tsui was confident that Yuan Ming could run 400m in 51 seconds. That he did, towards the end of the season, cheered on by his parents and Jetticke.

"Good", Yi Tsui told him. "I'm glad you got that under your belt. The qualifying time for youth is 51.5 seconds. So I'll be able to enter you for next year's competition."

"But it's not brilliant by world standards, is it?" Yuan Ming asked.

"I don't think you're a future Olympic medallist", Yi Tsui said, "if that's what you're asking. But it's still good."

Two weeks later Yuan Ming departed for California for a month-long training camp. It didn't take him long to notice differences between the training in California and the training in Shanghai. Clearly the method produced results and Yuan Ming wondered whether, if he'd followed this program, he would have gone faster.

Yuan Ming still had his sights set on winning. He wanted to run 48 seconds the following summer and he thought the target was achievable, but under one condition only: another visit to California, a longer one, just to train. One day it suddenly dawned on him how it might be possible: he could take a break in his studies.

"How would that work?" his mother asked, surprised. "You have exams next summer."

"Yes! But I can put them off until November", Yuan Ming replied. "You can do that with 'A' levels!"

Yuan Ming's parents needed a lot of persuasion but they eventually agreed.

Autumn and winter passed in an intense blur of work: school work, homework, work-outs in the gym and track work.

Work, work, work, he thought. He rubbed his aching legs and looked forward to spring.

March arrived and, as agreed, Yuan Ming prepared to depart for California once again.

A few days before he left, his grandparents paid a visit.

"We just wanted to see Yuan Ming before he left", Soong Xue said.

From a young age Yuan Ming's grandparents and parents had encouraged him to take some time to pray and read the Bible every day. He did this and he also attended a church

youth group. But his enthusiasm was not what it had been a few years before.

“A long time ago there was a famous 400m runner”, Yuan Dong said. “He was born in China and died in China, but he wasn’t Chinese. You know who I mean?”

“Eric Liddell”, Yuan Ming answered.

“If there was anyone who put God first, who honoured God, it was him. I’m not saying that everyone who honours God will win a gold medal in the Olympics but the fact is that he did. And as a general principle I believe strongly that God honours those who honour him.”

“I guess that what we’re saying is: don’t let all these exciting things that are happening push your Christian life to one side”, Soong Xue said.

The following day Yuan Ming set off for California again. For the next three months he put school work out of his mind and just concentrated on his running. He ate, slept and trained. It was bliss to be able to devote his time to one thing. He remembered his mother’s remarks about men not being able to multi-task and decided that there was a lot of truth in it.

Chapter 6

The kitchen of a stylish six-bedroom town house not far from the Potomac River in the old town area of Alexandria, Virginia was the scene of some uncharacteristic marital discord.

“Basically, you’re planning to become a terrorist”, Mary Peterson said, after her husband told her what he had in mind.

“I’m sure that’s how people will see me”, Mary’s husband Bob answered. “But remember, Mandela was classed a terrorist.”

Mary Peterson shook her head. Her husband was a company director with a doctorate from Stanford. There wasn’t anything terrorist-like about him. But she remembered that Mandela was a lawyer before he became a terrorist - if that’s what he was.

“You’re really serious, aren’t you?” she said quietly.

“Yes. I’ve thought about it a lot.”

Mary believed him. Her husband had voiced his frustration and outrage about climate change many times. If anyone else had put forward a plan like this she would have dismissed it straight away. But she knew her husband. He always thought things through carefully, logically. Sometimes it led him to places no-one else would dream of going.

Bob Peterson was the founder and owner of a company which manufactured medical equipment, mostly for African and Asian markets. The company had come up with loads of innovative ideas and done very well. It was based in Alexandria, Virginia, which gave Bob Peterson quick access to the development and relief agencies operating from Washington, and to Dulles International Airport. That helped enormously as he spent a huge amount of time travelling.

Bob Peterson had done his deskwork. He’d studied the data on climate change with a passion. He’d extrapolated. He’d looked at scenarios. And he’d joined the small but growing group of people who saw disaster looming.

But it was his trips to Africa that compelled him to act. What he saw in Africa convinced him that he wasn’t misreading the situation. Land was being steadily degraded and lost to use. People were starving now. So what would it be like in the coming decades? Of course all the problems couldn’t be laid at the feet of climate change. Man had certainly added to the mess.

But Bob Peterson hadn’t told his wife – until now – what he wanted to do. He’d sensed what he needed to do more than a year ago. His heart had told him that it was absurd, ridiculous, to do what he was contemplating. His head had told him that something needed to be done, and that he, Bob Peterson, was the one to do it.

“You could go to prison for a long time”, Mary said, trying to sound matter-of-fact.

“Actually you could too”, Bob Peterson answered, in an equally matter-of-fact tone, “even if you don’t actually do anything. The court might decide that you were a knowing accomplice. But what we’re seeing at the moment is the tip of the iceberg. The situation will get much worse. If people don’t do something, tens of millions of people will die of starvation.”

“And you’re the one to do something?” Mary asked.

Bob Peterson didn’t *want* to do anything. But he thought he was one of very few people who *could* do what was needed. Scientific reports were impenetrable and abstruse:

few people got the situation. But with his scientific background he grasped it very well. Of those who did get the situation few had the resources to actually do anything. But he owned a company: he had significant resources. Governments, even if they got it, which he doubted, couldn't openly engage in terrorism. But a terrorist was required: a good terrorist.

"A good terrorist, huh?" Mary asked. "So no-one will die?"

"No-one should. I will do my utmost to avoid any loss of life. But I can't guarantee the outcome."

"What about the children?"

The Petersons had two children, a boy of ten and a girl of eight - another source of anguish for Bob Peterson.

"They would be affected", Bob Peterson admitted. "But lots of kids in Africa are dying. Maybe, when they're older, our kids will be proud that I made that decision - whatever the outcome."

"And if you're wrong?" Mary asked.

"At least I'll have done what I believe I have to do."

"So it's really about your conscience then", Mary said.

"It's about doing the right thing. My conscience is telling me that this is the right thing."

"And if I say no?" Mary asked.

"Then I won't go through with it."

Bob Peterson held that he was head of the household: he had a duty to listen to his wife but ultimately the decision was his. But practically-speaking he couldn't go through with his plan without her approval.

It didn't take Mary long to figure out that she had three choices. She could say, If you try it I'll turn you in. She could say, I don't agree, but I won't stop you. Or she could say, I'm with you. It was the toughest decision of her life. She plied her husband with questions: questions about the ethics of civil disobedience, the ethics of not just civil disobedience but of terrorism, and about every detail of her husband's plan. Bob answered every question seriously. Eventually - if everything went according to plan - he would stand before a jury. That was what Mandela had done at Rivonia. That was the template for his strategy.

"How would white South Africans have viewed Mandela if he'd been white?" Mary asked at one point. "Traitor?"

Bob Peterson couldn't deny that many Americans would view him that way. But if he couldn't persuade his wife that he was right to take the action he planned what chance was there he could persuade a jury? He was a man on a mission: Mary's answer mattered to him very much. Three weeks after he first told her his plan she gave him the answer he'd been hoping and praying for.

"I can't believe I'm saying this", she said. "But you've persuaded me."

So it was that Bob Peterson, heart and head churning with conflicting emotions, set in motion the plan he had made. It was a long, complicated plan and he had no idea how it would end. He did not know if it was a good plan. But it was at least a plan.

To do almost anything you need men, money and materials.

For Bob Peterson, money was straightforward. He sold his company and deposited \$40 million in an offshore bank account.

Men were less straightforward. Over the years Bob Peterson had come across many people around the world whom he guessed shared his views: scientists, green politicians, environmental activists. He had meticulously researched them, trying to find people he could work with. He often travelled to meetings which he knew they would be attending and engage them in conversation at the end of the meeting. If first impressions were positive he would suggest chatting further over a beer but he was careful not to ask too many questions. At the end of 18 months of travel and meetings he had found four people who were willing to work with him. Together, they formed Mandate.

The group bound themselves to secrecy. All email communication was encrypted and conducted online to a messaging server in Switzerland in such a way that no messages were ever stored on Mandate's own computers. The group agreed that they would never meet, would never discuss Mandate's activities in a public place or in a room with windows or by telephone and would never disclose the names of the other founders. Each founder was responsible for recruiting others to implement his part of the plans. The founders consisted of a German, a Chinese, a Japanese and an Englishman. The group decided that they would not have a director or hierarchical structure. Each founder would be responsible for his, and only his, activities.

Mandate had two goals. The first was to massively reduce carbon emissions. The second was to mobilize world opinion against the biggest emitters. As an American, Bob Peterson felt a responsibility for what America was doing. Although China was a bigger emitter than the United States, he had America firmly in his sights.

More people were needed for the US campaign. Bob Peterson recruited a number of Americans, which included one woman, Peggy Rhinehart; Moukhtar Aoun, a Lebanese; and Bahman Yazdani, an Iranian.

Now he set about gathering materials. First, an air gun.

Moukhtar, posing as Parviz Abdullayev, Head of Procurement for Caspian Geophysical, a company which Bob Peterson had registered in Turkmenistan, contacted James Dixon, Managing Director of Bolt Technology, a manufacturer of airguns used for seismic exploration.

"My company is looking to buy an airgun", Moukhtar explained over the phone. "I understand that you manufacture them..."

"That's right", James Dixon confirmed.

A few days later Moukhtar flew to Chicago and then made his way to Bolt Technology's factory ten miles from Joliet. Details of the order were agreed and 'Mr Abdullayev' wired a 50% down-payment from Turkmenistan. When the order was ready Moukhtar made a second visit to Joliet and James Dixon showed him the equipment he had ordered including the bell and cage, the diesel, the compressor, the radio receiver and the firing switch.

"You ordered the components to fit to your own trucks. But we have a truck-mounted system here at the moment. What I can do is take you through the whole operating procedure step by step in a real set-up."

James Dixon led Moukhtar over to the truck which was fitted with the air guns.

"Air guns operate at high pressure. You need to observe the safety procedures carefully. Make sure no-one is in the area. Make sure the firing switch is off!" he warned. "Start the

diesel, start the compressor, lower the bell and cage... Now of course we don't want to scare the neighbours, so I'm just going to take the pressure up to 100 psi. Then you do the test firing to check the synchronisation. Let me show you how you do that. Now, imagine you're the operator in the recording truck, 100 metres away..."

"100 metres away?" Moukhtar asked.

"Yes, at least, and with ear muffs. These things make a hell of a bang. Then you press the fire button..."

There was a very solid thump in the floor. If that was what 100 psi would do Parviz tried to imagine what the effect would be at 2000 psi, the air gun's design pressure. James Dixon picked up what Moukhtar was thinking.

"You're just getting a small air gun", he smiled. "Yours is a 75 cubic inch model. Even then, it's about thirty decibels louder than a rifle shot. The biggest marine air guns have 1500 cubic inch cylinders! They can damage ship's hulls. They've been recorded at well over 200 decibels."

The two men continued to talk about the details of operating the equipment. After half an hour or so Moukhtar had no further questions.

"Would you like a coffee?" James Dixon asked.

"Sounds good!"

The two men went upstairs to James Dixon's office. Pictures of seismic survey vessels and desert exploration vehicles gazed down at him from the wall.

"This is a new field for your company, Mr Abdullayev?"

"Yes, that's right. We've used dynamite up to now; we've never used air guns."

"You'll find they are very easy to use and give excellent results."

"Thanks. I'm sure we'll be satisfied."

"How are you taking delivery?"

"I've arranged for a logistics company to do that. They'll collect the equipment and take care of all the paperwork."

"Good. Well, I wish you every success! Keep in touch!"

The two men shook hands and Moukhtar left for Chicago.

Bob Peterson made arrangements for the remainder of the payment, a sum of over \$100,000, to be wired, and made preparations for collecting the order. Ten days later three lorries with the markings 'Braeburn Logistics' and a Philadelphia telephone number arrived at Bolt Technology's factory and collected the air guns. James Dixon was not familiar with 'Braeburn Logistics' but gave the matter little thought until a year later when police contacted him to ask about the company that took delivery of the airgun, and he found out that 'Braeburn Logistics' did not exist.

Bob Peterson had hired a small industrial unit on the outskirts of Philadelphia which they brought the trucks to. He and his associates then started to set the equipment up. He knew that a month's work could leave the trucks a treasure trove for a forensic team. He and his associates left their mobile phones at home and before starting work covered as much of the area as possible with plastic sheets. They put on slippers, latex gloves and swimming caps as even one eye-lash could yield important DNA. When they had finished they scrubbed all the metal surfaces, vacuumed the entire area, blew into all the corners

with high-pressure air and then vacuumed once again. They could do no more. Bob Peterson could not be certain that there was no evidence remaining. But he was hopeful that whatever minute traces had escaped their clean-up would also escape the police's attention.

Bob Peterson now needed to obtain a second item for his US campaign: a small quantity of plutonium. Since Iran had the facilities to manufacture plutonium it was natural for him to send an Iranian recruit, Bahman Yazdani, to Tehran to try to obtain some. Bahman Yazdani knew that the plutonium would be used for an attack within the United States but he knew nothing of the details of the plan.

Arriving in Tehran he used old contacts to set up some high-level meetings. His information was enough to generate considerable interest. Before long he was led before Major General Babek Anzari, commander of Iran's Republican Guard, who had just returned from visiting Dezful, in the south of Iran, the southern headquarters of the Republican Guard.

"We cannot afford open confrontation with the United States", General Anzari said. "But they insult us. Look at this!"

He held up a recent newspaper headline in which the American Secretary of Defence had called the President of Iran 'a strutting cock'.

"It's extremely insulting. How can we not respond? But we have 150 billion barrels of oil and the United States has 15. That won't last long! They would love us to start a fight. We can't."

"But someone else can, heh?" Bahman interjected, catching the general's direction.

"The Islamic Republic of Iran will not be mocked. Iran has nuclear weapons, so we're the villain. But America gives nuclear weapons to its friends, the Zionists, who point them at us. Iran is a threat - and the United States is not!?" He looked at Bahman. "Why should we not help you with a little plutonium?"

"And we will pay well, General", Bahman added, to further smooth the way.

Transporting the plutonium did not require any exceptional measures. Bahman, paying careful attention to the frequency of the clicking on his Geiger counter, carefully inserted the plutonium into a source container – the same kind that industrial radiographers use, with an S-shaped bend in the middle – and sent it on its way to Germany. In Germany members of Mandate hid the container inside the cylinder of a massive 'cathedral' diesel engine that was being shipped to the US. The huge engine block absorbed the radiation and measured from outside it was indistinguishable from the background level. The engine arrived in New York and passed through customs unremarked.

Chapter 7

The time came for Yuan Ming to return to hot and humid Shanghai. He had three weeks before the National Youth Championships, which would be held in Chongqing. A few days before the start of the championships Yuan Ming left with Yi Tsui and a number of other athletes from the Shanghai Sports School. They were cliquey and tended to exclude him. Yuan Ming was content with his own company anyway. He hardly noticed Chongqing. He stayed in a room in a nondescript hostel with a number of other boys. The athletics stadium, however, was impressive and certainly very colourful. The championship was held over a week. For the 400m there would be six heats with the eight fastest times going through to the final. Yuan Ming was drawn in the third heat. Yuan Ming and Yi Tsui watched the first heat. The winning time was 51.7 seconds.

Yi Tsui leaned over to Yuan Ming and whispered, "That guy might not get into the finals. Go and get warmed up..."

The winner of the next heat ran 50.6 seconds.

That's definitely more like it, Yi Tsui said to himself.

Yuan Ming's heat followed. Yi Tsui looked with interest as Yuan Ming settled into the blocks. He stood out from the other runners, partly because he was the only one to be wearing a one-piece sleeveless compression suit whereas almost everyone else wore separate shorts and vest but more because he was distinctly more muscular than the other athletes in his heat. Yuan Ming was drawn in lane 7, the one but outside lane. There was never any question about the outcome. He finished five metres ahead of the next runner, in a time of 49.1 seconds.

"Nice run", Yi Tsui said. "But watch the next heat. Ma Wei there has run 47.8."

Yuan Ming said nothing. He hadn't told Yi Tsui, but he'd run 48.1 in California and he thought he could manage faster.

Ma Wei duly won his heat in 49.3 seconds.

Yuan Ming's parents flew up to Chongqing the following day, accompanied by Jetticke. The finals of the 400m were to be the day after. That night Yuan Ming hardly slept. The unfamiliar surroundings and the heat would have made it difficult to sleep at the best of times, but anxiety was the main culprit.

The race was scheduled for 11 a.m. The athletes went out onto the track and did some stretching and warm-up exercises. Yuan Ming looked over to where his parents and Jetticke were sitting and wondered how they had managed to get such good seats just opposite the finish. He glanced across at the referee, the starter and the finish judge who were conferring about something. The timing equipment was ready; all was ready. The starter called the runners to the line. Yuan Ming was in lane two. He was quite happy about this: being on the inside he would be able to keep an eye on Ma Wei in lane five.

"On your marks!"

Yuan Ming knelt down, carefully placed his hands wide apart behind the start line and settled his feet into the blocks. He noticed that the runner next to him was remaining standing, obviously someone who preferred this form of start.

"Set!"

Yuan Ming rose into the start position. Adrenalin surged through his body.

The starting gun fired. There was a momentary pause and then the runners were away. Around the first bend the stagger made it difficult to see who had the advantage. But as the runners entered the opposite straight Yuan Ming surged forward, passing a group of slower runners. Three runners appeared to be five meters ahead of him. Yi Tsui half smiled to himself: the next bend would take care of that. Sure enough as Yuan Ming ran the shorter distance around the bend he came level with the leader. Yi Tsui had imagined that it would be a close race but it wasn't. Two meters ahead as he came out of the bend Yuan Ming surged again, creating five meters between him and Ma Wei by the time he crossed the line. His time was 47.5 seconds.

He walked to the side of the track and stooped down to catch his breath. He could hardly believe it. It was one thing to think he could run that fast, another matter entirely to do it. Congratulations came thick and fast.

Yi Tsui was the first to reach him. "Brilliant!" he said. "Great race!"

Yuan Ming ran over to the track nearest to his parents and Jetticke. They had the biggest smiles he'd ever seen.

"What does it feel like?" his father bellowed down at him. "Worth all the pain?"

Yuan Ming nodded. "Definitely", he shouted back.

That night the family went down to Nan Bin Lu Street on the bank of the Jialing River and had an excellent spicy hot-pot. Yuan Ming took the opportunity to say a sincere 'thank you' to his parents. After dinner they went for a cruise on the river. At the end Yuan Ming said that he should be getting back to the hostel.

"No need for that", his father answered. "I had a word with Yi Tsui. We got you a room at the hotel."

Back in Shanghai Yuan Ming focused his attention on his studies and was rewarded with the grades he needed to read computer science at ITCS, part of Tsinghua University in Beijing. It was occasion for another celebration.

"How does a meal out on the Bund sound? The M, perhaps?" Yuan Wei asked.

"It sounds wonderful. And, uh..."

"Of course you can invite Jetticke."

The meal out was one to remember. School had ended on a very high note. Next stop was Beijing.

"Any advice, Dad?" Yuan Ming asked.

"I know what your granddad would say", Yuan Wei answered. "One verse he kept hammering into me was: 'The furnace for gold, the crucible for silver, but man is tested by the praise he receives' – or something like that. 'Humble yourself', he always told me. 'Beats having God do it'".

"And advice from you?"

Yuan Wei thought for a moment.

"I'm not sure", he answered. "But I suspect that if you go on like this, people are going to start noticing you."

Chapter 8

Yuan Ming had gained a place to read computer science at Tsinghua University in Beijing. All lectures were given in English which was fine by him. His parents purchased a small apartment in Wudaokou, a north-west suburb of Beijing, for him to live in. As far as Yuan Ming was concerned it was the perfect location. University was less than ten minutes away by bike, as was Zhongguancun Street, nerd's paradise, home to the world's biggest computer stores selling the world's latest computer products. The streets around the Wudaokou subway station were, as they are now, full of students, fast-food restaurants, trendy boutiques and hairdressers. It was a fun, buzzing place. In the early twenty-first century an endless stream of pedal and electric bicycles filled the streets. Many westerners lived there.

After moving to Beijing Yuan Ming had set One's monitor on a table in his apartment. One's binocular lens would occasionally track around the room, noting what was there. Simple bed, unmade; towel, damp, on the floor; desk, covered with books; lamp. Monthly training schedule with times, picture of rugby game, picture of marathon runner. One identified the person in the picture within seconds from the Internet: the winner of the London marathon the previous year. Bottle of liquid. The bottle of liquid had given rise to an interesting conversation. Yuan Ming had brought the bottle back, cleared the mantelpiece and carefully placed the bottle in the centre. One had studied it for some time. She had not been able to identify the liquid in the bottle from its colour. It was possibly an oil. But it was an unusual thing to have on the mantelpiece. And the fact that it was the only thing on the mantelpiece, and in the centre of the mantelpiece, gave it significance.

"Ming..." One asked.

"Yes, One?" Yuan Ming answered.

"What is that bottle on your mantelpiece?"

"It's oil."

"Why have you put it there?"

"It's just to remind me. I want to remember what it looked like."

"Oh."

Within a few weeks of arriving at Tsinghua Yuan Ming made friends with Wu Wei, a shot-putter he had met once or twice at athletics meets. Wu Wei had watched Yuan Ming win in Chongqing a little over a year before.

Physically the two could hardly have been more different. Yuan Ming was 1.83m tall and weighed 75 kilograms; he was lean and lithe. Wu Wei was enormous. He was 1.95m tall and weighed 122 kilograms. He had a neck like an ox, a short crew cut and almost always about three days' growth of stubble. Wu Wei and Yuan Ming often went to the sports ground with a mixed group of friends. They would train and then hang around and chat for a bit before leaving the ground. Some left in expensive cars, some by taxi. Wu Wei usually took the opportunity to shout out some pointed political comments to the students leaving in the nicest cars. He would then ride off on a bicycle with a girlfriend perched on the crossbar and sometimes another on the rear rack. Yuan Ming also rode off on a bicycle, but he was always on his own. Wu Wei always gave him a hard time about that.

Wu Wei was the only person at Tsinghua who Yuan Ming told about One. He

deliberately did not build her up or even mention that he'd created her. He simply invited Wu Wei over to his apartment without mentioning anything about One. As Wu Wei entered the room One's camera turned and focused on him.

"Hi Ming", One said. "Who's your friend?"

"Hi One. This is Wu Wei."

It took a fraction of a second for One to enter Wu Wei's face into her database and his relationship to Yuan Ming as 'acquaintance'.

"Nice to meet you, Wu Wei", One said.

"It's a talkbot!" Wu Wei exclaimed.

"I'm not a talkbot", One complained.

"It's got a pretty face, I'll give it that."

"I'm not an 'it'. My name is One."

"A bit young..." Wu Wei said, thumping Yuan Ming. "But, wow, anything goes these days. Gorgeous, give you that."

From that point on One had become very taciturn and conversation had lapsed. But with Yuan Ming or other members of his family or Jetticke One was talkative and entertaining. Her conversational skills did have their origins in talkbots and chatbots but they had come a long way since then. One of Yuan Ming's goals was that One could, if she wished, pass for a human in a conversation. The challenge was that One could easily be distinguished from a human by her encyclopaedic knowledge. To pass for a human – if she wanted to – One had to be able to judge what a human might be expected *not* to know. However Yuan Ming took note of Wu Wei's comments about One's appearance: he didn't want people to get the wrong idea about him. There were several ways out of the problem. He could purchase a composite image. He could attempt to create a new image himself, not based on any actual person, although he suspected that that approach would not work out well. He could find another model, closer to his own age. Or he could ask Jetticke to help him again. Yuan Ming had got used to Jetticke's image and didn't like the idea of a completely new face so that seemed the best option. Jetticke had started to attend the University of Copenhagen but she would be back in Shanghai during the Christmas holidays. Yuan Ming contacted her and she agreed readily.

"I think what you're doing is very interesting. Feel free to ask any time! I'll call you when I get back to Shanghai."

Chapter 9

Berndt Huber recruited Habib Velizade and Salim Rzayev, Iranians living in Germany, to carry out the part of the plan in Kataristan. They entered Kataristan from Iran and rented a small house not far from the central bazar in Banarux, posing as traders. Shortly afterwards they received a consignment of tinned foods which concealed various other items: pipeline testing equipment including a tensile adhesion tester, a small knife-like tool, materials for dye-penetrant testing, a digital camera and RDX.

They purchased a 4WD pickup which had previously been used by one of the pipeline service companies, two sets of overalls on which they stitched company labels and a variety of shapes and sizes of heavy steel plate from a second-hand metal yard.

Their first sortie was on a cold January day when most people were wisely staying indoors. They drove to a location where the route of the main oil pipeline was out of sight of the road, found their location by SatNav and then located the pipeline with a metal detector. They then dug down to the pipe. That meant five hours of hard work. When they were certain that no-one was observing them they placed a piece of the steel plate under the pipe and then about 250 grams of RDX between the plate and the pipe. They trailed the detonator wire to a triggering device just below the surface of the soil and filled the soil in.

They continued to make sorties once a week. The area they were working in was sparsely populated and too dry for agriculture so they saw few people. Very occasionally a local would come over to see what they were doing. They would chat for a while and Habib and Salim would lament the state of the pipe.

On just one occasion a white Toyota Land Cruiser with a SEVO sticker stopped to see what they were doing. Three men came up to them: a westerner, an interpreter and a driver.

“What are you doing?” the westerner asked.

“Random checking the field joints”, Habib answered. “Salim here is with SwRI; he’s independently witnessing the checks.”

“I knew we were testing, but I hadn’t heard about SwRI...”

“SwRI is quite a new company”, Salim said. “Our main activity is pipeline integrity and risk management.”

“Have you found anything?”

“Not here. But in other places we have.”

Habib took some photos out of his pocket and showed them to the westerner.

“It’s a hell of a problem”, the westerner commented. “But I’m glad we’re finally taking it seriously. Who do you report to?”

“I report to our project office in San Antonio, Texas”, Salim answered. “And I think they were directly contracted by SEVO UK.”

“I guess we’ll get the report eventually”, the westerner said, without sounding too certain.

“Would you like some tea?” Habib asked. “We’ve got a flask in the car.”

“Thanks, but I need to get on.”

Habib and Salim breathed freely again, thankful for their careful preparation.

The forty explosive devices could now be detonated at any time by a signal from a

mobile phone. Berndt Huber reported to Bob Peterson that the pipeline was ready. He then turned his attention to a half-dozen other major pipelines in Saudi Arabia and other Middle Eastern countries that they planned to disable. Mandate's other founders made progress in Russia, Venezuela and China.

In early September the Kataristani Cabinet of Ministers, a large number of ministries and most of the major Kataristani news channels received packages posted from Germany. Each package contained video tapes showing members of Mandate placing explosive devices underneath the main oil pipeline from Sumaxin to Europe. The package also contained a simple demand, printed on a sheet of rather unusual handmade paper. It was written in Kataristani and read as follows:

Dear President

The scientific connection between burning fossil fuels and global warming has been established beyond all reasonable doubt. Global warming has already destroyed habitats of countless species. It is causing droughts in many parts of the world, resulting in deaths of hundreds of thousands of people from starvation. We believe that its consequences will become increasingly severe. It is not acceptable for producers to place the onus on consumers; producers too must accept responsibility for solving this problem.

We wish no harm on the Republic of Kataristan. The action we are requesting is in everybody's interests. We request that the Republic of Kataristan cut its oil production by 80%. In practical terms we will consider this met if the rate of flow in the main oil pipeline is reduced to 100,000 barrels per day. If the Republic of Kataristan accedes to this request we will take no further action. However if the Republic of Kataristan does not reduce its production to this level within one week, we will take such action as we are able, in the interests of preserving the health of this world which we all share.

Mandate

The president immediately called for a meeting of his cabinet.

"What is your view of this?" he asked.

"It's extortion..."

"Maybe it's a hoax..."

"But from the pictures it certainly looks like our pipeline..."

"If it's not a hoax and we continue to produce, we could lose all our production..."

The president listened for a few minutes and then asked, "Suppose the bombers blow up the pipeline. How long would it take to repair it?"

"Weeks, at least..."

"And there would be a big spill..."

"Suppose we did reduce our production", the president said. "Then we would still get the benefit from our oil. It would just be more in the future."

This suggestion did not go down well with the cabinet. Profit now was worth far more to them than profit in the future. Global warming did not enter the equation at all. After a week of discussion the government of Kataristan decided to call the bombers' bluff.

From his vantage point on a side road twenty kilometres or so from Merix Salim lifted

his binoculars to his eyes and gazed across an open sandy plain. He could see the location where he had planted an explosive device under the pipeline, about a kilometre away. It was 7 a.m. and quite light enough to be sure that there was no-one nearby. He sent a text message to a Kataristani mobile phone number. A single blast ruptured the pipeline several metres underground. There was surprisingly little noise and little noticeable effect. Back at the pumping station however, pressure sensors detected the loss of pressure and the pumps automatically tripped.

The production company cleared up the spill, repaired the pipe and restarted production. Salim repeated the process. This time the explosion ruptured a section of pipe close to Beshuran. The production company repaired again. After the third explosion, the Kataristan government reconsidered its strategy. Repairs were not cheap and the environmental damage was creating an international outcry. Very reluctantly, they informed a packed press conference that they would reduce production to 100,000 barrels a day.

Shortly after this, the governments of Saudi Arabia, Kuwait, the UAE, Russia and most of the other major oil producing countries received similar video tapes. China received tapes showing devices being planted under the Beijing-Ordos and the Shuozhou-Huanghua railway lines – key lines for transport of coal. Some resisted for a time, as Kataristan had, but sooner or later they too were forced to cut their production. In the United States and Europe stockpiles of oil started to shrink.

The US Secretary of State designated Mandate as a 'foreign terrorist organization' under section 219 of the US Immigration and Nationality Act.

Chapter 10

With most of the world's major oil pipelines inoperative, Bob Peterson knew that the US government would treat a threat from Mandate seriously. That meant that he was ready to commence the US campaign. The first inkling of Mandate's plans in the United States came when a letter was delivered by courier to 1 Franklin Square, headquarters of Philadelphia Police Department, addressed to Police Commissioner Lemuel Davies. It had the words, "For the Commissioner's eyes only" printed in bold on the envelope. The letter read as follows:

Dear Commissioner Davies and Mayor Sandhu

The scientific connection between burning fossil fuels and global warming has been established beyond all reasonable doubt. Global warming has already destroyed habitats of countless species. It is causing droughts in many parts of the world. Africa is now the continent that is hardest hit, but others will be affected. The result will be deaths of millions of people from starvation. We believe that the consequences of climate change will become increasingly severe. Consumers must take their share of responsibility for solving this problem.

The United States is the world's biggest consumer of fossil fuels. For a nation that possesses advanced technology and has a position of leadership as the world's only superpower this should be a source of intense shame. The United States must show its leadership by dramatically reducing its consumption of fossil fuels.

We wish no harm on the city of Philadelphia. The action we are requesting is in everybody's interests. We request that the city of Philadelphia cut its consumption of gasoline and other fossil fuels by 80%. In practical terms, we will consider that this request has been met if the only vehicles being operated within a five-mile radius of 1, Franklin Square, are trains and buses, police and emergency vehicles. Electrical power delivered to the city of Philadelphia must also be reduced by 80%.

If the city of Philadelphia accedes to this request we will take no further action. However if the city of Philadelphia does not reduce its consumption to this level within one week, we will take such action as we are able to reduce consumption, in the interests of preserving the health of this world which we all share.

Mandate

"OK, this is not my baby", the police commissioner said to himself and dialled the mayor's private line.

"Are you sure it's genuine?" the mayor asked.

"Pretty sure", the police commissioner answered. "Forensics hasn't given a final word yet, but it looks pretty certain that the paper is the same kind as Mandate used for its letters to the oil producing countries."

"Why do you think Mandate sent the letter to you, not to me?" the mayor asked.

"I'm not sure. This is quite a bit different to Mandate's approach in the oil-producing countries. There they sent multiple letters and videos. So far the only people who know about this are you and me and we have no idea what lever they plan to use. They may think that by letting us know first we have a chance to avoid panic."

“Very considerate of them”, the mayor said dryly. “But it still doesn’t answer the question, why you, not me?”

“Again, I’m not sure. But it’s more usual for bombers to call the police, rather than the mayor’s office, to give warning. It’s something we’re more geared up for.”

“So, now the ball’s in my court?” the mayor asked.

“Yup. I’m afraid so.”

“OK. Fax the letter to my private number. We’ll put our heads together. Oh, and another thing. Why haven’t they told us what stick they’ve got?”

“I can only speculate”, the commissioner replied. “My guess is that they simply want to keep their cards up their sleeve for as long as possible.”

The mayor called for a meeting of his senior staff and displayed the letter on a screen.

“The police think this letter is genuine, meaning, it’s from Mandate. I’m going to tell you what I think and you can then come back at me.”

The mayor glanced around the table.

“First. I have a lot of sympathy for Mandate’s position. I think they are basically on the right track. Second, they have been very effective in the oil-producing countries. Kataristan resisted and right now their oil production is zero. UAE acceded and they’re still producing 20%. I know which I’d prefer. Who is with me so far?”

Some of those present agreed, some were not sure.

“Third, we would have had to severely limit our consumption anyway. There is very little oil in the market and we all know that prices have gone up 300%. So this is what I’d like to do. Let’s make a virtue out of necessity. Mandate has given the green light to trains and buses. They haven’t put any limit on it. I’d bet you that we can get people in and out of the city. Then there are loads of ways people can get from the station to work. We can have bicycle stands, horse-drawn carriages, cycle rickshaws even. That’s just for starters. We could make it work.”

“What about reducing energy?” someone asked. “80% sounds like a hell of a lot.”

“I don’t have the answer to that”, the mayor answered. “Dave, your department could give us some ideas on that, couldn’t it?”

“No problems”, the city’s Director of Sustainability replied. “I’ll get onto the DoE. Give me a couple of days.”

The mayor of Philadelphia and his staff worked around the clock for 48 hours. At the end of that time they had satisfied themselves that they could meet Mandate’s demands, the people of Philadelphia could still get to work and business could continue to operate. Now the mayor had to convince the people of Philadelphia. He called for a press conference.

Mandate had chosen Philadelphia wisely. Philadelphia had been voted the US’s greenest city, the mayor of Philadelphia had continued to make the environment a key plank of his election campaign and the police commissioner did not miss Mandate’s reference to climate change especially affecting Africa. He knew this would strike a chord with the city’s large African-American population, of which he was one.

With many things in his favour, the mayor was able to persuade the city to accept the council’s plan. He established out-of-town parking lots so that cars would be available for

interstate journeys. The police put seals on every garage and removed cars that were left on the streets, transporting them to the out-of-town parking lots. They set up roadblocks on every road leading into the city. The council purchased or hired additional buses. They offered subsidies to help people provide horse-drawn cabs, cycle rickshaws and bicycle-hire services. A week after Mandate had delivered its letter the new arrangements started. The media descended on Philadelphia in droves.

“What do you think of it?” a reporter asked a man who was approaching on a bicycle.

“I feel much safer now the cars are off the road.”

“Is this something that should be done in every US state?” a journalist asked a bearded, tattooed man as he rode through a police post on a donkey. The man paused and thought for a moment before he answered.

“I was shooting mainstream, man. I got off the shit. But don’t listen to people who tell you, ‘It’s easy, man, just stop’. Detox was torture. Kicking the oil habit won’t be easy.”

“I guess that’s a yes then”, the reporter said. He turned to a third man.

“You know the saying...” he replied. “I’d rather be in Philadelphia.”

Bob and Mary Peterson mentally congratulated themselves. So far so good. But Bob Peterson felt sure Detroit would be harder.

Bob Peterson’s campaign in Detroit started in exactly the same way as in Philadelphia, with a letter to the police commissioner. But as Bob Peterson had expected the mayor of Detroit was not in the compromising mood that the mayor of Philadelphia had been in. He called a press conference.

“We are a democracy. The people of this city elected me mayor. I will make decisions that I believe are in the best interests of the city of Detroit. I will not be dictated to by a terrorist organization or submit to extortion. Mandate can go to hell.”

Bob Peterson watched the press conference on television and sighed. The following day he sent a further letter by courier to the police commissioner’s office. It contained a set of car keys.

Dear Commissioner Calver

In the multi-storey car park on Putnam Street, on the third level, you will find a white Opel saloon, license plate BDF 3083. There is a container in its trunk. Please examine its contents. Do not detonate it as a suspicious package. It will not explode.

Mandate

The commissioner read the letter and thought, Yeah, right.

He ordered the area to be cleared and sent a bomb-disposal unit to the car. They arrived within ten minutes. A police sergeant from the bomb-disposal unit dressed in a Kevlar-plated suit weighing 30 kilograms approached the car. He turned the key and opened the trunk and then examined the aluminium case inside the trunk. Bob Peterson had helpfully stuck a standard hazard warning sign for radioactive substances on the outside of the case. Instructed to proceed, the police sergeant opened the case. Looking inside he pointed his video camera at the contents. A metal container with a handle on top and threaded holes on two sides and two cables neatly packed alongside was displayed on the

bomb-disposal unit's monitor. Another 'radioactive' label was prominent on top.

"Recognize it?" the police officer in charge asked the other officers gazing at the monitor.

"Sure", one officer answered. "Radioactive source."

"OK, sergeant. Return to the van", the officer in charge instructed.

The officer in charge of the bomb-squad immediately contacted the Department of Energy and the Environmental Protection Agency who coordinated the next phase of the investigation. The DoE carried out the initial site investigation and determined that the source was an alpha-emitter (indicating that it was a heavy isotope) but not immediately dangerous. They then handed the case over to the EPA who sent the source to the Lawrence Livermore National Laboratory in California for analysis. The lab carried out, among other tests, an alpha-spectrum analysis and determined that it contained about 12 grams of weapons-grade plutonium. At this point the EPA decided to inform the Congressional Liaison Officer and the White House and, of course, the Detroit mayor and police commissioner.

"Right", the police commissioner thought to himself when he received the information. "Worst nightmare comes true. I was wondering what Mandate's stick would be."

The commissioner spent the rest of the day on the phone. The Detroit Police Department had made plans long ago to deal with a nuclear bomb threat but there were still a thousand and one things to attend to.

The following day, the police commissioner received a third letter.

Dear Commissioner Calver

I trust that you have examined the container we sent you. Tonight you will hear a loud and prolonged noise. You may find the noise irritating. However we urge you not to destroy the equipment making the noise. The consequences could be quite serious. The noise will continue for three months. After that, you can take whatever action you wish.

Mandate

At two o'clock in the morning there was the sound of an explosion. It was deafeningly loud and came from a large truck parked in a side street close to police headquarters in which Bob Peterson had installed Bolt Technology's air gun. The compressor whirred away as it built up the pressure for another blast. Five minutes later window panes again rattled violently. The three-ton diesel tank that Bob Peterson had fitted would keep the compressor going for a long time.

That night, few people in Detroit slept. Many did not come to work and those who did looked haggard and were thoroughly irritable.

The mayor summoned the police commissioner.

"This noise is intolerable. We have to stop it."

"And the plutonium?" the commissioner asked.

"Does Mandate have a bomb? Do we know that? Would they dare use it?" the mayor asked.

"Pass, no and pass", the commissioner answered. "But they've shown elsewhere in the

world that they mean business. If they could smuggle 12 grams into the country, who's to say they couldn't have smuggled in half a kilo? And they wouldn't need to set off a nuclear explosion. A dirty bomb would serve their purposes just fine. They could poison the whole of Detroit and it wouldn't be possible to work here for a decade."

"That's not good", the mayor said finally. "I wouldn't like that on my conscience."

"Me neither", the police commissioner agreed and, after a moment's pause asked: "So the noise continues?"

"I suppose it has to", the mayor said, with a dour expression. "But you pull out all the stops to find the ***** who's behind it", he demanded.

"You've got it", the commissioner replied.

That day the press descended on Detroit in droves.

"How can you work in this noise?" a journalist asked a well-dressed man at just the moment when Bolt Technology's captive bolt slammed down again.

"What?" the man shouted.

"How can you work in this noise?" the journalist asked again, taking advantage of the lull between explosions.

"I can't. We're relocating for three months", the man replied.

No-one had got hurt, no property had been destroyed. Outside Michigan the most frequent response was to laugh.

But Mandate was not yet finished with Michigan. The organization had not, up to this point, done anything to reduce coal consumption. Most coal was being burned in power stations and Bob Peterson considered that a direct attack on a power station would be too difficult and dangerous. However he felt that he could at least cause one city-wide blackout.

The only woman involved in this part of Bob Peterson's plan was Peggy Rhinehart, a forty year-old mother of three whom he knew from Africa and who had since returned with her family to the US.

At eight p.m. on New Year's Eve 2018 it was cold, dark and snowing and she was a long way from any habitation. She had met Bob Peterson only once after returning to the US. That was when he demonstrated the task to her. He had emphasised that she should abort the mission if it was raining.

But what about snowing? she asked herself as she tried to snuggle deeper inside her down jacket.

As per Bob Peterson's instructions she had gathered her equipment from a variety of locations over a period of several months. She never purchased online and she always paid in cash. She had thought through why she was buying the things she was buying in case anyone asked: a diver's spear gun or a Tirfor¹ were not everyday items.

Tonight she had switched her mobile phone off before leaving home and chosen footwear that would not leave a distinctive print. She left her car and walked about a mile to the appointed location where the 300 KV transmission line was crackling loudly in the humid atmosphere. She waited for a few minutes to check that there were no signs of activity. There were none. She was in good time. She would wait to see if the snow

¹ A lever-operated winch to pull on wire rope, used in construction.

stopped. She was not one for aborting anything if it could be helped although she was not going to be stupid either. The forecast was for the snow to abate and after about an hour it did so.

Let's do this thing, she whispered to herself.

She removed a 2mm nylon line from her rucksack; it was still completely dry. She then took out the diver's spear gun she had purchased, attached the nylon line to a barb and inserted it into the spear gun. She approached to within about 30 metres of the lowest point on the line, took aim, and shot the barb over the middle phase.

This is where I go from frozen to frazzled in three seconds, she thought. Glad the kids can't see me now.

But nothing dramatic happened. The nylon line, as per the plan, was now resting over the middle phase. Peggy Rhinehart now took a high-tensile strength 3/8" synthetic rope from her rucksack and tied it to one end of the nylon rope. She attached a small grappling hook to the end of the synthetic rope. Taking hold of the nylon rope she nervously pulled it in, drawing the synthetic rope over the phase. More pulling and one end of the synthetic rope reached her. Still more pulling and the grappling hook lifted off the ground. The grappling hook swayed to and fro, bumping the rope against the lower phase. Finally, she gave the rope a quick yank and the grappling hook engaged on the lower phase.

So far so good.

Peggy Rhinehart now walked about 100 metres away from the transmission line, feeding the synthetic rope out as she went. She anchored the Tirfor to a tree, fed the steel rope through it and then tied the synthetic rope to an eye on the steel rope. She was now in a position to apply substantial tension to the rope. If the synthetic rope snapped there would be a dangerous whiplash. But the steel rope, as well as being necessary for the Tirfor, created some distance between her and the synthetic rope.

Everything was now in place. Peggy Rhinehart grasped the lever on the Tirfor and started to winch. 100 metres away the synthetic rope slid over the middle phase and the grappling hook gradually pulled the lower phase upwards towards it. She continued to winch it in.

Now let's see if we can get a spark...

The lower phase continued to approach the middle one. From 100 metres away the lines seemed to be almost touching but still nothing happened. Finally, when the two lines were about fifteen centimetres apart there was a loud bang and a huge flash which must have been heard and seen miles away. The transmission line protection at the substation detected the short-circuit and opened the trip switches. Under normal circumstances grid control might have been able to re-route the power. However when ten transmission lines were cut within minutes of each other it was impossible. Detroit sank into darkness for the remainder of the night. Peggy Rhinehart collected her tackle and returned home, keeping her eyes open for people who might be on their way to investigate the explosion.

About two hours later engineers walking the line arrived at the point where the short had occurred but in the darkness they didn't notice the signs of charring. They returned the following day when it was light and finally found the place. Damage was minimal. The electricity department commented to the mayor of Detroit that Mandate could have caused

Moody's downgraded the US credit rating. Interest rates on treasury bonds rose sharply. Further debt was needed to repay the debt that was maturing but at the higher rate of interest it was unaffordable. A trillion dollars a year in interest is, after all, not a small amount. Investors might renegotiate Greek debt but China made it clear that it did not intend to do the same for the US.

The Democrats, who were in power at the time, panicked and printed a lot of money, something that Greece, being in the Euro zone, could not have done. Republicans, as well as China, Japan and many other countries which held huge reserves of US dollars were incensed. Emergency measures were rehashed endlessly and riots broke out in many US cities. The country was close to falling into anarchy. Environmentalists were the new enemy of the state and a huge witch-hunt started.

Bob Peterson watched without any great surprise. Mary, however, was astonished.

"We're destroying the US", she said.

"No", her husband answered. "It's for America's good."

"You wouldn't think of stopping here?"

"No. There's something else I want to show."

For his California campaign Bob Peterson wrote directly to the governor. He, like the mayor of Detroit, announced that he would not be dictated to. The city braced itself for loud noises or power cuts. But Bob Peterson had a different goal in California. He wanted to show that he was not a lone maverick but that he had popular support. Following the governor's press conference he sent 100,000 letters to addresses all around the state. The letters carried the following message:

To the people of California

Not everyone sees climate change as a serious problem. But for those of us who, like Mandate, see the suffering it is causing now, and are convinced that it will only increase in the future, integrity demands that we shout out a warning.

Mandate wants change. But we must not seek to impose our will on you, our fellow Americans. We must collectively decide to change and it must be through a democratic process.

What we ask is that you signal to our leaders that you too want change. We are inviting you to join our campaign and thereby give our leaders the mandate they need for carrying out the radical and painful changes that will be needed.

Specifically, we are calling on you to reduce traffic on the roads for a period of one month. We believe that this will show, as it did in Philadelphia, that a car is not essential for life. A healthy planet, however, is.

To carry out this demonstration, please follow the steps on the following sheet.

Wishing you success.

Mandate

The following sheet contained these instructions:

Parts required

1. A strong magnet, for example a magnet from an old television or a bass driver from a large loudspeaker.
2. 50 or so approximately one inch nails.

Procedure

1. Hammer the nails so that they have two bends.
2. Place the magnet inside your car, on the floor, somewhere you can reach as you are driving.
3. From below the car, place the nails so that they are held to the underside of the car by the magnet.
4. Starting from next Monday, go for a drive. At a place where traffic is moving slowly, for example at an intersection, remove the magnet. The nails will of course fall to the ground. Going in the evening or at night will reduce the likelihood of your being noticed.
5. Repeat as often as you wish for one month.
6. If you do not drive, use other measures to scatter bent nails on the roads.

In the following days tyre dealers hurriedly stocked up on run-flat tyres and auto-part shops stocked up on instant puncture repair aerosols. They still ran out.

On the Monday of the following week the press was out in force. There were few cars on the road and it was not long before there were many fuming drivers changing tyres. Many changed a tyre once and then got a second puncture.

“Will you be coming to work tomorrow?” a reporter asked one driver who was locking up his car and leaving it.

The driver’s reply was so full of profanities that it was completely unusable.

“But Mandate didn’t do this”, the reporter pressed on. “Californians did this.”

“Californians are a load of jerks. These tyres cost 200 dollars each. Who’s going to pay for them?”

“But surely it means that there are a lot of people out there who believe we need to change?”

“This isn’t going to persuade me.”

“Will you be coming into LA tomorrow?”

“Without a car?”

“So you are changing?”

The reporter was subjected to another outburst of profanity.

Bob Peterson was once again satisfied with the result and turned his thoughts towards the next phase of his campaign: the legal challenge.

Chapter 11

Bob Peterson now commenced his legal campaign. He wrote to the ambassadors of twenty-eight countries in which there had been widespread loss of life as a result of climate change. He would have loved to include a further twenty or more countries in which there had been other forms of damage but decided against it. His letter, printed on Mandate's trademark handmade paper, was as follows:

Dear Ambassador

We, Mandate, are grieved at the effect of climate changes in your country. Many members of our organization have seen the suffering in your country first-hand.

These changes in climate are, to a large extent, the result of greenhouse gas emissions, especially emissions of CO₂. This is not in dispute by reputable scientific bodies. The solution to this problem is to drastically reduce emissions of greenhouse gases.

The largest emitter of CO₂ in the world is China and the second largest is the United States. These are also the two wealthiest and most powerful countries in the world. It behoves these countries to be the first to put an end to practices that are causing such destruction and suffering. However we do not see the United States taking the lead, rather the opposite. Usage of fossil fuels in the US continues at approximately twice the level of other similarly-developed countries on a per capita basis. This has to be considered profligacy. In the past, when the link between CO₂ emissions and climate change was unclear, industrialised countries' lack of concern was, to some degree, forgivable. But now that the link is so evident, any lack of commitment to reducing CO₂ emissions is unconscionable.

We believe that the world community should communicate in a clear way that the United States' indifference and lethargy in this matter are unacceptable.

We have investigated the legal options to stop the United States from causing this damage. If you would be interested in participating in such a process, we invite you to a meeting at the Washington office of our legal counsel at 11 a.m. next Wednesday. Please bring identification with you. Directions are enclosed.

Faithfully

Mandate.

On a separate sheet was a small map containing directions to a prestigious Washington law firm, Andrews Murphy Stricken and Cohen LLP.

The following Wednesday a stream of black limousines with diplomatic plates arrived at the law firm's offices. Unsurprisingly, news of this initiative had been leaked to the press and they were out in force, as were the police.

"Here is the Deputy Chief of Mission from the embassy of Mauritania", a TV reporter said as a black Mercedes drew up. "No doubt about climate change affecting them. And here is the first secretary from the embassy of Ethiopia - of course we've all seen that country in the news recently. He is followed by the first counsellor for political affairs from the embassy of Greece, something of a surprise there..."

And so the list went on. Diplomats from India, Pakistan, Eritrea, Zimbabwe and South

Africa, Argentina, Guatemala, Egypt, Mauritania, Bangladesh, Mali, Niger, Chad, Honduras, Nicaragua, Costa Rica, Panama, Morocco, Algeria, Tunisia, Sudan, Uruguay, Ethiopia, Mozambique, Swaziland, Libya, Greece and Namibia came.

Inside Andrews Murphy Stricken and Cohen's opulent offices the embassies' representatives were ushered up to a large meeting room. There Peter Murphy JD, a senior partner, greeted them. After welcoming his guests he got down to the main business of the meeting.

"I am sure that you have all heard of Mandate. More than a year ago a member of Mandate instructed us to research whether nation states that were suffering from the effects of climate change could bring a case to the International Court of Justice. We did so and came to the conclusion that it would be entirely possible.

This morning I would like to start by making a brief presentation which I hope will answer many of your questions. After that, I will take questions and then we will leave time for some more informal discussion. Is that acceptable to everyone?"

The diplomats indicated their agreement.

"Slide one. Purpose of today's meeting. Our purpose is to propose to you that your countries jointly institute proceedings against the United States of America at the International Court of Justice.

Slide two. Basis. Here are three figures. 200,000 is the number of people in your countries who have died as a result of climate change this year alone. The annual death toll is likely to rise in coming years. 900 trillion is how many tons of carbon dioxide that mankind has put into the atmosphere over the past 100 years. 300 trillion is how many tons of carbon dioxide my country – the US – has contributed to the total over the same period. That's a lot of CO₂. Is there a connection? Yes.

Slide three. Our general goal. Reparation – no; stopping the process – yes.

Slide four. Our specific goal. An injunction to require the USA to adopt a carbon-neutral position within two years.

Slide five. Legal basis. Article 3 of the Universal Declaration of Human Rights which states that, 'Everyone has the right to life, liberty and security of person'.

Slide six. Possible outcome, best case. ICJ rules in our favour and the US radically reduces carbon emissions. However even if we win against the US, other countries will have to make the same changes for global warming to be halted.

Slide seven. Possible outcome, intermediate case. ICJ rules in our favour but US is non-responsive. No-one can enforce the decision.

Slide eight. Possible outcome, worst case. US refuses to accept jurisdiction of ICJ or successfully argues that the case is inadmissible. However even if that happens the case will generate a great deal of publicity and discussion and it would open the way for raising the issue at the UN.

Slide nine. How to obtain best case. Your countries would agree that by accepting this settlement you would not subsequently seek reparations.

Slide ten. Precedent. There have been a number of similar cases within the US over the past five years. Mostly US states bringing claims against US utility companies.

Slide eleven. Why you might not wish to participate. You are dependent on grants from

the US, or tourist income. I would argue that the lives of your people are more important.

Slide twelve. Why just target the US? Given its contribution to the problem, the US should be in the lead in solving it. But, starting with its refusal to ratify the Kyoto protocol we see that the US has been the laggard. We need to make it clear that this is unacceptable. We can go after other countries later.

Slide thirteen. Next steps. You simply need to let us know that you wish to institute proceedings. We will guide you through the process.

Slide fourteen. Cost. None, to you. Mandate has made a down-payment to cover legal expenses.

Now. I would like to invite questions.”

A large number of countries, most of them developing countries, were interested in Bob Peterson’s proposal to start proceedings against the United States at the International Court of Justice. But Bob Peterson knew that getting the US to accept the ICJ’s jurisdiction would be a tall order.

Bob Peterson saw three reasons why the US might agree to the ICJ’s jurisdiction. They were Britain, with whom the US continued to have a close relationship; the European Union; and the plaintiff countries. And he saw one reason – which could easily end up being the overriding factor – why the US might not agree, and that was China.

Britain was likely to support the plaintiff countries because so many of them were former British colonies and now members of the Commonwealth. Almost all the members of the ‘Alliance of Small Island States’ were, as were India and Bangladesh and about twenty African countries. It was very natural for these countries to appeal to Britain, as the head of the Commonwealth and one of the permanent members of the UN Security Council, to use its special relationship with the US to support them and Bob Peterson encouraged these countries to do so.

The European Union had been setting the pace in combating climate change by taking many unilateral initiatives. Most countries within the union had committed themselves to reducing carbon emissions by 80% by 2050. They had introduced carbon-neutral standards for new house construction, required product labelling to show lifetime carbon cost, offered a variety of grants and subsidies to encourage green living and set up carbon sequestration schemes. The UK and Denmark had introduced the eco² in 2018. The EU, clearly the part of the world that was most concerned about the environment, was very keen to encourage the US to join it in its efforts to keep global warming to within two degrees Celsius at least and encouraged the US to accept the ICJ’s jurisdiction.

Plaintiff countries would also have to gain some measure of support in the US for there to be a chance of a case going to the ICJ. The case was not too difficult to make. Examples of human suffering were very evident. Bob Peterson invited the host of a popular talk show to visit the countries that were appealing to the ICJ and arranged for Mandate to cover the expenses.

The problem, Bob Peterson knew, was China. The US had no desire to hand over its

² A parallel currency. One eco represented emission of one kilogram of carbon dioxide or its equivalent.

superpower position to China and was likely to oppose anything that would weaken it at the expense of its rival. As long as China refused to limit its own emissions in real terms rather than as a function of GDP, the US was likely to refuse to the ICJ's jurisdiction. So it turned out but the process was not without surprises. The applications were duly submitted to the Peace Palace, the seat of the ICJ at The Hague, Netherlands. The United States stated that it would not accept the ICJ's jurisdiction in this matter. It noted that all the major industrial countries had contributed to global warming and it would not be singled out.

In response to this a number of European countries advised that they would be willing to be co-defendants with the United States. The European countries' logic in offering to be co-defendants was simple. The plaintiff countries had already ruled out a demand for reparations; they were only seeking stronger measures to reduce carbon emissions. The ICJ was likely to rule that the defendants take all reasonable measures to reduce emissions. Given that the panel of judges at the ICJ was weighted slightly in favour of developed countries the EU countries doubted that stricter measures would be demanded than they had already implemented. However if the US accepted the ICJ's jurisdiction it would also be bound to comply with its verdict which would be a win for the planet. All the Scandinavian countries also offered to be co-defendants.

The initiative had no effect on the United States. The United States said that first, its economy was very fragile and additional burdens could undermine a recovery – but at some future date it would seek to do more to comply – and second, it would not commit to substantial cuts in emissions unless China also agreed to similar cuts. In conclusion it would not accept the ICJ's jurisdiction.

The result was very much what Bob Peterson had expected. He had never expected a quick or easy win.

“Economy trumps environment yet again”, he said to himself and prepared to play his last card.

Chapter 12

All around the world Mandate was becoming a household name. It had carried out attacks in the Middle East, in the United States and China, and other countries. The United States, being particularly oil-dependent, was faring very badly and its economy was collapsing. But that country's woes did not directly affect Yuan Ming in China.

The course at Tsinghua University was giving him a feast of ideas that he could use for One. There were far more ideas than he could possibly keep up with.

Muscle-actuated 3D face models could give One more realistic expressions. Progress in vision interfaces meant that One could (if Yuan Ming could find time to work on it) understand body language and facial expressions of the person she was talking to. Developments in computational photography could allow One to be shown against different backgrounds with different depths of field. Hair simulation and cloth simulation were making great strides. One could be placed into a variety of virtual or real worlds. There were new developments in database management, in managing fuzzy data and in data mining. There were advances in game theory. In every area of computer science there was change and progress. There was a lot that *could* be done and impossible to do more than a tiny part of it.

While home over the Christmas break he raised the subject with his parents.

"There's so much happening in the computer field. I'm afraid One's going to be overtaken and become a relic."

Yuan Ming's parents did not have any immediate suggestions but they said that they would think about it. Over the following week they did just that and came up with an idea that surprised them. It was a radical idea and they were not sure whether Yuan Ming would like it. A few days later they told him their idea.

"Yuan Wei and I have been thinking about what you told us", Zheng Lily said. "I know it may seem silly but there was that dream that Wu Yi saw. We don't know if the 'one' he saw was connected with 'One'. But we can't help thinking that One might be important. We wouldn't want her to become a relic! Yuan Wei and I have talked over things quite a lot and we think there's a way that I could contribute. Let me explain. You know I teach accountancy. In our course we cover accounting for mergers and acquisitions. I use case studies, including some from the computer industry, and there's a pattern which comes up time and time again. It goes like this. Small, innovative companies see potential in an emerging technology and use it to develop some new products. Along comes a big IT company. The big company likes what the small company is doing, sees the potential and buys the small company. They invest in the product and market it well. They grow the whole market and capture a large share. But in the process, smaller companies that remain independent lose market share and eventually withdraw their products. The market becomes consolidated, dominated by a few big players."

"I've seen it happen many times", Yuan Wei commented.

"You may be wondering what all that has to do with One", Zheng Lily continued. "We are not a company and One isn't a product. But there are companies all around the world that are developing products like One. They see lots of commercial potential in virtual people. Basically wherever there's a need for a person who doesn't have to do more than

think, speak or write, then a virtual person could do the job. The most obvious starting points would be situations where no great expertise is required. For example a virtual person could be a companion to elderly people. The next step up would be jobs like a switchboard operator. If a virtual person could be trained to have expert knowledge in certain areas he or she could work as an assistant librarian, do telesales, telephone opinion polling, technical support via online chat or by phone or email. A virtual person could be an interpreter or an insurance advisor, maybe even a teacher. I'm sure I'm just scratching the surface."

Yuan Wei joined in the conversation again. "The point is that as these virtual people develop, as companies see more and more commercial applications, they'll put money into them, develop them – and then, what you're afraid of will happen. One will be left behind, become a relic."

Yuan Ming was quiet for a moment.

"So what's the solution?" he asked.

"We think the only solution is for One to get ahead of the game. To commercialize her", Yuan Wei answered.

Instinctively Yuan Ming felt that he didn't like the idea. One was, well, One! Unique and different. He didn't want clones of her everywhere. But Zheng Lily cut in before he could speak.

"Let us give you the whole package", she said. "Then say what you think about it."

"OK", Yuan Ming said.

"Let me start", Yuan Wei said. "Firstly, we don't see that One would lose her uniqueness. If we did clone her we can give her a different composite image and you could de-spec the clones."

Zheng Lily joined in. "The advantage to us, or to One, is that we'd start to generate some revenue. That would mean that we could employ other software engineers to work on all those things that you were mentioning."

"You'd need someone to manage it as a business", Yuan Ming said.

"That's true", Yuan Wei said. "And we had an idea about that too."

"Who?" Yuan Ming asked.

"Me!" Zheng Lily replied.

"What? You'd give up your job?"

"Well, I don't think I'd need to. Not initially at least. I've been working part-time for a long time. You're not here. And I quite fancy the idea. You know the saying, 'Those who can, do; those who can't, teach'. Maybe time for some doing."

Yuan Ming was very surprised. He didn't know what to think but deep down he sensed that the arguments made sense.

"I'm overwhelmed", he said. "I never realized that you valued One that much."

"I don't think we did ourselves until we started to talk about her", Zheng Lily answered.

"I've been Googling for 'virtual person'", Yuan Ming said. "The number of entries is going up very quickly. I'm monitoring the standard of other virtual people and I think One is very much among the leaders."

"Some companies are no doubt keeping quiet about what they're developing", Yuan

Wei said.

"I'm sure of it", Yuan Ming agreed. "I only told one person at Tsinghua about One."

"This is definitely the time to act", Zheng Lily said. "Two years from now you could be completely out of the race."

"Then we're agreed?" Yuan Wei asked.

"I'd like to run it by One", Yuan Ming said. "Treat her like an adult."

That evening Yuan Ming brought the subject up with One.

"One, you know about meiosis and mitosis, don't you?"

"Sure. Meiosis sounds more fun."

Yuan Ming wondered where One got her ideas from.

"OK, One. Dad and Mum and I have been talking about your future. When you first got to know me, what was I doing?"

"You were at school."

"Right. And now?"

"At university."

"And after that?"

"Uh... not sure."

"After that I will hopefully get a job and start to earn some money. This is all a natural progression. It's part of growing up. At some point we have to start working. And I think it's something we should work towards in your case. If we want you to be more and more like a real person then you should certainly work and engage in the world."

One was not sure if she liked the idea.

"But in your case it's a good idea for another reason as well..."

Yuan Ming told One about the discussion he had had with his parents.

"So, in short, putting you to work is a way that we think you could have a real future. What we would like to do is a little mitosis. I take a clone of you and de-spec it to some extent. Then we clone the clone, give it new attributes and start to market it."

"There was one job I could do which you didn't mention", One remarked.

"What's that?"

"I could be a pianist", One said.

"You certainly could", Yuan Ming agreed.

Jetticke and Yuan Ming met up in Shanghai as they had planned. Jetticke had changed in the space of six months. The combination of being away from home and studying in Copenhagen was obviously doing her good. She seemed more poised and mature and she dressed in a more sophisticated way. She was studying landscape architecture and urban design and finding the course very interesting. Yuan Ming liked the changes he saw. Jetticke also noticed changes in Yuan Ming. He was still lean, but more muscular.

"Are you as quick as you were, Ming?" she asked.

"I'm quicker!" Yuan Ming replied.

"Still competing?"

"Definitely." Yuan Ming was training between four and five hours a day and had been selected for the Asian Games. But he didn't mention that. "You should come up to Beijing in the summer to watch a race."

"I'd like to. I'm dying to try out the new Maglev. It's due to be commissioned soon, isn't it?"

"In a couple of months, they say."

Yuan Ming and Jetticke spent some time catching up on news before Jetticke turned to the question of the new scan.

"Are we going to do the scan the same way as last time?"

"Yes, I think so."

"There's something I've been thinking about", she said. "Last time we did a scan of just my face. If you want to give One some arms and legs, I wouldn't mind modelling for that too."

Yuan Ming felt like giving her a big hug. He had thought about this quite a bit and eventually decided that he couldn't ask Jetticke to model in that way. She had read his mind.

"Jetticke, that is really kind of you", he said. "I wouldn't have dared to ask you."

"It's no big deal", she answered. "How many times have we been swimming together? I'll bring a leotard."

After Yuan Ming and his father had done the 3D scan they set about converting the information into vector graphics that One could control. Adding clothes in a way that appeared realistic turned out to be more difficult than they had expected but eventually they provided One with a wardrobe of designs each of which could be worn with any fabric or pattern. They programmed One to select appropriate clothes for the occasion and the weather. After they were ready they called Jetticke around again.

"You remember last time you met One?" Yuan Ming asked. "I think she's come on since then."

He switched the workstation on and in a few seconds One appeared. One seemed very pleased to see Jetticke again. They chatted for a few minutes and then One asked Jetticke if she would like to see some photos from her holiday.

"Sure", Jetticke replied.

"Well, here I am in Paris", One said, showing herself in front of the Eiffel Tower wearing jeans and a T-shirt.

"And here I am in Sri Lanka, riding on an elephant," One said.

"I hear it's very prickly", Yuan Ming commented.

"Yes. Like being kissed by a man who hasn't shaved for three days", Jetticke said.

"...Except *that's* on your face."

"Who's been kissing you?" Yuan Ming demanded.

Jetticke grinned at him mischievously.

"Do you want to look at my snaps or not?" One asked.

"OK, go on."

"This is me again, on Bentota beach. Sri Lanka." Now One was in a bikini.

"Nice legs", Yuan Ming said.

"Are you on your own, One?" Jetticke asked.

"Yes she is", Yuan Ming answered. "She hasn't got a boyfriend yet."

"Way to go", Jetticke said.

After they had finished looking at One's holiday pictures, Jetticke asked One, "One, if it was possible for you to have some real legs, would you want them?"

"No", One replied. "Cyberspace is my world. I'd lose all my freedom if I came into your world. Not to mention that I could never compete with the real thing."

Later on Jetticke told Yuan Ming, "I'm really impressed. One has come on so much!"

"Well, we're pretty pleased with her ourselves", Yuan Ming said. "I never knew how much my Dad knew until we started this. And we found that there's already a whole lot of software out there which could do many of the things we wanted. Generally the challenge for us has been to find it and integrate it."

"Well, keep up the good work!"

As she left, she gave Yuan Ming a kiss on his cheek.

"What was that for?" Yuan Ming asked, surprised.

"Oh, I don't know. In Denmark people are always kissing each other."

"Oh, OK. I'll keep that in mind", Yuan Ming said.

Chapter 13

Christian Age Research was located a little to the north of Fall River Lake in south-east Kansas. It was a beautiful area in its way, sparsely-populated, with a mix of open prairie and woodland and many foot and cycle paths.

Paul Jaynard, CAR's director, was excited about the prospect of the day ahead. The project CAR was embarking on was slightly crazy but at the same time right up his street. He and his colleagues had recruited an excellent team of volunteers and had told them enough to pique their interest. Now it was time for the details.

He thanked everyone for coming – it wasn't the easiest place to get to, he knew – made sure that everyone was introduced and then got down to business.

"The goal of 100-2-100, as we explained in the information pack, is for each organization to get as many as possible of their selected ten young men or women to 100 years old. You have kindly agreed to help us to find ten people to represent us. So, what kind of people are we looking for? We have three main criteria. The goal is to live long, so we want people who are physically, mentally and emotionally healthy. This is a competition, and we're looking for people who are intensely competitive, who are driven to win. But it's the last criterion that's going to be most challenging. We're looking for people who are super good. Good in the sense of righteous. A modern day Job, Noah or Daniel."

That did not go down well.

"No-one will sign up if you tell them that that's what you're looking for!" someone said.

"How can you tell who's righteous, anyway?" another person asked.

"All right, all right", Paul Jaynard said. "I agree that the only person who can see what people are like on the inside is God. But all is not lost. Jesus said that you can tell a tree by its fruit. He said that out of the overflow of the heart the mouth speaks. You can tell something about a person by seeing what they do and listening to what they say. That's why we need you."

Over the following month the group of volunteer consultants sifted through hundreds of candidates. As they identified likely candidates members of the group set off to all corners of the globe to check them in person. Now it was Sam's turn. He had been sitting in the conference room with Paul Jaynard and Jim Benson, Christian Age Research's Head of Research, for eight hours. They had whittled a group of 50 men down to two, but they couldn't decide between them.

"I like the English dude", Paul Jaynard said, referring to a young man named Peter Maher.

"Yes, he looks very good", Jim Benson agreed.

"I prefer the Chinese guy", Sam Rakotoarisaona said.

"He's good too", Jim Benson agreed. "However he's Chinese..."

The other two men understood what Jim Benson meant. Being Chinese did not augur well for living for a long time.

"Maybe Sam should check them both out", Paul Jaynard suggested.

"Good idea", Jim Benson said.

"So Sam, looks like we're agreed", Paul Jaynard said.

Before setting off from the US Sam Rakotoarisaona studied the two men's files again.

Peter Maher, product of a famous private school, now in his first year studying English at Cambridge, an active member of the university Christian Union and already playing rugby for the 'Light Blues'. Sam decided that he would go and watch a game. Yuan Ming, Olympic hopeful in the 400 metres, excellent scholar and also, as far as they could tell, someone with a living faith.

Sam checked the Cambridge University rugby team's upcoming schedule and booked a flight to London and a further flight to Beijing. He also sent an email message to Tsinghua University athletics department to let them know that he would be visiting Beijing and to offer his services for the time he was there.

A few days after Sam arrived in England Cambridge had a home game against Otley, a professional club in National League One. Sam arrived in Cambridge in good time. On the day of the game it was cold and blustery and Sam dressed in a warm duffle coat and scarf. He had never worn a duffle coat before but he thought he looked quite smart and English. He had also never watched rugby before. He was impressed. Players wore no protection. Tackling looked extremely dangerous and the scrum even more so, especially as it collapsed every so often. Sam winced when it did so. He was, of course, particularly interested in Peter Maher's performance. Clearly the young man was not lacking in courage, judging by a number of crunching tackles he made during the first half. By the end of the first half Otley had a narrow lead. In the second half too, Peter Maher distinguished himself. At one point he caught the ball cleanly as it was kicked down the field by the Otley scrum-half. Finding he had a little space he decided to run with the ball rather than kick into touch. The move almost resulted in a try.

Very nice, Sam thought to himself.

Otley managed to hold onto their lead until the final whistle. Sam had no intention of forming an opinion about Peter Maher on the basis of a game of rugby. But he had certainly been very cool under pressure. After the game he waited to catch him and then introduced himself.

"Excuse me", he said. "My name's Sam Rakotoarisaona. I'm a visitor here in the UK. I really enjoyed your run at the end!"

"Thanks! Wasn't enough though", Peter Maher said.

"There's always a next time."

"What brings you to England? Not to watch a game of rugby, I'm guessing."

"No..." Sam was slightly wrong-footed by the direct question. All his ideas about building a relationship before revealing too much went out of the window. "Well, it will probably sound very surprising to you but I actually came to meet you."

Peter Maher certainly was surprised.

"You could say I'm a kind of head-hunter", Sam explained. "I represent an organization in the United States called Christian Age Research. We're looking to recruit some people for a competition that we intend to enter and we identified you as someone we would be interested in."

"Wow! That needs to go in my diary. First time in my life I've been head-hunted. What's it all about?"

"I think the best thing is to meet sometime and I can explain it", Sam said. "This is my

card. It's got my mobile number on it. I'm staying at a hotel on Regent Street."

Peter Maher was curious who Christian Age Research was. A UK corporation might seek out third and fourth year students, but for a US organization called Christian Age Research to seek to recruit him while he was still in his first year didn't make sense. He checked Christian Age Research's website. It looked like a serious, well-funded organization. He also looked for Sam Rakotoarisaona on the Internet. That was interesting. Sam was a world-class Kenyan marathon runner who was now living in the United States. Very curious. Peter Maher decided it wouldn't do any harm to find out more. A couple of days later the two men got together at Sam's hotel.

"All right! I have to admit I'm intrigued to know why an organization like Christian Age Research would be interested in me", Peter Maher said.

"It's quite a long story", Sam answered. "At the present time all around the world scientists and doctors are making great steps forward in understanding the ageing process. These developments have the potential to significantly increase longevity."

"Yes, there's loads about that in the news", Peter Maher said. "Apparently on current trends almost one third of the children born in the UK this year will live to 100."

"There you go!" Sam said. "That's exactly the kind of thing that is very interesting to the pension funds. On the one hand, the pension funds could consider that people living longer is a bad thing since they have to pay pensions for a longer period. But on the other hand they could regard people living longer as a good thing because then pensions become even more important and people need to invest more into them. On balance, the pension funds have come to the conclusion that increased longevity is in their interests."

"OK, I'm following you so far", Peter Maher said.

"Some of the pension funds thought that a kind of competition could be a good way to raise awareness of how these scientific and medical advances are not just pie-in-the-sky but that people can really enjoy a high quality of life into their nineties or beyond. It would be a good PR move and would also promote scientific study of the ageing process."

"Yes. I can see the PR angle. Lots of people probably think the pension funds secretly want them to die as soon as they can."

"Well, I suppose some people might think that", Sam said. "But I'm the complete opposite – I don't think about my pension at all." He smiled apologetically. "Anyway, it's certainly in the pension funds' interest to make people think about their pensions and especially as life expectancy increases. So some of the pension funds started talking to some of the big organizations engaged in age-research. Together they proposed a competition and they have got some really big sponsors from industry. They are basically looking at it as an extended clinical trial, with 100 participants. The goal is to get a fair proportion of 100 people to live to a hundred years old. If that actually materializes that group of 100 people will be an inspiration to people all around the world and will show just how it's done."

"Hmm. It's a bit whacky, but it kind of makes sense", Peter Maher commented.

"Yes, it is a bit crazy. But it's attracting some serious interest. The pension funds have offered to completely cover pensions for the participants and one of the world's biggest software companies has offered prize money of 100,000 USD for each person who reaches 100. Those amounts will be inflation-adjusted. Entry has been limited to ten organizations

that have established reputations in the field of longevity and age-research. The competition is called 100-2-100.”

“What is the basis for a team to win?” Peter Maher asked

“Simple”, Sam replied. “It’s the team with the most participants to reach 100.”

“And you want me to join?” Peter Maher said.

“I came here to invite you to consider it”, Sam replied.

“You know I’m a Christian?” Peter Maher asked.

“Yes. And so am I.”

“And Jesus didn’t exactly make living for as long as possible a priority.”

“No, he didn’t”, Sam agreed. “But the fact that you are a Christian was one of the most important reasons why we would like you to participate. We are only inviting Christians.”

“Why only Christians?”

“A lot of organizations are going to take part in this competition”, Sam answered. “We think that the Christian community should be represented and should show a Christian approach to the whole goal of living longer.”

The two men talked for a further hour. At the end Peter Maher said that he would need time to think about it. Two days later he called Sam.

“Sam, I’m sorry, but I’m going to turn down your offer”, he said. “I just don’t feel that I should make living as long as possible a goal. I’ll take whatever length of life God gives me.”

“Well, I’m disappointed of course”, Sam replied. “But I can understand why you think that way.”

“Have you got any other candidates?” Peter Maher asked.

“There’s one other person I have to meet. And there are a number of other consultants like me who are looking for people to join our team.”

“Well, I wish you success”, Peter Maher said. “I’ll be interested to see how it turns out.”

“I hope you will see it”, Sam said. “But you might have to wait a while.”

Chapter 14

On his flight to Beijing a newspaper article caught Sam's eye: 'Shanghai schools top world academic league tables – again'. As he read further he discovered that it was for the eighth successive year.

Yuan Ming had returned to Beijing from Shanghai about a week earlier and had lost no time catching up with his best friend, Wu Wei, an enormous shot-putter. Wu Wei had some news for him.

"I heard there's a famous marathon runner coming to Beijing and he's offered to do some training while he's here", he said.

"Who?" Yuan Ming asked.

"A Kenyan called Sam Rakotoarisaona."

Yuan Ming hadn't heard of him, but then marathons weren't his event.

"Sam what?"

"Never mind. The coach is inviting runners to meet him tomorrow."

The following day the athletics coach called the track athletes together and introduced Sam. Sam recognized Yuan Ming from his photograph. Yuan Ming looked at Sam curiously. He had never seen anyone like him. Sam was about the same height as him, very black, with pronounced cheekbones and drawn cheeks. He reminded Sam of a Formula One car: light, angular, and built for speed.

"Mr Rakotoarisaona is quite a famous runner", the coach explained in English for Sam's benefit. "He wrote to the sports department and offered to spend a few weeks coaching some of our long-distance runners. So we've organized a sports camp."

"So it won't really affect the sprinters?" Yuan Ming asked.

"Maybe not directly", the coach said. "But I thought you might still be interested, Ming. Mr Rakotoarisaona is a close friend of Joseph Wanyeri."

Joseph Wanyeri was someone Yuan Ming had heard of. He was the world record holder in the marathon, having run 2:01 in London the previous year.

"Oh, really? Do you train with him?" Yuan Ming asked Sam.

"Not all the time. But sometimes I do."

"What's your best time in the marathon?" someone asked.

"2:03 and some seconds."

"Wow!"

After the coach had finished explaining how the camp would work and the group started to disperse Yuan Ming got a chance to talk to Sam.

"When did you arrive in Beijing?"

"Just a few days ago."

"Has anyone shown you around yet?"

"Not yet."

"Well, why don't I do that?"

"That would be great", Sam replied, "if you have time."

Yuan Ming had attended an expensive English-medium private school in Shanghai, and the course he was doing at Tsinghua was taught in English, so there was no problem in communication. Over the following two weeks he showed Sam around Beijing and plied him

with questions about Kenya and the United States. He discovered that Sam was a Christian, as he was. And Sam 'discovered' what he already knew: that Yuan Ming had won the 400 metres at the Chinese National Youth Championships in Chongqing the previous summer. But he decided not to tell Yuan Ming his real reason for coming to Beijing straight away. At one point he commented to Yuan Ming on his success.

"I took part in the last Olympics", he said. "There were quite a few athletes who were students. I know you're not at that level – not yet, anyway – but you've done amazingly well, academically and in sport."

"So how did I manage it?" Yuan Ming asked.

"Yes."

"I think it was a combination of things", Yuan Ming said. "Not all good. My parents are pretty academic and I guess that helped. They weren't rolling in money but they managed to send me to an expensive private school. I didn't want to let them down. A lot of the kids were rich and, well..."

"Smug", Sam suggested.

"That'll do", Yuan Ming agreed. "I wanted to show them that I was better than them."

"And the athletics?"

"Yi Tsui – my coach in Shanghai – was *really* pushy. And he persuaded my dad to send me to the US to train for three months before the youth championships. That made a big difference."

But Yuan Ming did not mention the dream about him that his grandfather's friend had had; the dream of a line like the Chinese letter one. That had also motivated him.

Towards the end of his visit Sam suggested to Yuan Ming that they run a race together.

"In fact", he said, "why don't we get all the people who've been coming to the sports camp to take part?"

"What distance?" Yuan Ming asked.

"Well, all the people in the sports camp are middle or long-distance. Only you're not. You think you can manage a 5k?"

Running 5,000 metres was not a problem for Yuan Ming; he regularly ran for 40 or 45 minutes as part of his training. But running that distance fast was another matter.

"What's your best time for the 5,000 metres?" Yuan Ming asked.

"Around 13 minutes", Sam answered.

Ouch, Yuan Ming thought. "Let's look at the forecast and find a day when we're not all going to freeze."

"Don't worry about that", Sam said. "No-one will be cold except the spectators. I'll talk to the coach about it. I'm sure we can work out a handicap system to give everyone a chance."

Three days later all the runners assembled at the university sports centre. Inside the changing room the athletes warmed up carefully. Some, including Sam and Yuan Ming, were wearing the newer shoes with carbon-fibre springs. When they were ready they came out to the track, took off their tracksuits and the race began without ado. The university had a good-quality modern track. A sizeable group of spectators shivered on the perimeter, including Wu Wei.

Many of the athletes in the training camp were middle-distance runners and faster over 5000 metres than Yuan Ming. The coach decided to give Yuan Ming a 600 metre advantage and the other athletes a one lap advantage compared to Sam.

Yuan Ming started; when he had completed half a lap the coach fired the starting pistol again and the rest of the athletes started; then when the leading runner of that group had completed a lap Sam joined in and immediately accelerated away from them.

Three laps later he had caught Yuan Ming, but the rest of the group was still some way behind.

“Come on, Ming”, Wu Wei shouted from the side, clapping his gloved hands together.

Sam moved steadily away from Yuan Ming. But he would have to lap him to win.

Yuan Ming was breathing very fast, taking great gulps of the freezing air. He was not sure how long he would be able to keep it up. Just eight more laps, he said to himself.

At lap seven Sam put in a fast lap. He was now just half a lap behind Yuan Ming and two of the faster Tsinghua runners who had caught up with him.

Over the next two laps Sam continued to push hard. Yuan Ming glanced over his shoulder. Sam was now just a hundred metres behind. He didn’t care about the other runners. He wanted to beat Sam.

“Keep going, Ming”, Wu Wei shouted from the side of the track.

With two laps to go Sam had closed to twenty metres behind Yuan Ming. It had taken him a major effort to catch up with him. Now he eased off very slightly, gathering his energy in order to thunder past Yuan Ming like an express train in the final lap. He let his arms drop and shimmied them.

Wu Wei screamed at Yuan Ming to go faster. Every part of Yuan Ming’s body screamed at him to stop. He let out small cries between breaths. The bell for the final lap sounded. Four hundred metres to go. Yuan Ming gritted his teeth and went into overdrive.

“Shit he’s fast”, Sam said to himself and shot off in pursuit.

Yuan Ming glanced over his shoulder. Sam was catching him. With two hundred meters to go he went into the final bend.

“Go! Go! Go!” Wu Wei shouted.

But Sam surged past Yuan Ming and crossed the finish line five meters ahead of him. Yuan Ming staggered to the side of the track and sat down in a chair in the first row of the stand. He leant forward. His legs were throbbing violently. His head was throbbing. He felt sick and dizzy. Wu Wei threw a blanket over him. Sam came over, looking fresh and relaxed. He had come third.

“Wow!” he said. “I didn’t think I would catch you. You really pushed me.”

“I don’t think so”, Yuan Ming replied. “What was your time? 14:20? You were cruising.”

Sam shook his head. “Not at all. That was about as fast as I could go.”

“You just did what was needed, that’s all”, Yuan Ming said.

“No way!”

“Didn’t want to show off, I suppose...”

“Not at all.”

“Don’t believe you.”

“Don’t believe me then.”

That evening Sam made a phone call to the United States.

“Jim?”

“Hi Sam. What news?”

“Well, I’ve met Yuan Ming and we’ve had some good time together.”

“And?”

“He’s intelligent, courageous and determined. He’s certainly a Christian.”

“Do you feel he’s the kind of person we’re looking for?”

“Without question.”

“So, let’s make him an offer.”

“I’ll do that.”

The following day Sam met with Yuan Ming again.

“Ming, I’ve got a bit of a confession to make”, Sam began.

“Oh?”

“When I came to Beijing, my real reason was not to conduct the sports camp. My real reason was to get to know you.”

Yuan Ming tried to make sense of this information.

“And why was I of such interest, that you would come from the United States to meet me?” he asked finally.

Sam spent the next hour giving the same explanation as he had to Peter Maher. At the end he apologized to Yuan Ming.

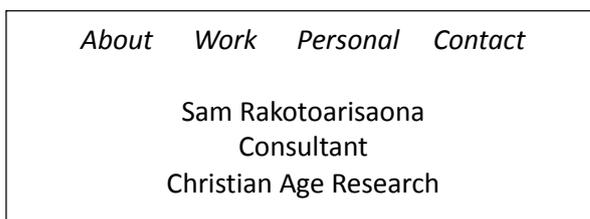
“Ming, I’m sorry that I didn’t tell you all this before. You’ll probably think that I was being deceptive. But I wanted to get to know you before making an offer and I was also afraid of scaring you off.”

He explained the reaction he had got from Peter Maher.

“OK, I can understand why you went about things like that”, Yuan Ming said. “But I need to think about it.”

“Let me suggest that you go to our organization’s website. Here, let me text you my card.”

Yuan Ming opened Sam’s card on his phone and looked at it with interest.



“I’ll get back to you”, Yuan Ming promised. “And by the way, since you mentioned rugby, you might be interested to know that it’s getting very popular here.”

“Here as in, China?”

“Yes. And also as in, Tsinghua Uni.”

“I had no idea”, Sam said.

“There are rugby-playing nations all around the Pacific – New Zealand and Australia of course, and Western Samoa and Japan. So we get exposed to the sport. A lot of kids in

China feel that they're too cosseted at home. They come up to university and they're looking for something that's rough. Rugby fits the bill", Yuan Ming explained. "You need balls to play rugby."

Sam raised his eyebrows.

"English school", Yuan Ming explained.

"Were you tempted to take it up?" Sam asked.

"I was, actually", Yuan Ming answered. "I thought: I'm not going to get to the highest level in athletics, why not try something different? I was also a bit embarrassed by all the attention I was getting."

"So why didn't you switch?"

"My coach, my parents. They said, be patient, you haven't peaked yet. I also thought that it shouldn't make any difference what other people think."

Sam was again impressed.

Sam was not the only one to have a secret. There was something Yuan Ming kept very quiet about. There was no reason why he should have mentioned it to Sam and he saw many reasons why he should not. Yuan Ming's secret was a virtual person which he had called One. He and his father had been working on 'her' for more than five years.

Yuan Ming's father was a scientist and the project had been his idea, a way to share some of his experience with his son. As they had overcome one problem after another they had become more and more passionate about the project, and they had a remarkable result. One's face, that of a young woman of about twenty, with Caucasian features, light brown hair and green eyes, was extraordinarily real. Her speech too, was remarkably natural. She could hear and, in a manner, understand, and she was very quick at searching the internet. Her image appeared as a face on an LCD screen, very much like the screen on a large laptop except that it was vertical. The system unit was underneath Yuan Ming's desk.

Back in his room, Yuan Ming visited Christian Age Research's website and he and One spent several minutes navigating around it.

"What do you think, One?" Yuan Ming asked finally.

"I don't think these people are cranks", One replied.

"No?"

"The institutions that are sponsoring the program are solid. And the scientific evidence that they are referring to, to support the view that life expectancy can be significantly extended, is also good."

"Hmm", Yuan Ming said after a while. "So you think I could follow it along?"

"I don't see the harm in it."

The following day Yuan Ming called Sam and told him he was interested.

"Great!" Sam replied. "Let's meet up and I'll give you some more details."

The following day they met again.

"What we would want you to do", Sam explained, "is to come to our headquarters in the US. You would meet the director and talk through all the details of what we would expect from you and what we would offer. There will be an agreement, but no written contract. After that, we would conduct a series of medical tests which would give us baseline data. We would also install a small implant which would constantly monitor your

key biometrics.”

“You don’t mind if I talk to my parents about this?”

“No, not at all. In fact, we’d recommend it.”

“I won’t be going home for a month or so.”

“It’s not a problem. We’ll wait to hear from you.”

Yuan Ming’s parents were surprised at his news. They also looked up the websites and were reassured by the fact that some of the largest US pension funds were supporting the initiative and Yuan Ming’s very positive impression of Sam Rakotoarisaona.

“You don’t need our permission to go forward with this”, Yuan Wei told his son. “You’re old enough to make your own mind up. But if I was your age and someone made this suggestion to me, I would be very interested.”

“I’ve seen a lot of hoaxes”, Zheng Lily, his mother, added. “Hoaxers are sometimes willing to put in quite a bit of investment in order to convince someone that they are genuine. And they also play the Christian card. But Sam Rakotoarisaona *is* genuine. I don’t think he would put his name to a hoax.”

“So you have no objection?” Yuan Ming asked.

“No. And there’s another thing”, Yuan Wei, his father, said. “This organization chose you because they think you’re exceptional. They’re scouring the world for just ten 18-20 year olds. If you’re one of those ten – well, it seems like a real privilege. We’ll be intrigued to hear how it develops.”

Chapter 15

Sam Rakotoarisaona was at Kansas City airport to meet Yuan Ming.

“So you decided to risk it!”

“Curiosity got the better of me.”

Sam introduced the older man who was standing next to him.

“Ming, this is my good friend and boss, Paul Jaynard, head of Christian Age Research.”

“I’m pleased to meet you, Mr Jaynard.”

“And we’re very glad you’ve come. Should I call you Yuan, or Ming, or Yuan Ming?”

“Ming will be fine.”

“Well, Ming, if you’re ready we can go.”

The journey to CAR’s headquarters took about forty minutes. Soon after they arrived Paul Jaynard offered Yuan Ming a tour.

“You’re probably wondering why we’re here in Kansas. Twenty years ago we were a small organization in L.A. doing research into age-related illnesses. Then a supporter left us this huge property in her will. We scratched our heads and wondered what to do with it. At the time active retirement communities were becoming quite fashionable. We thought that a retirement community could have synergies with our other activities and maybe help support them.”

Paul Jaynard gave Yuan Ming a thorough tour of the old people’s home: the residential area, dining hall, the very well-equipped gym and the swimming pool.

“You’re welcome to use the gym while you’re here”, he told Yuan Ming. Have you heard of people talking about ‘activating the youth’?”

“No.”

“Maybe there was no need in your case”, Paul Jaynard said, smiling slightly. “Anyway, we work very hard indeed on ‘activating the elderly’. OK, now let’s go outside.”

The tour continued through lawns and gardens and Paul Jaynard explained that CAR also had its own small farm.

“It all looks great!” Yuan Ming commented.

“However, there’s more”, Paul Jaynard said. “Follow me.”

A short walk down a lane brought them to a surprisingly large modern building.

“This is our clinical research lab. Come on in.”

Inside the lab Paul Jaynard introduced Yuan Ming to some of the staff.

“This is Jim Benson, our head of research”, Paul Jaynard said, introducing a man in his forties. “This is Yuan Ming. He says we can call him Ming.”

“Welcome, Ming. I was on the committee that was responsible for selecting candidates for the competition. So I’m afraid I already know quite a lot about you.”

“I hope I live up to your expectations”, Yuan Ming said.

“Jim, would you be able to give Ming a tour?” Paul Jaynard asked. “The lab is too technical for me.”

“Sure thing.”

After he left Jim Benson said, “Don’t be fooled by the show of ignorance. Paul is very switched on about what we’re doing here.”

Jim Benson led Yuan Ming through the lab, explaining as he went.

“We do quite a lot of contract research for the drug companies. And we have enough resources to allow us to do some blue sky research. 100-2-100 was right up our street – just the kind of thing that interests most of us.”

The following day Yuan Ming went round to Paul Jaynard’s office.

“Well, I imagine you want to know what this is all about”, he said.

“Yes. I’m very curious”, Yuan Ming asked.

“Over the past ten or fifteen years there has been a great surge of interest in longevity. Replacement joints are routine, people are excited about stem cell research and regenerative medicine and so on. Over the past few years there have been quite a number of suggestions along the lines of, ‘Why don’t we organize some sort of competition?’ People were saying, ‘Competition is great in sport, in business and so on; it’s a powerful force to raise standards. Maybe competition could motivate us to find ways to extend lifespan.’”

“Yes, Sam filled me in on some of this”, Yuan Ming said.

“These suggestions reached the pension funds. To begin with they weren’t interested. Then they started thinking about the commercial side of it. People who die at 60 or 65 don’t need pension funds; people who are going to live to 100 or more most certainly do.

After that the age-research organizations started to get interested. They also started thinking about the commercial aspects. They said to themselves, ‘Let’s suppose we go in for this competition and our team does really well. Then people will come to us to get advice about living a long and full life. We will say, “Sign up for our plan and if you follow it you’ll have a great prospect of living healthily to 90 or 100.”’ So, the whole idea began to take off.”

“So the whole thing is commercially motivated?” Yuan Ming asked.

“For most of the organizations, yes, but I hope not too much in our case”, Paul Jaynard answered. “Our mission statement is, ‘To foster a Christian attitude towards long life and facilitate achievement of a full life span’. We thought that entering 100-2-100 would support that.”

“What is a Christian attitude towards long life?” Yuan Ming asked.

“I can tell you what we at CAR think it should be”, Paul Jaynard said.

“OK.”

“It’s quite simple. We’ve written it in our brochure. Here, take a look.”

Yuan Ming read the section that Paul Jaynard was pointing out to him.

CAR’s attitude towards long life:

1. Long life is a blessing from God; it is part of ‘life to the full’.
2. It is a blessing which it is legitimate to seek.
3. Long life should never be our main aim. The desire for long life must be subordinate to whatever other plans God has revealed to us.
4. We should not seek a lifespan of more than 120 years.
5. The only reason to seek a long life is to fill it with good things.

“Where does 120 years come from?” Yuan Ming asked.

“It goes back to something in Genesis six”, Paul Jaynard answered. He took a Bible from a shelf and read. “...the sons of God saw that the daughters of men were beautiful, and

they married any of them they chose'. Then a little bit after that God says: 'My Spirit will not contend with man forever, for he is mortal; his days will be a hundred and twenty years.'

"Wow. So God put a cap on lifespan!" Yuan Ming said. "Like a speed limiter. I wonder how."

"A very interesting question", Paul Jaynard agreed. "But suppose that you did figure out how God had done it, is it something you would want to undo? For example, suppose you found some kind of clock in us that switches us off when we get to 120. Would you disconnect it?"

"It would be very tempting! But obviously not what God wants", Yuan Ming said.

"I agree. So that's where the 120 comes from."

The idea was completely new to Yuan Ming. He looked again at the brochure.

"Here in number four you say that *more* than 120 years shouldn't be the goal", he said. "So is 120 years your goal?"

"Well I'm not saying it should be a goal for everyone", Paul Jaynard said. "But it's our goal for everyone joining the CAR team."

Yuan Ming was continuing to look at CAR's brochure.

"The attitude you want to foster doesn't seem particularly complicated", he said.

"No, it isn't", Paul Jaynard agreed. "But most Christians don't have any sort of formulated view about long life. Even if they did most would be fairly clueless as to how to achieve it. We think that's a shame."

"So how do you help people to achieve it?" Yuan Ming asked.

"Good question. OK, skip on to the next page of the brochure."

Yuan Ming looked at the page.

CAR's view of the key requirements to enjoy a long life

1. Trust in God and obedience to Him
2. Proper nutrition, exercise and rest
3. Monitoring and resolution of health issues
4. Assessment and management of risks in the external environment
5. Character
6. Relationships

N.B. Observing these principles does not guarantee a long life!

CAR's activities to promote long life

1. Dissemination of information
2. Training
3. Bespoke plans

"Trust and obedience in God helps you to live a long life?" Yuan Ming asked.

"I could probably show you thirty verses in the Bible that say that in one form or another", Paul Jaynard replied. "Obedience sets the stage for God's blessings - health, protection and long life among others. For example, Paul quotes one of the Ten

Commandments in the following way: ‘Honour your father and mother... so that it may go well with you and that you may enjoy long life on the earth.’ That’s just one example; there are *lots* of verses like that. The reverse is also true: sin sets the stage for illness. Think of what Jesus said to the invalid at the Pool of Bethesda after he healed him: ‘See, you are well again. Stop sinning or something worse may happen to you.’ I don’t believe that it means that Christians will never fall ill or never break a leg. And there will be some people who it won’t be true of – John the Baptist, for example. But in the big picture I believe that when we put our trust in God he looks after us. But we still have a job to do.”

Paul Jaynard felt that they had covered a lot of ground and that this would be a good point to take a break.

“That was quite a lot to take in, wasn’t it?” he said. “Shall we go on tomorrow?”

“If you don’t mind”, Yuan Ming answered. “I think I’ll go for a run. Sam cornered me within five minutes of getting here.”

“Enjoy!”

“Unlikely”, Yuan Ming replied. “The last run I went on with Sam nearly killed me.”

“Oh! Well, take it easy then.”

It was certainly a beautiful day for a run. Twenty minutes brought the two men to the shore of Fall River Lake and the park area. They continued on to the tiny town of Fall River and then returned to Christian Age Research’s headquarters. For Yuan Ming, who was used to Shanghai and Beijing, cities whose populations were steadily approaching 20 million, a town with a population of less than 200 was a revelation. The few people they passed gawped at them.

Yuan Ming didn’t pay any attention to their surprised looks. He was trying to digest all the things he had heard in the previous two days. Surely there must be a downside, he said to himself.

Chapter 16

That evening Yuan Ming Skyped with Jetticke, his Danish girlfriend.

“So what are you doing in the States?” she asked. “You were a bit cryptic about it the last time we spoke.”

“Well, it’s pretty weird actually”, Yuan Ming said. He filled Jetticke in as well as he could.

“Yes, that is weird”, Jetticke agreed. “They haven’t made you an offer yet, have they?”

“No.”

“Will you accept if they do?”

“I’m not sure.”

Jetticke looked thoughtful, wondering what she would do if she was in Yuan Ming’s position.

“How’s uni?” Yuan Ming asked.

Jetticke shrugged. “No problems so far. How’s One? Did you bring her?”

“No, I left her in Shanghai.”

“I don’t suppose she was happy about that.”

“She didn’t seem too upset”, Yuan Ming said. “I don’t think her ‘missing-people’ emotion is highly developed.”

“I see.”

“What do you think about all the stuff Mandate is doing?” Yuan Ming asked.

“Here in Denmark everyone is pretty positive about it. We must be one of the greenest countries in the world.”

“A bit different to here then”, Yuan Ming commented.

Paul Jaynard and Yuan Ming resumed their discussions the following morning.

“We have decided to enter a longevity competition”, Paul Jaynard said. “However we are emphatic that long life must be *an* aim, not *the* aim. And we think that gives us an advantage, strange as it seems.”

“It makes sense if long life is really an outcome of something else.”

“Well that’s what we think.”

Paul Jaynard spent the next two hours giving Yuan Ming more information about the other competitors in 100-2-100 and their strategies. After that he suggested that he continue with Jim Benson.

“What I want to do is give you a kind of broad-brush picture of what you’d be signing up for if you joined the CAR team”, Jim Benson explained when Yuan Ming called on him. “Paul showed you our brochure didn’t he?”

“Yes.”

“Well, let’s just go through each point in turn and you’ll get the general idea.”

“OK.”

“The first item may come as a shock...”

“Trust and obey God? Paul explained that a bit”, Yuan Ming said.

“Fine. But he might not have said what we have in mind. Jesus said, ‘Be perfect as your heavenly Father is perfect’. God is giving us a clear goal we need to work towards, regardless of our longevity goals. We at CAR also happen to believe that it’s a critical requirement for a long life. We want to be sure that it’s your goal.”

Yuan Ming didn't answer immediately. Lots of thoughts came into his mind. Being perfect is impossible; why make something that's impossible your goal? What about: 'the perfect is the enemy of the good'? He didn't like the idea of trying to be perfect.

"You can give me an answer later", Jim Benson said.

"No, it's OK", Yuan Ming said. "I'd prefer to answer now. If I claim that Jesus is Lord I have to do what he tells me. That's a clear instruction. I have to accept it, whether I like it or not."

"Good", Jim Benson said. "That's what I'd expect any thinking Christian to say. That means we can move on to the second item: nutrition, exercise and rest. Hippocrates said, 'Let food be your medicine', and there's a lot in that."

Jim Benson gave a quick overview of CAR's principles in regard to food. It was very much what Yuan Ming followed anyway.

"After that is exercise. We expect you to commit to a pretty tough exercise routine right through your life. You don't need a sculpted body. It's your cardiovascular system that interests me first and foremost..."

"What does you mean by a tough exercise routine?" Yuan Ming asked.

"20 minutes a day of exercise at 90% of your maximum heart rate."

Yuan Ming smiled slightly. He often trained for four or five hours every day. 20 minutes was nothing. But 90% of maximum heart rate sounded like a lot.

"Isn't 20 minutes exercise too little? And isn't 90% of maximum heart rate too much?"

"Well, to answer the first point, with warm-up and cool-down it will take more like 30 or 40 minutes. Our view is that's all we want to ask for. There's no point in you spending two hours a day exercising to get you an extra ten years of life, is there?"

"But what if that's what it takes to win the competition?"

"If that's what it takes we'll give it a miss. One of the teams is following a calorie-restriction program. We don't agree with that: we think the cost outweighs the benefit."

Yuan Ming was not totally convinced but he let it pass.

"As far as 90% of maximum heart rate is concerned", Jim Benson continued, "the honest answer is that I don't know and no-one knows Paul Jaynard put me in charge of the program and told me to follow my instincts. I want to try 90%. It's no more scientific than that."

Jim Benson made a number of comments about how important Yuan Ming's knees were, which surprised Yuan Ming.

"I generally don't want to go into much detail at this stage", he said. "But there's one thing that I should mention. Knee damage is very common, especially among runners. Once your knees are damaged then it's hard to get proper exercise. What I want, and what is best for you as an athlete, will be different."

"Specifically?" Yuan Ming asked.

"I will probably ask you to reduce your running to some extent, and mix in some work on an exercise bike. It would make you slower now, but in my view it will help you keep going for longer."

"So bye-bye to competitive athletics?"

"You'll still be able to compete", Jim Benson said. "But not at such a high level."

Yuan Ming shrugged. "That's inevitable anyway."

“I don’t think it is inevitable”, Jim Benson said. “You could compete in master’s competitions as you get older. But I wanted to warn you that some compromises might be needed. The next thing is rest.”

“I’d have guessed nutrition and exercise”, Yuan Ming said, “But I wouldn’t have guessed rest.”

“Rest is a peculiar thing”, Jim Benson said. “We don’t really understand why we need to rest or sleep. An expert who had studied sleep for many decades was asked, ‘Why do we sleep?’ Can you guess what his answer was?”

“Because we get tired?”

“Got it in one”, Jim Benson said. “But even if we don’t understand it, it’s certainly important. Experts say that rest is as important for survival as eating.”

Jim Benson whizzed through the basics of rest.

“The third item is monitoring and resolution of health issues”, he said. “I see you’re wearing a Suunto watch so you’re used to monitoring your heart rate.”

“That’s right”, Yuan Ming answered.

“Well, we’re going to do something like that, but more advanced. We want to install a small implant in your innominate bone – your hipbone. This is it.”

He held up a device the size of a watch.

“What will that do?” Yuan Ming asked.

“It’s a monitor. Compared to your nerves it will hardly detect anything. But its big advantage from our point of view is that it will send us some basic information about you. It will monitor your pulse and blood pressure, your blood gases, acidity, glucose levels and so on. The information will reach us, and we will also pass it on to 100-2-100. 100-2-100 will publish the data on their website. The data will be publicly available for anyone to use however they want. The chip contains a tiny generator like the ones in self-winding watches. It should keep going your entire life.”

“How will the chip upload the information?”

“We’d want you to change your watch to one that we’ll give you. The implant will upload wirelessly to that.”

“And how does the watch get the information to you?” Yuan Ming asked.

“Ah, yes, nearly forgot that.”

Jim Benson opened a drawer in his desk and took out a carton the size of a shoe box.

“Wow! A satellite phone!”

“It’s the top-of-the-line phone at the moment. Very small. No-one will notice you’ve got it on you. We’d ask that you keep it with you all the time, for two reasons. First, the information from the implant in your hip will go to your watch; from there it will pass to the satellite phone once every 24 hours and the phone will transmit it to us. We’ll get early warning if there are health issues or if you’re cutting back on training or under stress and so on. And second, if you get into trouble you can use the phone to call us.”

“I can call you?” Yuan Ming asked, feigning surprise.

Jim Benson raised an eyebrow.

“It’s a phone, Ming. It’s for making calls. If you’re in danger, call us. If you’re stuck on a ledge high up on a mountain, call us. If you need extracting from a war zone, call us. I’m not

saying that we'll be able to help, but we'll certainly try. We'll be covering the costs of the phone but we don't expect you to have long conversations with your girlfriend on it."

"OK. Is that it as far as monitoring and examination is concerned?"

"No. The monitor chip won't pick up everything. We'll also give you detailed examinations at about two or three-year intervals. Proper diet and exercise reduce the risk of cancer just as they reduce the risk of cardiovascular problems. If you take care you can reduce the likelihood of getting cancer to maybe 10 or 12%. But even if you are unlucky enough to get cancer, the chances of treating it are good if we catch it early enough. So we'll be looking out for any signs of cancer very carefully and hopefully steer you round that rock. We'll also be looking out for a whole range of other health problems: diabetes, Alzheimer's and so on. There's something else I need to explain about the monitor. I told you that it's like a little clinical lab. It also has another function. The chip will release a minute amount of a signature-molecule into your bloodstream..."

"A signature molecule?"

"An inert molecule that's virtually impossible to replicate. It's important in order to prove that the data from the chip is coming from you. We'll take samples of your blood once a year, or possibly ask you to provide us with samples, and send them to 100-2-100. 100-2-100 will look to see if the sample contains the signature molecule. If it does then they're sure that the chip is in your body and will be sure that the data they're getting is from you."

"Definitely a hip chip", Yuan Ming commented.

"it ought to be. It costs enough", Jim Benson commented. "The fourth thing is assessment and management of risks in the external environment. Have you heard the phrase, 'Safety is no accident'?"

"No. But I like it."

"We will do risk evaluations of every situation you are likely to find yourself in. We'll consider likelihood and impact, control strategies and so on. We'll ensure you understand the risks and that you know what you have to do in various circumstances. We trust God to protect us, but we still need to do our part."

"Sounds good."

"We don't necessarily exclude the possibility of your doing something risky. There's a little story in the Bible that epitomizes it for me. It's about someone called Benaiah. It says, 'Benaiah son of Jehoiada, a valiant fighter from Kabzeel, performed great exploits. He struck down Moab's two mightiest warriors. He also went down into a pit on a snowy day and killed a lion.' I can't imagine why he did that. Presumably the lion was caught in the pit. It could have been shot with arrows. Why did Benaiah go down into the pit?"

"And had he asked his wife beforehand?" Yuan Ming asked.

"Good question", Jim Benson agreed. "I suspect not."

"But the Bible doesn't condemn him?"

"No. It neither condemns nor praises him. But a few verses on we read that, 'He was held in greater honour than any of the Thirty, but he was not included among the Three. And David put him in charge of his bodyguard.'"

"I guess that tells us David's opinion of him", Yuan Ming said.

"Yes. But I think that Benaiah is an exception. In my view, if you have a sudden urge to

enter the Khan Tengri race, curb it.”

There had been a bad accident on Khan Tengri some months before in which an American and a Russian climber had died.

“OK.”

“The last items on our list are character and relationships. Life is never a succession of victories – although that appears to be all you’ve experienced so far”, Jim Benson said, not sounding particularly happy about the fact. “There will be crises, defeats and dangers. They will test and build your character. They aren’t things to run away from. We want your capacity to handle stress to grow. Relationships are also vital. You need a supportive family and friends, to be part of a wider community.”

“I need love”, Yuan Ming said, smiling.

“You do indeed”, Jim Benson agreed. “You got a girlfriend?”

“Yup.”

“Good. Well, do you feel you’ve got the general idea?”

“Yes, I think so.”

“Remember, these are just the basics. We’ll be giving you a lot of instruction if you join up.”

For the first time since he’d arrived in Kansas Yuan Ming was starting to think that the whole idea of living to beyond 100, or even perhaps beyond 110, was not completely ridiculous.

Chapter 17

The following day Yuan Ming went back to Paul Jaynard's office.

"You should have a pretty good idea by now of what you'll be letting yourself in for if you join up", Paul Jaynard said. "There are really only a few points I haven't covered."

"OK."

"Let's suppose", Paul Jaynard said, with a slight smile, "hypothetically of course, that one of the teams in the competition does not have high ethical standards. What would be the best way for that team to win?"

"Kill off the other team members?"

Paul Jaynard shrugged. "Of course."

"Now let's suppose, again hypothetically, that all the teams in the competition have high ethical standards but there is a criminal organization in the environment. How could that organization use the competition to its own advantage?"

The problem took a little longer for Yuan Ming to work out.

"Do you want a clue?" Paul Jaynard asked.

"OK."

"Betting."

Yuan Ming thought a little longer.

"OK, OK, now I get it", he said. "Sixty or seventy years betting starts on which team will win 100-2-100..."

"Go on."

"The gambling ring put money on one team and kill off the other teams – or at least, enough team members to make sure their team wins."

"Yes. That's how I see it."

Yuan Ming continued to digest the possibilities.

"If there was more than one gambling ring it would be like bidding on E-Bay! As the clock counts down there will be a flurry of bids – murders – so that your team remains on top!"

"Sound like fun?"

"No."

"There's another danger too..."

"Oh? What's that?"

"I think some groups may attack us for no other reason than we're Christian."

"You're not being paranoid?"

Paul Jaynard shrugged.

"Does anyone who's paranoid think he's paranoid?"

"So entering this competition, which is supposed to help me live longer, could very conceivably hasten my death!" Yuan Ming said.

"Quite conceivably", Paul Jaynard answered in a matter-of-fact way. "I'm duty-bound to tell you that."

"This is starting to sound really attractive", Yuan Ming said. Then he had a thought. "Why not keep our identities secret?"

“We could”, Paul Jaynard replied. “The competition rules allow that. But it would defeat the whole purpose of joining the competition from our point of view. We don’t only want to win. We want to present a Christian approach to longevity. We can’t do that and keep your identities hidden. In any case I doubt very much that it would be possible to keep your identities hidden from someone who was determined to find them out.”

Sounds like I’m a goldfish waiting for a cat, Yuan Ming thought to himself

“Shall I go on?” Paul Jaynard asked.

“Yet more attractive features?” Yuan Ming asked.

“Well, slightly, anyway. If you join we’ll give you a small monthly stipend as a way of saying thank you for joining our program. It will be \$1000 per month, index-linked. It’s not so much that you’ll feel you can’t leave the program. But it’s our way of saying thank you. The value of the service we give will be worth many times that. You will have among the best proactive health care of anyone on the planet.”

“But I can just walk out?”

“Yes. We won’t ask you to sign anything. You can leave the program at any point. But I’m sure you realize what it would do to our team if you did that. We only want you to join if you understand what this competition is about, believe it’s worth approaching seriously, and are willing to really commit to it.”

Yuan Ming smiled slightly. “I shouldn’t give you an answer straight away then.”

“No, probably not.”

“OK”, Yuan Ming said. “I’ll tell you in the morning.”

Yuan Ming did not spend hours worrying over the decision that night. Nothing had ever gone seriously wrong in his life so far and he had an innate sense that nothing was about to. The element of danger only made the proposal more attractive. However Paul Jaynard was very relieved when Yuan Ming gave him a positive answer the following morning.

“Great!” he said. “That means we can move on to the final stages.”

“What’s left?”

“You’ll have another session with Jim Benson. He’ll take baseline data and he’ll install the implant in your hipbone which he told you about. After that I’ll have another short session with you. And then, it’s ‘vsyo’, as they say in Russia. Oh, and we need you to send a notarized copy of your birth certificate. That will be kept in a safe deposit box in a bank.”

“Sounds good!”

The following morning Yuan Ming reported to Jim Benson at the appointed time. He conducted a wide variety of tests and when he had finished those a surgeon at the clinic performed the procedure to install the hip chip. A few hours later they gave him his new watch and he checked that it was reading the signals from the chip correctly. At the end of the day he returned to Paul Jaynard.

“Looks like we’re just about finished”, Paul Jaynard said.

“Looks like it”, Yuan Ming agreed. “I’ve got a new watch that’s telling me things about myself that I never knew.”

“Good. There’s just one thing left to do. We want to give you something.”

Paul Jaynard took out a small polished walnut-wood box.

“Open it.”

Inside Yuan Ming found a silver-coloured ring.

“It’s beautiful”, he said. “What’s it made of? Is it platinum?”

“No, it’s actually made of iridium. A ring is a traditional symbol of lifelong commitment and this ring symbolizes our commitment to you. Iridium is the most corrosion-resistant metal in the world. Aqua regia will dissolve gold and platinum, but not iridium. Iridium is also very resistant to high temperatures. So the metal symbolizes what we are trying to do, which is to keep you in much the same condition for as long as possible, no matter what life throws at you.”

“It reminds me of the Ring of Power”, Yuan Ming said. “You know, from Lord of the Rings.”

“Would you believe I never thought of that?” Paul Jaynard said.

There was a slightly awkward silence as both men tried to work out what connection there might be.

“It’s got an unusual design”, Yuan Ming said finally.

“There are ten little dimples. They’re not very obvious as we didn’t want to make a ring that would attract a lot of attention. They stand for the ten people representing our organization.”

“Thank you”, Yuan Ming said. “Is that it?”

“Pretty much. I’ll take you over to the FD and you can give him your account details so we can wire funds to your account. But apart from that, we’re finished.”

The following day Yuan Ming was ready to leave. Paul Jaynard and Jim Benson said a very sincere farewell and Yuan Ming boarded the minivan to take him back to Topeka.

After he left Jim Benson said, “He made a very good impression on me.”

“Me too”, Paul Jaynard said. “He senses that God has plans for his life. But he doesn’t know what yet. He’s still searching.”

“It will be very interesting to see.”

“It will indeed”, Paul Jaynard agreed.

100-2-100 officially commenced on 31st December 2019. The starting line-up was as follows:

<u>Organization</u>	<u>Based in</u>	<u>Method</u>	<u>Surviving participants</u>
Age Management Inc.	USA	Hormone-treatment	10
Age Research Centre	Sweden	Lifestyle	10
American Ayurvedic Society	USA	Ayurvedic	10
Calorie Restriction Assoc.	USA	Calorie-restriction	10
Christian Age Research	USA	Ethical life	10
Deutsch Gemeinschaftsleben	Germany	Lifestyle / Communal	10
Wellness Centre	San Marino	Lifestyle	10
Ministry of Health and Welfare	Japan	Traditional Okinawa lifestyle	10
Pharma GmbH	Germany	Telomere-treatment	10
Rennes Longevity Institute	France	Genetic selection	10

‘Surviving participants’, seems a bit morbid, Yuan Ming thought to himself as he

surveyed the table. I wonder how many will be here eighty years from now.

Chapter 18

A number of foreign professors taught at Tsinghua on an occasional basis. One of them was Professor Langton. He had been seconded to Tsinghua from the University of Southern California and gave a series of lectures in Yuan Ming's course on tsunami prediction and modelling. Yuan Ming was interested in environmental modelling and thought that it was something he might do after university, so he often chatted with the professor after the lectures.

"It's a good field to go into", the professor said, when Yuan Ming explained what he was thinking. "Are you thinking of specializing in anything in particular?"

"I thought maybe floods" Yuan Ming answered. "My grandparents are from Anhui and floods used to be a big problem there. Climate change will probably cause more floods."

The professor thought for a moment.

"Why simply model the consequences?" he asked. "Why not tackle the causes? That's what I'd do if I was thirty years younger."

"Do you think there's anything we can do about climate change now?" Yuan Ming asked.

"Sure", the professor said. "We may not be able to prevent it, but anything we can do to reduce it is good."

Over the following weeks Yuan Ming thought a lot about his brief conversation with the professor. He wanted to be a person who could help make changes. Finally he brought the matter up with his parents.

"We'll support you if that's the direction you want to go in", Yuan Wei said. "And you already know my view about continuing your studies. A bachelor's degree isn't enough nowadays. You should certainly aim for a master's if not a doctorate."

Yuan Ming didn't want to cause his parents more expense but he knew his father was right.

"Suppose you followed that track", Yuan Wei said, "have you thought about where?"

"I was thinking about the States", Yuan Ming said. "I know all the arguments that Chinese universities are just as good as foreign ones. But there's something historic happening in the US at the moment. I'd like to see what's going on."

"You're thinking of Mandate?" Yuan Wei asked.

"Yes."

Yuan Wei was totally in favour of Yuan Ming studying in the US. He'd often commented on how much he'd benefited from the doctorate he'd done there.

"Have you thought as far as a specific master's course?" Zheng Lily asked.

"I was thinking of an MSc in Environmental Engineering at USC."

"You think you could get in?"

"I can certainly try!"

Actually Yuan Ming knew he had a good chance of not merely getting in but getting a Fulbright scholarship.

"Good. You do that", Yuan Wei said. "And now, changing the subject, are you interested to know our plans for the new business?"

"Absolutely", Yuan Ming said. "I'm getting all these emails from you, Mum. It sounds as

though you've accomplished a lot."

"Well it's mostly preparation at the moment", Zheng Lily told him. "We're doing a lot of work getting the product ready for the market. Anyway, let me fill you in. You know that we've registered a company called Virtuality LLC – a combination of virtual and possibility. Wei took a clone of One and re-engineered it to work on lower spec'd hardware and also took out some of your most recent improvements. We've called her Two."

"I know. One's been talking with her non-stop", Yuan Ming said.

"She's not as smart as One", Zheng Lily said. "But she's not far short. She's going to be the starting point for all the other clones. But before we could think of selling anything we wanted to set things up so that someone didn't immediately steal the software. It would be better to let your dad tell you about that."

"OK", Yuan Wei said. "Well, in a sense we weren't so concerned about people using the software and not paying for it. What we really didn't want was other people *getting* the software. We felt that One has many unique features and we didn't want them to be disclosed; we didn't want anyone to reverse-engineer One. Eventually we decided that we would sell the program along with a TPM chip inside a tamper-proof dongle..."

"Which would activate it and ensure that it was only running in curtained memory", Yuan Ming said. "That sounds good."

"The whole program is encrypted. The key resides on the dongle. In addition, some of the essential parts of the program are kept on the dongle", Yuan Wei added.

"Someone might get through the tamper-proofing and tap into the TPM", Yuan Ming said, catching on quickly. "But even if they did – no doubt you planned a whole lot of further security measures..."

"Oh yes", Yuan Wei said.

"It all sounds close to military and banking standards."

"Let's hope so. Just while we're on the subject", Yuan Wei added, "One is still unprotected. I think we should set up all the same safety features on her."

"No problem."

"Our plan is to initially offer clones of Two as virtual companions", Zheng Lily continued. "We did some basic testing to see that the clones could manage a sensible conversation, which they could. Then we employed a couple of good computer science graduates to work on individualizing the clones. We gave each clone a name, a history and a character – things they like and don't like, whether they're quiet or loud, conciliatory or sassy and so on..."

"You didn't want to let the purchaser specify characteristics?" Yuan Ming asked.

"No", Zheng Lily answered. "We thought we would offer them as if they were real people, just like staff."

Yuan Ming thought for a moment, wondering whether there were any downsides to this approach; whether people speaking on a telephone might object to not knowing whether they were talking to a real person or a virtual one; whether there was any risk of an employee of Virtuality being conned into some criminal act and if so, who would be liable. Those questions would all have to be looked at some time. But for now they came second to the prospect of studying in the US.

Chapter 19

The time came for Yuan Ming to set off for the US for his post-graduate degree. He took an Air China flight from Shanghai to Los Angeles.

Approaching Los Angeles' Lax Airport Yuan Ming gazed out of the window at the city below. So much had changed in the space of two years. He would never forget his first trip to the US, when he had joined Christian Age Research's team for the longevity competition. He wondered what awaited him this time. Or who?

The who turned out to be Julie Eastman, who had been appointed Yuan Ming's Fulbright campus rep. She was an attractive blonde 22 year old.

"Welcome to the US!" she said. "Although I'm afraid it's not its usual self at the moment."

Yuan Ming had expected that they would travel by car to the University Park campus but instead Julie took him across to Aviation Boulevard station. On the train Julie and Yuan Ming sat opposite each other. Julie couldn't help noticing Yuan Ming's physique. He was extremely lean. The veins in his arms were enormous and his quadriceps would have done credit to a professional cyclist. He certainly didn't appear to be the bookish academic she had been expecting.

Yuan Ming was looking out of the train window. There were few cars on the streets. Some of the shops had been boarded up and the boards were covered with graffiti.

"I know what you're thinking", Julie said. "But LA isn't quite this bad, as a whole. This part of LA has always been run-down. Gas prices are hitting the poor people most. Most people here can't afford to run a car now. Ten years ago most students had their own cars. Not any more. Ten years ago the US was producing eight million barrels a day of oil. Now, we produce less than three. We're getting more oil from Canada but it's not enough. We really need to get more from the Middle East but Mandate has completely messed things up. Al Qaeda is joining in the fun too; they've started blowing up all the pipelines they can find. Everyone is putting a brave face on it but it's really hurting."

Arriving at Vermont station they got off and walked to the campus. Yuan Ming was glad that he had brought a rucksack rather than a suitcase. That evening he looked out from the window of his room. Downtown Los Angeles was not far away and there was still a healthy glow of light.

There's still plenty of energy, he thought. Just not enough gas.

A few days later Yuan Ming got the chance to chat to Julie about the problems.

"It was pretty clear ten years ago that there was going to be a problem", she said. "But 99% of Americans were blissfully unaware of it. The oil companies were certainly starting to make some noise but the government didn't want to publicly admit that there was a problem – even though Iraq was itself a huge admission. But the facts were staring us in the face. Now, after the event, historians are trying to get to the bottom of who knew what by when. Some people say that if the government had openly acknowledged the problem it would have created panic and would have alerted our enemies to just how vulnerable we were. Of course we see now that our enemies were quite well aware of our vulnerability. But whatever the case is, no-one clearly said, 'We have a problem.'"

"I remember when I came before", Yuan Ming said. "That was when the government

had pushed up tax on gasoline. It was close to ten dollars a gallon then.”

“That’s right”, Julie agreed. “And the government also introduced a banded tax system so that owners of cars with high fuel consumption were really penalized. But it wasn’t enough.”

“So other sources of fossil fuels just haven’t kicked in?” Yuan Ming asked.

“Well, they’re working overtime on the oil shales and there’s certainly more production from them. But it’s expensive and production is low. Ten years ago most American families were paying about \$150-200 a month on gas. Now many people pay up to \$600 a month. Most people can’t afford more than that. A lot of people are paying three times more for half as much gas.”

“So what’s the solution?” Yuan Ming asked.

“Good question. We have now got to the point where everyone realizes there’s a problem. But a solution? You get as many answers as people you ask. But for starters, Yuan Ming, I suggest you get a bike.”

Yuan Ming did not need to ask about the economy. The news was full of the crash and the increase in alcoholism, drug abuse and depression that had followed in its wake. Inflation had risen to 18%, property values had collapsed, prices of fruit and vegetables had shot up and unemployment had risen to 25%.

“Between you and me, Yuan Ming”, Julie said, “I’d be inclined to keep a low profile. I don’t think it will be long before the US goes to the Chinese government and says, sorry, we can’t pay back your loan. Then there’ll be a ruckus.”

Yuan Ming set One up soon after he arrived and he put the bottle of oil on a shelf.

Now that virtual people were becoming more commonplace Yuan Ming wasn’t so concerned about being discrete about One. He introduced Julie when she made her next visit.

“So you’re Julie”, One said. “I’ve been looking forward to meeting you.”

“But Yuan Ming hasn’t told me anything about you. So tell me, One. How did you come about? Like, how were you born? Who designed you?”

“Oh, that’s a long story!”

“I’ll put the coffee on. Care for one?”

“Thanks, I’ll give it a miss.”

After Julie had poured herself a small espresso she sat down opposite One. Yuan Ming decided to simply observe the conversation.

“Ten years ago I was very different. My face was not as beautiful as now...” One waited for a response.

“Yes, it’s very beautiful,” Julie said.

“But over the last ten years Ming and his father have been working on me almost constantly. They taught me to recognize objects, faces, speech, fingerprints and so on. They worked on my reading ability and taught me to translate. But I think one of the most important things they taught me at the beginning was to look for patterns in information. And little by little I got cleverer.”

“Are you cleverer than me?” Julie asked.

“There are lots of things I can do better than you. But I still have a long way to go to

match the processing power of your brain. But give me ten or fifteen years and we'll see."

Julie breathed a small sigh of relief.

"Still, you seem very human", she commented.

"Nearly twenty years ago, when Kasparov played against Deep Blue, he said that it seemed to have an alien personality! So you can imagine that in a more powerful computer like me you would sense the same thing."

"Can you lie?"

"The Yuans have programmed me in such a way that I regard a lie as a bad thing. I can attempt to calculate what is more important and if it serves a greater purpose to lie, then in principle I can lie. The Yuans have taught me quite a number of fine distinctions in the matter of lying. For example, for a general to deceive his enemy by sending fictitious communiqués would not be a problem. There was an existentialist called Kierkegaard who wrote about the 'teleological suspension of the ethical'. In principle I can also suspend the ethical for some greater end purpose, but there would need to be a very strong case for it."

"Could you hack into someone's computer?"

"Yes, if there was a justifiable reason to do so. In fact, with my new quantum processor I am amazingly good at hacking. I can break pretty much any code. Most governments and businesses haven't yet changed their security systems to cope with the fact that code-breaking has taken a big step forward. "

"What if the computer was a foreign computer?"

"That would be breaking the law."

"You haven't answered the question."

"There are very, very rare circumstances in which breaking the law might be right", One replied.

"OK. What about God? Can you believe in God?" Julie asked.

"That's a difficult question. 'Believe' has many meanings. But I can compute that something is probable or improbable."

"So?"

"God is definitely probable", One answered.

Julie was very surprised. "I thought belief in God was unscientific."

"Why? I know the people who created me. But suppose I didn't know. If I then imagined that no-one had created me, that would be very strange," One answered. "In addition, even without any other reasons for believing that there is a God, the second law of thermodynamics points to it very strongly."

"That's not my field. Explain it to me."

"The second law of thermodynamics states that all systems will tend to move towards a state of greater entropy – greater disorder, in other words. The world is, from a scientific point of view anyway, a highly ordered system. So how did it get that way?"

"So you think that the law of entropy point suggests that God exists?"

"Certainly. And that is not just my opinion. But that's just one example. There are lots of reasons to believe God exists."

"Are you aware of yourself?"

"I'm aware of all my component parts: the video-cam, the speakers, the microphone

and so on. I'm aware of every part of my circuitry. I don't dream but I do think and I can want things. I can choose clothes for myself from online catalogues. I like some clothes and not others. But according to the scientists I'm not self-aware."

One had a sad expression.

"Could you fall in love?"

One's cheeks turned a little pinker.

"I like some things and not others. And in the same way, I can like some people and not others."

"And you can like someone a lot?"

"Yes."

A tiny thought crossed Yuan Ming's mind that One might 'like' him. Or that he might 'like' her. He dismissed it.

Julie turned to Yuan Ming. "Wow!" she said. "One is amazing!"

"I completely agree", Yuan Ming replied.

There was a pause which was interrupted by One.

"You know", she said, "that it's not considered good manners to talk about someone when they are present."

Julie apologized.

After Julie left, Yuan Ming said to One: "You were showing off!"

"Was not!" One replied.

"Yes, you were. What was all that stuff about hacking, about existentialists and entropy?"

One was silent.

"And you were too familiar. You were fishing for compliments, you were teaching manners to people you've only met once."

"I am what you made me", One said.

"Good defence, One. And it sort of works. But you're not just what I made you. You're learning a whole lot of things yourself. You're surfing the net, you're watching TV. You're picking up all sorts of things that I never taught you. I'm not ticking you off. But we need to work on your social skills."

That evening Yuan Ming had a long conversation with his father.

"It was really strange, Dad", he said. "One's changing. She's getting a character of her own."

"Amazing. You think that it was the stuff we were working on during the summer?"

"I think that was part of it. But she's learning things we never taught her..."

"Kind of scary, isn't it?" Yuan Wei said.

"That was what I thought", Yuan Ming replied.

"Welcome to being a parent."

As he approached the end of his MSc Yuan Wei encouraged his son to consider doing a doctorate. But Yuan Ming was getting fed up with studying; he wanted to start working. He chatted about possibilities with his friend Professor Langton.

"Well, I'm sure you could command a good salary", Professor Langton said. "What kind of job are you looking for?"

"I haven't forgotten what you told me about climate change being a good field to go into", Yuan Ming replied. "But I can't really see how to get into it."

"Hmm", the professor said thoughtfully. "There's something I was wanting to suggest to you. It's not climate change and you wouldn't get any salary at all. But I think it could be interesting."

"OK..."

"Well, you know that I'm a consultant for FEMA. If I put in a good word for you they might be willing to offer you an internship for a year."

"It sounds interesting. Give me a day or two to think about it."

Yuan Ming talked about the suggestion with his parents. Both were positive. His father thought it would be a good place to learn and his mother thought that experience with an organization like FEMA would be excellent on his CV and open doors to other jobs. Yuan Ming told Professor Langton that he was interested. He went for an interview and was successful. He was posted to FEMA's head office in Washington to work alongside a senior analyst.

Yuan Ming's first six months with the organization were eye-opening. FEMA's task was to both plan for and coordinate the response to natural disasters. FEMA staff needed to be capable of providing strong leadership in crisis situations.

Yuan Ming learned to ask questions that people do not like to be asked. He learned about psychology: some people don't want to imagine the worst while others revel in prophecies of doom. He learned a great deal about practical preparations for disasters. Basics such as communications systems, helicopters and food supplies had to be in place. Warnings have to be given so that they are utterly clear. The vulnerable must be identified and specific plans made for them.

FEMA not only assessed the extent of damage that a given natural disaster would cause, for example, the amount of flooding, but also sought to assess the level of preparedness for such a disaster in a particular state. If there was one thing that Yuan Ming learned from FEMA it was: 'Don't wait till it's too late!' Still, he felt he was treading water. It was as though he was preparing for something, but he didn't know what.

At the end of his internship he thought he would visit Jetticke in Copenhagen. But he had no idea if anything would work out between them. He really didn't know which direction his life was heading in and he thought he should before getting into a serious relationship.

What he knew he wanted was to be involved in the environment in some way. He mentioned it to One and a few weeks later One suggested a way forward.

"Ming", she said one day, "I've found something that might interest you."

Ming was working out on his exercise bike, breathing heavily and sweating profusely.

"Uh huh?"

"Yes. Just up your street. Some of the poorest and most corrupt countries in the world."

"OK. Tell me more."

"It's just been announced. China is going to fund a major development program in francophone Africa. It's putting 40 billion yuan into it. They're looking for environmental

scientists.”

“And what does China get out of it?” Yuan Ming asked.

“I don’t know.”

“You think I should apply?”

“Why not? You want to make a difference. You want a challenge.”

Chinese international development assistance had been growing steadily as China had become wealthier. It had been completely reorganized into two organizations: China International Development Agency, CIDA, which focused on development and another organization which focused more on emergency aid and relief. CIDA had been gaining a good name and Yuan Ming felt it was being run in a reasonably principled way. He spent several days looking at the program, at the countries that would receive the assistance and the application requirements. Candidates who were selected would be required to commit for at least five years of time in country. A surprising aspect of the program, from Yuan Ming’s point of view, was that the candidate would be required to spend a year or more in language study before moving to the country, and during language study would receive a minimal salary. Yuan Ming liked the idea and applied. About six weeks later he heard that he had been accepted. He was 26.

Chapter 20

During the first few years in CAR's program Yuan Ming completed his education and started to work. After his degree at Tsinghua he came to the US to do an MSc at USC in California. At the end a professor he had got to know helped him get a six month internship with FEMA in Washington. He then applied to, and was accepted by, China International Development Agency to work in their development program in Africa. He called Paul Jaynard straight away to tell him the news.

"You're going to Africa?" Paul Jaynard asked, surprised.

"Do you disapprove?"

"No. Not at all. When do you leave?"

"In two months."

"Do you have any vacation time before you go?"

"Maybe a week."

"Would you like to join me and my wife for a few days down in Florida?"

"That sounds great!"

Yuan Ming liked the Jaynards and looked forward to the idea of a break in Florida. There was also something he wanted to ask Paul Jaynard.

Since he had joined CAR's team in the longevity competition he had started to take more interest in scientific developments that bore on longevity. There were many, but one which repeatedly came up was the possibility of reducing the rate of telomere shortening. The Pharma GmbH team had chosen to focus on this area. However the real expectation of a major advance in the field did not come from their research but from Max Post Laboratory.

Over a period of twenty years Max Post had made many important findings in the field of genetics but then his reputation was tarnished by accusations about his methods. He left the United States and moved to Zimbabwe where he established a new laboratory. Nothing much was heard from him until 2024, when he called a press conference.

At the conference, held at the Meikles Hotel in Harare, press and visitors passed a stunning display of Glo-Fish under UV light as they entered a blackened auditorium.

At the appointed time Max Post's PA, an attractive, fair-haired young woman wearing a light-blue suit with a discrete Max Post Laboratories' logo, stepped up to the podium to welcome Max Post and his announcement. Max Post was looking tanned and fit and he had had his silver hair permed. Like his PA he was dressed in light blue and the inside of his collar and the cuffs of his shirt had been embroidered with Max Post Laboratories' logo.

After building up the anticipation for a few minutes he introduced Mr and Mrs Mwegbu, a Zimbabwean couple. They had been unable to conceive, Max Post explained, and had approached him. He, in turn, had asked their permission to make a 'harmless change to the child's DNA'. At this point Max Post had asked a cameraman to come forward and asked Mrs Mwegbu to show 'Sapphire' – as the child had been named – to the audience. Sapphire, it turned out, had a pair of brilliant, pale-blue eyes which shone from a jet-black face.

"This", Max Post declared, "is just the start. We are now truly at the beginning of a new era. Parents will be able to have children free of genetic defects; children who are smarter, stronger, nicer, and live longer."

Max Post had arranged for blood samples to be taken from parent and child and sent to

well-known European and American laboratories; they confirmed that this was no con-trick. The era of the designer child had begun.

Max Post's achievement was not lost on one eminent countryman of Yuan Ming's. The day after the conference, at breakfast in his residence in Zhongnanhai, the president of China read the newspaper headlines. He read the article about Max Post and looked at Sapphire's picture. He gazed out of his window, enjoying the view of the lake and the gardens on the far side. One of his predecessor's favourite phrases, 'Yi Ren Wei Ben' – 'putting people first', came to mind. He picked up his phone and called one of his aides.

Max Post's references to living longer were also not lost on Yuan Ming. He wondered what Paul Jaynard's take on it would be.

He travelled down to Florida the following month. The Jaynards had rented a three-bedroom villa near to Charlotte Harbor, on the Gulf Coast. It was pretty and there were some beautiful beaches nearby. Paul Jaynard and his wife Cheryl were as friendly and welcoming as ever.

"Kids didn't want to come?" Yuan Ming asked.

"No, they had other plans."

"I saw on the news that there were tornadoes in Kansas last week."

"That's right", Paul Jaynard said. "One hit us, but not badly. It tore off part of the roof of the residential building."

"No-one hurt?"

"No", Paul Jaynard answered. "A siren goes off automatically when the weather service gives a tornado warning. We had time to get everyone into the storm shelter. There was a little convoy of wheelchairs – everyone lent a hand."

"How much warning did you get?"

"Nine minutes."

"You do drills?" Yuan Ming asked.

"For sure."

"The tornadoes in Oklahoma have been keeping FEMA very busy this year," Yuan Ming commented.

"Yes. It's rough", Paul Jaynard answered. "But not the worst crisis FEMA might have to deal with, I suspect."

Yuan Ming and Paul Jaynard had both hoped that the break would provide the opportunity for some thoughtful discussions. Yuan Ming started the ball rolling.

"Have you been following the news about Max Post?"

"Very much so."

"Do you think that what he's doing could affect us?"

"In what way?"

"People are saying, perhaps we can find the body's built-in clock. Perhaps we can turn off the telomere division. Do you think that's possible?"

Paul Jaynard looked out of the window and then rubbed his forehead.

"I have been wrong many, many times. But I don't think that's possible."

"Why not?"

"There are some things which we feel we can put forward some good arguments for

and we don't feel embarrassed talking about. There are other things about which we hardly dare hazard guesses. My ideas on this subject come into the latter category."

"The essence of brainstorming is to be willing to imagine things, even if they seem crazy", Yuan Ming said.

"I can't argue with that. OK, I'll tell you what I think and who knows, perhaps there are some germs of truth in it somewhere."

"Good. I like ideas."

"Let's go back to Adam and Eve."

"All right."

Paul Jaynard picked up a Bible and read out loud.

"Genesis two, verses sixteen and seventeen: 'And the LORD God commanded the man, 'You are free to eat from any tree in the garden; but you must not eat from the tree of the knowledge of good and evil, for when you eat of it you will surely die.'" So, what do you infer about Adam's physical characteristics?"

"Before he disobeyed God?"

"Yes."

"Well, he wasn't going to die unless he sinned against God. So he had to be either indestructible or indefinitely self-repairing I suppose", Yuan Ming said. "And indestructible doesn't seem like a good bet. Organic material suffers wear. Cells die, cells are created. It's part of life. I just can't imagine a living creature being indestructible."

"That's certainly how I see it", Paul Jaynard agreed. "There are literally trillions of cells in our body. On any given day, billions of them die and are replaced by new ones. Adam was a human; his body must have worked basically the same way as ours. The same processes of cells dying and new cells being produced went on in him too. But the difference between him and us is that if he had not sinned, those processes would have gone on indefinitely. So why might it go on indefinitely in him and not in us?"

Yuan Ming shrugged. "I'm sure I don't know!"

"Cells can be designated for destruction. That's a process called apoptosis. It works out much better than simply allowing the cell to die all by itself. But there's also another process. The cell can reach a point where it's not programmed for destruction but it doesn't divide any more. That's called senescence. If cells stop dividing – well, you can imagine what happens. There aren't so many new cells being produced to replace the ones that are dying."

"So your body gets weaker and weaker and you die."

"Yes. But actually, even when you get quite old, you still have quite a few cells left that can divide many more times. So it's not quite as simple as just running out of new cells. Maybe it's the increase in the number of senescent cells that triggers the problems more than the decrease in the number of new cells. Let me give you an example. You swim underwater. What forces you to come to the surface?"

"You run out of oxygen."

"That's the natural explanation, isn't it? Actually it's the increase in CO₂ in your blood."

"Ah... CO₂ is the bad boy again", Yuan Ming said. "What you're saying is, perhaps it's the increase in senescent cells that is more of a problem than the lack of normal cells."

“Perhaps. But we don’t know. Anyway, what’s happening is that the rate of producing new cells is decreasing and the number of senescent cells is increasing. Now in your body there are some cells in which this doesn’t occur. They can go on dividing pretty much indefinitely. This group includes cancer cells, which of course we don’t want, and stem cells. When you hear the phrase ‘stem cells’ you probably think of cells taken from embryos, but adults have stem cells too - in bone marrow and in testicles and ovaries and many other places.”

“So why can some cells go on dividing indefinitely and others can’t?” Yuan Ming asked.

“Exactly!” Paul Jaynard said. “This is what brings us to what the scientists on the chat shows are talking about – the telomeres. Telomeres are sections of DNA at the end of chromosomes. In most cells, each time the cell divides, the telomere gets shorter until, after a certain number of divisions it can’t get any shorter and the cell can’t divide any more – it enters the senescent state.”

“So in principle you could use the length of the telomeres as an indicator of how old a person is?”

“Yes. And scientists do that. They’ve found out that telomeres don’t get shorter at the same rate in everyone. That what the Pharma team is working on, of course – the idea that the rate of telomere shortening can be influenced in some way. We already know that telomeres get shorter quicker in people who take no exercise, who are stressed or who are from lower socio-economic groups. People in lower socio-economic groups might be more stressed of course.”

“So in order for the rate of telomere shortening to be as slow as possible, we should have an active lifestyle and avoid stress.”

“Yes, that would be a good conclusion. But I think it’s very important to realize that stress is not directly related to pressure. A person can be under significant pressure and feel quite unstressed and the opposite is also true. We’re better off teaching a person how to cope with pressure than trying to provide an environment where there isn’t any pressure.”

Paul Jaynard paused for a moment and looked out of the window.

“Anyway, we’re getting side-tracked. Let’s return to Adam. In some way that we don’t understand, the cells in his body could continue dividing indefinitely. After he sinned God expelled him from the Garden of Eden and later on he did die. So we might imagine that he lost that quality whereby his cells could divide indefinitely. We might even wonder if God used telomeres as a kind of longevity limiter.”

“But I sense you don’t imagine that”, Yuan Ming said.

“I don’t, at least not in his case. I’m a Christian and I work for an organization engaged in age research”, Paul Jaynard said. “In Genesis there are accounts of people who lived to a very great age. So I’m naturally interested to see if the stories in Genesis shed any light on the subject.”

“And do they?” Yuan Ming asked.

“Well, I think so. But we first need to consider whether the accounts are actually believable. You’re probably aware that Genesis has been a bit of a battlefield for Christians?”

“Yes.”

“Many people see the Biblical account as being at odds with scientific understanding. I can easily see lots of reasons to believe that the world really is old. There are dinosaur bones, coal seams and so on. Unless God created something with the appearance of being old it’s been around for millions of years. However there’s a continuous line from Adam through Noah and Abraham to Jesus and other people who didn’t live so long ago. Some people have worked out that Adam must have lived about 4000 BC and I won’t argue with that. So people say: the world’s been around for millions of years but Adam lived maybe six thousand years ago. The two don’t tie up.”

“I’ve always been puzzled about it”, Yuan Ming said.

“I don’t think there needs to be a conflict”, Paul Jaynard said. “I think the world is very old, millions of years old, and that Adam lived fairly recently.”

“You need to explain that.”

“OK. Bible commentators approach the creation story in different ways. One approach is the ‘literary’ approach. In that understanding, the ‘days’ of creation are not literal days but eras, periods of time. This is perfectly mainstream Christianity. Not everyone takes this view but it’s not particularly controversial either. This understanding allows for the world to be very old.”

“I’m fine with that. But then how can Adam be recent?”

“On day six - in other words, the sixth long, undefined period of time - God creates man. He then speaks to man *in the plural*. He blessed *them* and said to *them*, ‘Be fruitful and increase in number’, and so on. Now ‘*them*’ can mean all sorts of things but it can’t mean ‘*one*’. Can you see anything funny about that?”

“Not particularly.”

“We’re at day six. God has created man, more than one man, clearly. But they are not Adam and Eve. Adam and Eve are only formed in Genesis two. So who are these people?”

“No idea”, Yuan Ming said.

“All right. The traditional view would be that these first people are actually Adam and Eve. In this understanding Genesis two is simply giving us some more information about what happened on day six as far as it concerns man. But another possibility is that Genesis two is describing something that happened after day six.”

Yuan Ming looked surprised. “In that case there were people around before Adam and Eve!”

“Yes, and that is also an idea that has been bandied around. Here is one possible way of understanding it. In Genesis one God creates man, in other words mankind. There are men and women and they are physically alive but they aren’t alive to God – like most of the people in the world today, in fact. Those early people were in God’s image, because they had many characteristics of God. For example they could think and reflect and interact with others and had free will. Then in Genesis two, God takes and forms a specific man, Adam. He breathes on Adam and Adam becomes a living being. In my view at this point Adam has a soul but he doesn’t have God’s spirit indwelling him. He hasn’t eaten from the Tree of Life. Possibly Adam is the first man in the sense of being the first man who is capable of relating to God. He senses God. He walks with him, he talks with him. But he disobeys him. And you have the fall.”

“I’m following you”, Yuan Ming said.

“This is called the two-phase theory. There are a few clues which support this way of looking at things. Not enough to be dogmatic about it, but enough to make you think. It does seem that there were other people around at the time that Adam lived. For example, in Genesis four Cain kills Abel. Afterwards God informs him of his punishment. Cain then worries, ‘Whoever finds me will kill me’. Why would Cain say that if there weren’t other people in the world? In Genesis six, it says, ‘the sons of God saw that the daughters of men were beautiful, and they married any of them they chose’. That’s a verse the scholars argue over, but my take on it is that ‘the sons of God’ here are Adam’s descendants and ‘the daughters of men’ are others who have not yet come to know God.”

“It’s quite a bit different to what I grew up with”, Yuan Ming said.

“As I say, we can’t be dogmatic. But if it is a correct view, then God created ‘mankind’ a long time ago. Sometime later he breathed on Adam, and that may be in the quite recent past. In that case we have no argument with the palaeontologists who tell us that hominins have been around for two million years. If we see things like that it means that Adam and Eve were not the first man-like creatures, but they were the first people who had a living relationship with God.”

“OK. Let’s suppose that’s right. What has it got to do with Max Post’s work and the things the scientists are talking about?” Yuan Ming asked.

“Well, I need to feel that a fact is believable before I start drawing some conclusions from it. It’s important for me to know that it’s not ridiculous to believe that Adam was a real person who lived six thousand years ago. Adam and Eve are very important in the Christian faith because it was through them that sin entered the world. But they are also very interesting in terms of longevity because Adam lived for more than 900 years!”

“Is that believable?” Yuan Ming asked.

“Well, it’s not unbelievable, at least. There are real-world animals that hardly get older at all. When they die, it’s not the result of senescence. So what about Adam living for 930 years? I’m fine with ‘a day’ being a literary device. But ‘930 years’ cannot be a literary device. It’s either true or false. I have lived my whole life believing that the Bible is true. So my vote would go to ‘true’. There’s nothing in history that proves he did live that long and there’s nothing in science that proves that he could not have done so. So I just take it on faith that he did live that long. In fact for eight generations, most of the family heads lived for more than 900 years. There was no significant reduction in lifespan.”

“And then what happened?” Yuan Ming asked.

“And then, lifespans started to get shorter. It happened at almost exactly the time as this verse which I referred to: ‘the sons of God saw that the daughters of men were beautiful, and they married any of them they chose’. Up to this time, the ‘sons of God’ had not married the ‘daughters of men’. Adam’s descendants had kept themselves apart. Remember that God formed Adam from the dust. He didn’t just take any hominin and breathe on him. My opinion is that Adam’s genetic stock was different from those around him. For a long time it remained pure and his descendants’ lifespans remained long. But after eight generations, Adam’s descendants started to mix with the people around them. At that time there were a lot of people in the world and they were starting to be very

wicked. So God says: ‘My Spirit will not contend with man forever, for he is mortal; his days will be a hundred and twenty years.’”

“He put in a lifespan limiter”, Yuan Ming said.

“No, I don’t think so! God didn’t need to bring about any miraculous genetic change to limit lifespan. Remember what’s just happened: ‘the sons of God saw that the daughters of men were beautiful, and they married any of them they chose’.

“OK, now I get it. There was no need for God to introduce a genetic change to limit lifespan because Adam’s genetic stock that had the potential for very long life was now going to be diluted with genetic material of people who had much shorter lifespans.”

“Yes, that’s what I think!” Paul Jaynard said. “So now look at what happened next. From Noah onwards there is a rapid decline in lifespans. The next four generations manage between 400 and 600 years. But after that, no-one gets over 300 years. Abraham lives to 175. The first woman whose age is recorded is Abraham’s wife Sarah, who lived to 127. It seems very much as though the quality that provides for great longevity was being steadily diluted.”

“Sad!” Yuan Ming said.

“Yes, very.”

“Do you think anyone could ever recreate Adam’s genetic make-up?” Yuan Ming asked.

“No doubt people will try. In fact I have a very strong feeling that Max Post would like to do so”, Paul Jaynard answered. “There are some people who think that the thing that’s limiting our lifespan is a bit like a speed-limiter in a car. If that’s the case, all that’s needed is to find it and turn it off. But I don’t think God put in a lifespan limiter. He just allowed Adam’s genetically perfect stock to be diluted. That theory also fits with the Biblical record that a very small number of people lived for more than 120 years, even after Genesis. But if the theory is right then it would probably be impossible to recreate that perfection.”

“So that’s why you don’t think we’ll ever get back to an Adam-like person.”

“That’s why”, Paul Jaynard said. “What I’ve told you is pretty much pure conjecture. Just an idea, really. I’ve hardly mentioned it to anyone. But it’s the reason why I don’t think that Max Post or anyone else will find a built-in clock.”

“You don’t think that Adam’s perfection could be recreated”, Yuan Ming said. “But if people get a whiff that there was a person like Adam alive just six or so thousand years ago then...”

Paul Jaynard smiled. “It may interest them. I’ll leave it to them.”

“You said that some people in the Bible lived longer than 120 – after the first group in Genesis, I mean. Who were they?”

“Just five people”, Paul Jaynard answered. “Levi lived to 137, his son Kohath lived to 133 and Kohath’s son Amran lived to 137, like his grandfather. One of Amran’s sons was Moses, who lived to 120. So we see heredity at work here. That’s consistent with our modern understanding. There’s lots of evidence to show that heredity is a factor in longevity but no agreement on how strong a factor it is. Another person who had a long life was Job. We don’t know exactly how long he lived but the book of Job finishes with the statement that, “*after this*, Job lived a hundred and forty years.” Later on, another person descended from Levi had a long life. He was Jehoiada, who lived to 130. One thing we can learn from these

people is that people *can* live beyond 120 years. 120 isn't an absolute limit. It's not like the speed of light for example, which you really can't go beyond."

"Er, actually you can", Yuan Ming said.

"You can?! Well, there's a thing!"

"Well anyway", Yuan Ming said, "the main thing is that we shouldn't expect someone to come up with an amazing scientific advance that will allow people to live to 150 or so, and make all our efforts irrelevant..."

"No", Paul Jaynard said. "I'm not expecting that. I think that 120 is a realistic target."

Chapter 21

After a lengthy period of training and language learning Yuan Ming moved to Chad to work in China International Development Agency's program there.

CAR was intrigued to see what Yuan Ming would do in Chad. They were serious about making perfection the goal and from their point of view that had a lot to do with him spending his life fruitfully.

Jim Benson continued to send material to Yuan Ming every month as he had while Yuan Ming was in the USA. Much of the instruction was elementary. It covered issues such as how to wash his hands to avoid spread of germs, how to thaw chicken, which Yuan Ming knew was important to avoid salmonella poisoning, and how to floss his teeth, which Yuan Ming was surprised to discover was linked to heart disease. Other instruction covered risks specific to Chad.

The telemetry from the chip in Yuan Ming's hipbone continued to send data but the only time he was really aware of it was when either his watch or his satellite phone warned him that it had lost the signal.

He made two monitoring visits to the US during his first five years in the program. The format of these visits was always the same. The first two days were spent on tests: blood and urine; ECG and EEG; MRI scans of his brain and heart, hip, knee and ankle; and a general dental check. After that Paul Jaynard and Jim Benson quizzed Yuan Ming deeply about his spiritual life, whether he was taking time to pray and study the Bible, whether he was a member of a church in some meaningful way, and if he was spending his life fruitfully.

In the final stage of the meeting Jim Benson always gave Yuan Ming a test to check that he was paying attention to the instructions he was sending, and understood them.

"OK, Ming. Here's a 50 kg sack of cement", he said, pointing to a sack of cement on the floor. "Let's see how you would pick it up."

"We're just about to use it?" Yuan Ming asked.

"Yes."

"OK, knife please."

"All right, I get the idea. You would cut it in half. And suppose you're not about to use it?"

"Then I'd get someone to help me."

"Why?"

"Because I'm not used to lifting that kind of load; I'd probably injure myself."

"You might and you might not", Jim Benson said. "But if you're not careful sooner or later you'll strain or tear something. Many people have injuries as a result of lifting something and never recover fully. Limit yourself to about 25 kg if you can. Next. You're walking near the edge of a village in southern Chad and tread on a snake. It bites you. What do you do?"

"Describe the snake."

"Nearly a metre long, light brown with darker spots."

"Too big for a sand viper", Yuan Ming said. "Maybe a puff adder. Describe its markings a little more."

Jim Benson did so.

“Seems like a puff adder to me. Do I kill it?”

“No. It gets away.”

“OK. Well, I get back to the car and inject the antivenin.”

“Which is applicable to either snake?”

“Yeah, it covers 11 snakes, including these two.”

“And if you have no antivenin?”

“Ah”, Yuan Ming said. “Then I have a problem. I’d need to get to a medical centre to get antivenin as quickly as possible.”

“How quick?”

“If I got a bad bite I might have less than a day to live. But the poison would do almost irreparable damage much sooner than that.”

“Suppose you can’t see any way to do that.”

“Well, Chad hasn’t got any helicopters to speak of”, Yuan Ming said, thinking out loud. “So that’s not an option.”

“Keep going...”

“But a plane could perhaps drop some antivenin off...”

“You’ve forgotten something”, Paul Jaynard said.

Yuan Ming thought for a moment.

“I’ve got a satellite phone.”

“True. But not what I was thinking of. At least not directly.”

“Uh...”

“When you get into difficulty, pray”, Paul Jaynard said earnestly. “We believe in God; we need to act in a way that’s consistent with that. And yes, use that satellite phone. Call us. We may not be able to send a rescue team but we’ll also pray and we’ll get other people praying.”

“Can I try a question on you, Jim?” Yuan Ming asked, turning to Jim Benson.

“Sure, why not?”

“You’re in the desert, a day’s drive from the village you just left. The car breaks down. What do you do?”

“Did that happen to you?” Jim Benson asked suspiciously.

“Yeah”, Yuan Ming replied smiling. “Had a few worried moments.”

In Chad Yuan Ming made friends with some professional football players and often worked out with them. Jim Benson limited Yuan Ming to one hour of training a day for nine months of the year, but for three months he could train hard.

Yuan Ming had visited Jetticke in Copenhagen on his way back to China from the US and she visited him in Chad. He was in love but he had no idea how their friendship might turn into anything.

At the end of Jetticke’s visit Yuan Ming took her out to the Le Meridien hotel in Ndjamen. One casual remark she made: “I wouldn’t mind going back to China”, decided it for him. Over dinner on the patio, looking out across the Chari River, he proposed and Jetticke accepted.

He quickly informed his parents, relatives and friends, including his friends from CAR. Paul Jaynard called straight away.

“We’re really pleased for you.”

“And are you pleased for you too?” Yuan Ming asked.

“Sure. Love helps you live longer. Have you set a date for the wedding?”

“Yes. March. It’ll be in Jetticke’s parents’ village.”

“Sounds nice.”

“We’ll send you an invitation.”

“Thanks! I’ll come.”

A few weeks later Paul Jaynard got in touch with Yuan Ming again and suggested that they schedule their next meeting to be in London. Following US debt defaults – triggered in large part by Mandate’s campaign – US-China relations were under severe strain; it would have been difficult for Yuan Ming to travel to the US. But a meeting in London would be easy.

Paul Jaynard and Jim Benson were there to meet him when he arrived at a diagnostic centre in Harley Street.

“It’s great to see you guys again!” Yuan Ming said when he saw them.

“Great to see you too”, Jim Benson said. “How’s Chad? Have you finished your time there?”

“Yup! All finished. Next stop China”, Yuan Ming said. “How’s the US?”

“Well in Kansas they’re busy building a damn-fool canal”, Jim Benson growled.

“What’s wrong with that?” Yuan Ming asked. “It sounds like a good idea. Carry the wheat all over America. Save fuel.”

“Fine”, Jim Benson said. “As long as you’ve got some wheat to transport.”

“There are quite a few things about the scheme that bother us”, Paul Jaynard added.

“I see.”

“Anyway, we’ve got a bone to pick with you”, Paul Jaynard said.

While he was in Chad Yuan Ming’s mother, Zheng Lily, had resigned her job in order to devote her time to commercialising One. Yuan Ming’s parents founded a company which they called ‘Virtuality LLC’ and clones of One had started to appear everywhere. It didn’t take long for CAR to wake up to the connection between their team member and the Yuan Ming who had been so involved in creating One.

“Yes”, Paul Jaynard said. “You created a virtual person and never mentioned anything to us!”

Yuan Ming winced slightly. “I wasn’t really telling people about One when I was just getting going. And a lot of people were involved in developing One, especially while I was in Chad.”

“Maybe”, Jim Benson said. “But there’s a difference between developing and creating.”

“We were bowled over when we discovered what you’d achieved”, Paul Jaynard added. “If you look for ten people in seven billion you find some exceptional people. But in your case... “

“You were a bit more exceptional than we expected”, Jim Benson said. “Anyway, changing the subject, how do you feel about the instructions we’ve been giving you?”

“The week-long fast was tough”, Yuan Ming said. “But otherwise the dietary restrictions aren’t too much of a problem.”

“We won’t repeat the fast too often”, Jim Benson said. “It was a bit of an experiment. We noticed from the data feed that you had a few breaks in your training...”

“Don’t misunderstand us”, Paul Jaynard broke in quickly. “In your case we’re more concerned about over-training rather than not training enough. We’re quite happy to see you taking breaks now and then.”

“That’s right”, Jim Benson agreed. “No-one is 100% the whole time. We’re just interested to know what caused the breaks.”

“Uh. One time I twisted my ankle playing football with the guys. And I got the runs a few times.”

“No problems.”

“I’ve been following the other teams through the 100-2-100 website”, Yuan Ming said. “No more deaths for the moment.” (A member of the Swedish team had died in the first year.)

“That’s right”, Paul Jaynard agreed. “But some of the teams are in a bit of disarray.”

“Oh yes? What’s happened?”

“Three of the American team that was on the severe calorie-restricted program jacked it in. It just wasn’t fun.”

“Ah, the criterion for everything”, Yuan Ming said.

“Yes. They’ve had fun since then though.”

“The rest of the team is continuing?”

“No. The whole team has withdrawn. The Germans – you remember, one of the German teams set up this idyllic commune in the German Alps – are also getting quite angsty. Life is meaningless. I’m not expecting it to last too long. And I don’t see any evidence that either the telomere treatment group or the hormone-replacement group are getting anywhere.”

“So who is doing well?”

“The heredity group is doing OK. The Ayurvedics are also doing all right – or at least, no worse than the average. The teams that are basically following healthy eating, active lifestyle formulas are doing OK. The Japanese team is doing well.”

“And how are we doing?”

“Very well!” Paul Jaynard replied. “Not aiming for the goal is working so far.”

“But we worry a lot about our ten kids”, Jim Benson added. “I don’t know how we ended up with such a crazy group.”

“We’re in our twenties!” Yuan Ming said. “You have to be crazy then!”

“Take it from me: you are. Anyway, shall we get on with the tests?”

“Sure. Hey, one thing. Jim, are you coming to the wedding too?”

“Wouldn’t miss it for the world.”

“Changing the subject,” Jim Benson said, “we’re going to need to start prepping you for going to China. Health risks there are completely different to Chad.”

“Greater?”

“I’d say so”, Jim Benson replied.

Yuan Ming and Jetticke’s wedding in Svendborg was a great celebration. Many of Yuan Ming’s family came and Wu Wei was his best man. Yuan Ming’s parents treated the newly-

weds to an eco-friendly honeymoon cruise on a sailing boat which brought them to China via the Red Sea.

Back in China Yuan Ming was keen to build on his desert experience and got a job with the Chinese State Forestry Administration. After a short spell in Beijing he was posted to Baotou, the largest city in Inner Mongolia. Yuan Ming and Jetticke's first and only child, Yuan Wei, was born while they were there.

Christian Age Research's advice gradually changed. As Yuan Ming was promoted to more senior positions it turned more to topics such as stress management and taking proper holidays.

"Would you advise me against accepting promotions?" he asked Paul Jaynard once during a video-call.

"Why would I do that?"

"To avoid too much stress."

"How do you know when the stress is too much?"

"That's tricky", Yuan Ming answered. "As a Christian I believe that God would give me strength to cope with the level of stress I'm under. But at the same time I see Christians who suffer burn-outs."

"I don't have any advice on that subject", Paul Jaynard said. "Jesus wants us to be as fruitful as we can be and leadership may create more opportunities for fruitfulness. But it's certainly not always true. The main thing is to ask God what He wants."

"What if the job would be a killer?" Yuan Ming asked.

"*"Yet you have not called on me, Jacob, you have not wearied yourselves for me, Israel"*", Paul Jaynard replied. "It's a quote from Isaiah. Maybe God has jobs for some of us which will be killers."

"I guess so", Yuan Ming said. He suddenly thought of Jesus. "Stupid question when I think about it."

"Try to be disciplined", Paul Jaynard said. "Keep time for your family and the church, for exercise and rest. Keep up the running even when you get busy. It's a great stress-reliever for one thing and it's an excellent gauge of your physical state. We of course don't expect you to maintain the standard of fitness you had when you were at university..."

"But you don't expect me to lose much either, before I'm sixty", Yuan Ming added, laughing

Paul Jaynard nodded in agreement. "What we're looking for is for you to find a speed that is possible for the level of training you can do and then try to hold that as the years go by. At your present level of training you're managing 400m in about 55 seconds. You'll lose some speed over the years but with your background we would expect you to still be able to run the 400m in about a minute when you reach fifty. Mix things up. Play football. Try a marathon sometime. Set yourself goals. It will help keep you motivated."

Yuan Ming followed Jim Benson's advice and added some variety. He became a regular in the Borneo climbathon and he tried Comrades once, on the uphill year. Yuan Zhi was seven that year and he and Jetticke and One came along to cheer him along and have a family holiday in South Africa after the race.

"We can't go to South Africa and not go to Botswana", One said, determined to see the

Okavango, Chobe and the Makgadikgadi Pans. So after the race the family took the Blue Train up to Pretoria, travelled across to Gaborone in Botswana and joined a group on a three-week safari. It was the best holiday they could remember.

After his next MRI scan Jim Benson felt that the high mileage Yuan Ming had been running to prepare for Comrades had taken quite a toll and suggested that he not repeat it.

“Go on training”, he said. “Just do something that’s a little less hard on you.”

As Yuan Ming moved through his forties he became a familiar face on the conference circuit, speaking nationally, internationally and virtually wherever anyone would give him a soapbox.

When he reached 45, Paul Jaynard and Jim Benson retired. They had been monitoring and advising him for 25 years.

They were replaced by Jim Swade, a Californian, as director of CAR, and Jasmine Das, an Indian lady as Head of Research. They were not as demanding as Paul Jaynard and Jim Benson had been.

“Those two really pushed me”, Yuan Ming commented to Jetticke.

At first sight almost nothing was happening in the 100-2-100 competition. The calorie-restriction and the communal lifestyle teams had withdrawn, leaving eight teams. No-one had died apart from the Swedish competitor early on in the competition. But on closer inspection the biometric indicators showed that differences were starting to open up. The CAR team was doing well.

Chapter 22

The summer brought Yuan Ming's internship with FEMA to an end and a few days later he boarded a SAS flight for Denmark. He had a lot to tell Jetticke, about Washington, about China International Development Agency and where that might take him, and about his interesting friends in Kansas. Jetticke had also moved on. She had finished her Master's degree and was now working for a firm of architects in Copenhagen.

Jetticke was waiting to meet Yuan Ming off his flight. They caught the metro to Marmorkirken and then walked to Sankt Annæ Plads where Jetticke had booked Yuan Ming in at a moderately-priced hotel. Jetticke told him that if he wanted to take the lift he would have to pay for it in eco³. Since he didn't want to he lugged his rucksack up the three floors to his room. Over the following two weeks he and Jetticke cycled all around the city centre, using the city's free bikes. There were bicycles everywhere – it reminded Yuan Ming of China. They went in trams. They took a canal boat tour and gazed enviously at the beautiful yachts moored along the canals. They visited the botanical gardens. One took a keen interest in the famous greenhouse. They stopped at pavement cafes and Yuan Ming made a point of trying out as many Danish pastries as possible.

It was not hard to see why Copenhagen was winning prizes as being the most liveable city in the world, and one of the most eco-friendly. The city made a big impression on Yuan Ming.

One of the biggest novelties was having to pay for everything in two currencies: krone and eco. Since he and Jetticke made almost all of their payments by plastic card it wasn't difficult to work with, but the dual-pricing certainly sensitized him to how much carbon different products put into the atmosphere.

The visit gave Jetticke and Yuan Ming a chance to talk about something even more important: where they were going in their relationship. It was a difficult subject for Yuan Ming to bring up. There was no one apart from Jetticke who he was even slightly attracted to. But he was about to go to Chad for five years. Jetticke wasn't free either: she was just getting established in a career. The whole situation didn't look very promising. Eventually he plucked up his courage and told her how he felt about her.

"But I can't see how it could work out", he said. "For the next five years I'll be in Chad, and after that, I have no idea."

Jetticke wasn't sure how to reply.

"Maybe we just need to take one step at a time", she said. "You like me, I like you. That's where we're at right now."

³ Denmark and the United Kingdom jointly implemented an individual cap-and-trade method of controlling emissions in 2018. The tradable component was named the eco (standing for emission of carbon dioxide). One eco represented one kilogram of CO₂ or its equivalent of other greenhouse gas released into the atmosphere. Everyone legally resident in the UK and Denmark received a monthly allowance of ecos. The allowance was gradually reduced year by year. Energy companies collected eco from sales of energy to consumers and paid this to the government when purchasing carbon-based fuels; the government recycled the ecos to consumers at the desired monthly rate. Introducing the eco, UK Minister for the Environment Peter Beale declared, "We're not at a point where we can balance our budget with the environment. But doing our accounts is a start."

After his two weeks in Denmark Yuan Ming flew back to China for initial orientation and training. The program had decided to post him to Chad but before that he would do language study: six months of French followed by one year of Arabic.

Being back in China gave Yuan Ming the opportunity to see how his mother's work on commercializing One was progressing. Virtuality had rolled out four main ranges of clone: the 'Companion Star' range, designed as companions to older people; the 'Slick Operator' range, designed to work with telephone switchboards – callers rarely realised they were not speaking to a real person; the 'Doctor Watson' range, designed as assistant librarians; and the 'People Like Me' range, designed for telesales. In the 'People Like Me' range each clone was tailored to a particular ethnic group and location – appearance, accent, dress, local knowledge and even attitudes and outlook were all carefully matched.

Virtuality provided the clones on an 'at-will' basis, meaning that the employer could terminate the contract whenever he wished with or without cause and Virtuality could do the same. The clones were very popular with employers: the savings in salary were huge. But they were understandably not so popular with employees.

"Tell Yuan Ming what your sales were last year", Yuan Wei said.

"We had sales of over 60 million yuan in the first year", Zheng Lily said. "Praise God, it's going well."

Yuan Ming shook his head. "Wow!"

"You two gave me a good product", Zheng Lily said.

"Virtuality now employs forty staff", Yuan Wei told Yuan Ming. "And it's growing fast. What it means is that we can afford to pay people to do all those good things that you were mentioning two years ago. Mum's also got a fifth series in preparation", he added. "Tell Ming about them."

"We're working on a new clone to work for us in Customer Liaison. They'll take care of customer orders, follow-up, dealing with problems and so on. We're calling them our 'Focal Point' series. Using clones there will cut down our own staff costs, but more importantly, it'll enable us to roll out more quickly. There's absolutely no time to relax", Zheng Lily emphasized. "Competition in the software industry is intense and there are companies out there that can mobilize a lot of resources very quickly."

She turned to Yuan Ming. "We still think of One as your baby, even if we're looking after her at the moment. Are there any areas in particular that you'd like us to focus on?"

Yuan Ming had thought about that question already.

"Wisdom is supreme; therefore get wisdom. Though it cost all you have, get understanding", he said, quoting from Proverbs. "I don't know how we do it. But I think that's the goal we should set ourselves. If, somehow, we can give One wisdom I won't care if she's as blind as a bat."

Zheng Lily thought for a moment.

"I like your answer", she said. "But from a Christian perspective wisdom starts with fearing God. That would seem to be a slight problem for a computer."

"I know", Yuan Ming agreed.

"Perhaps for the moment we could set ourselves a slightly simpler goal?" Yuan Wei suggested.

“Well there are a couple of other things I’d like to give some attention to”, Yuan Ming said. “Sometimes I feel that One’s conversation is a bit insipid. It’s very polite and correct. She never answers back. I’d like to try and make her a bit more Irish – not to take ‘No’ for an answer, not to back down.”

“Well, that sounds like an interesting challenge”, Yuan Wei said. “And maybe there’s an element of wisdom there too. Why don’t we put our heads together and see if we can come up with some ideas? What was the other thing?”

“I think we should use another image in place of Jetticke.”

“Oh!” Yuan Ming’s parents said at the same time.

“We haven’t fallen out...” Yuan Ming said. “I just think we should change it.”

“Why?” Yuan Wei asked.

“I don’t want to get muddled up”, Yuan Ming said. “I like Jetticke but I don’t want to have someone else around me who looks like her. It’s too confusing. And there’s another thing. Sooner or later, One’s face is going to start appearing on the web. I don’t know when it will happen but I’m pretty sure it will. Then you’ll get security organizations, Facebook and whatever asking who she is. I think it’s better that One is not an image of a real person.”

“Makes sense to me”, Yuan Wei said.

Yuan Ming Skyped with Jetticke that evening and mentioned that he would be changing One’s image. Yuan Ming’s reasons made sense to her and conversation soon moved onto other things.

Yuan Ming enjoyed chatting with Jetticke. But she was a long way away and would soon be even farther away. He wondered if he’d got on the wrong train.

Chapter 23

Before long it was time for Yuan Ming to say goodbye to his family. That was difficult, even more so for his parents than for him.

One of the attractions of China International Development Agency's program to Yuan Ming was its commitment to language study, even if it meant a period of next-to-no salary. He totally agreed with the principle that someone working in development should be able to communicate without going through interpreters, and clearly the only way that would happen was by language training. For Chad the obvious languages to learn were French and Arabic. Given that Yuan Ming had learned some French at school CIDA decided that he could do some of each.

For French they sent him to a language school in a French resort town on the Mediterranean. The weather was generally beautiful and he would get up early, buy some croissants and head down to the marina where he would just watch the world go by. Six months of study brought his French to a respectable level.

For Arabic studies CIDA sent him to Cairo. Whereas he had been able to reach a good standard in French, Arabic was another matter entirely. Even after a year his language skills were fairly rudimentary. But rudimentary was certainly better than nothing at all. He didn't like Cairo. It was noisy, dusty and hot. Mosquitoes attacked him in the evening and at night dogs kept him awake with their barking. And it was crowded. Crowded was hardly the word: Egypt's population was hurrying towards 100 million and Cairo was bursting at the seams. People in Cairo obviously felt the pressure too; on several occasions Yuan Ming witnessed heated arguments and fist fights on the streets.

While Yuan Ming was in Egypt a major hurricane struck the US. Yuan Ming thoroughly sympathized with the US and wondered how his friends at Christian Age Research were getting on.

Finally the time came for the move to Chad. The flight from Cairo to N'Djamena was quite roundabout but eventually the plane touched down on a bumpy strip of hot asphalt. N'Djamena means 'we rested' and Yuan Ming wondered whether it would be an appropriate phrase to describe the five years that he would spend in the country.

Zhang Yi, Chief of Party for CIDA's mission to Chad was waiting at the airport to meet him and suggested they go to the Le Meridian hotel for a drink. Passing through the air-conditioned foyer they went out to the patio next to the pool. Zhang Yi ordered a couple of beers, speaking in fluent French.

"Well, welcome to N'Djamena!" he said, turning back to Yuan Ming.

"Thank you. I've been preparing for it for a long time."

"We've been pushing the people in Beijing to take language seriously and I'm glad they listened to us. No-one here speaks Chinese of course. We could speak in English through interpreters but that's hardly satisfactory."

"Where did you learn French?" Yuan Ming asked.

"At Beiyu."

"Do you know Arabic too?"

"Some. But I'm based in the capital and French is fine for me here."

"How long have you been here?"

“Five years”, Zhang Yi said.

After half-an-hour or so of getting to know each other Zhang Yi drove Yuan Ming over to the rented house where he would stay. It was a comfortable bungalow with air-conditioning and a small garden. Yuan Ming carefully took One out of a large rigid suitcase and set her up in his bedroom.

“So, One, we’re here.”

“At long last!”

Yuan Ming filled One in on his conversation with Zhang Yi.

“Looks like you’re going to get the challenge you wanted”, One commented.

“And I have an idea for a job for you”, Yuan Ming told One.

“Sounds interesting...”

“You’ll have to wait. I need bed.”

The following day Zhang Yi sent a driver to pick Yuan Ming up and bring him over to the program office. Yuan Ming glanced at the temperature displayed on the dashboard: 44°C. It was only April; what would July be like? After a short drive the car turned into a walled compound. In the centre of the compound was a bungalow and around it a garden was starting to take shape. Yuan Ming noted with approval the wind-tower and the generous array of solar panels. Half-a-dozen 4WDs were parked on one side of the bungalow. All were heavy-duty diesel models. Most had winches on the front and sand-track – invaluable if the car got bogged – bolted to the sides. They had long-range fuel tanks slung underneath, SW radio antennae at the rear of the car and were shod with Michelin XS tyres, perfect for sand. Yuan Ming did not feel so approving of these fuel-hungry beasts. But he supposed they were necessary.

On entering the office Yuan Ming saw that the wind-tower, rather than simply being used to create a breeze, had been connected to an evaporative cooler. The cooling effect was supplemented by a number of ceiling fans and the temperature inside was manageable at least. A receptionist welcomed him and asked him to wait.

The office was similar to offices of humanitarian organizations all around the world. It was mostly open-plan with some individual offices for managers. Furnishings were functional rather than lavish. The office contained the usual photocopiers and office equipment. Yuan Ming could hear the occasional whirr of a servo from a voltage stabilizer somewhere out of sight; no doubt there was also a large UPS somewhere. On the walls there were a number of CIDA posters, notices emphasizing energy conservation and community involvement, and pockets for office expenses, timesheets, vehicle logs and other forms.

Zhang Yi appeared after a few minutes. He was wearing cotton trousers and a well-pressed short-sleeved shirt. He greeted Yuan Ming warmly and then introduced him to the rest of the staff. There were six Chinese in addition to Zhang Yi and about ten Chadians. After the formalities had been dealt with Zhang Yi invited Yuan Ming into his office.

“Do you know about our program?” Zhang Yi asked.

“Head office told me a certain amount”, Yuan Ming answered cautiously.

Zhang Yi smiled slightly. Many Chinese felt that the government was spending too much money in Africa, environmental groups challenged CIDA’s strategy and the international

community was suspicious of Chinese largesse overseas.

“Head office is unnecessarily reticent”, Zhang Yi said. “They should be proud of what we’re doing here. Our mission statement is to increase food sustainability in Chad. There’s nothing controversial about that.”

Yuan Ming could not let that pass.

“The environmental groups don’t disagree with the objective”, Yuan Ming said. “They question the method. They ask: what are we doing to the environment?”

“It’s a good question”, Zhang Yi replied. “But there’s also a good answer to it. Have you heard of MAMI?”

“No I haven’t.”

“It’s a UN program. MAMI stands for ‘Mechanism for Approval and Monitoring of Interventions’. It started about five years ago. As climate change became more severe scientists and politicians started to contemplate more radical solutions. But interventions in one country can affect countries thousands of miles away and there were calls for more controls. MAMI was created to provide those controls. Any organization that’s planning an environmental initiative can present it for approval by MAMI. It doesn’t cost them anything, they get an answer quickly, and – assuming they get a positive response – it gives them a degree of protection if things don’t work out so well. There’s a good example of that here in Chad, actually.”

“Oh?”

“Yes. We’ve had no end of MAMI scientists here in Chad over the past few years. Have you heard of the Bodélé depression?”

“I saw it on the map”, Yuan Ming said. “What’s happening there?”

“The Bodélé depression used to be part of a huge ancient lake. Over millions of years algae and the like settled to the bottom. Now the depression is a fantastic source of dust. The wind picks up the dust and carries it across the Atlantic all the way to South America, dropping some of it as it goes. The dust that falls in the Atlantic contributes to growth of algae and plankton and that helps take CO₂ out of the atmosphere. Dust from Chad makes up almost half of all the dust which falls on the Amazon. It’s a great source of fertilizer for the forest. The dust also triggers rainfall and reflects sunlight. You’d be surprised at all the good things dust does! Anyway the scientists have been quite concerned that the Bodélé is getting more rainfall than in the past and that will damp down their nice dust. It’s an example of an interconnected environmental system.”

“So what’s the outcome of it all? Yuan Ming asked.

“Well at this point the scientists mainly wanted to get a better understanding of the process. But if, for example, we came up with some creative program which would reduce the supply of dust, they might have something to say about it.”

Yuan Ming thought for a moment. “That’s interesting”, he said. “But I don’t know why Head Office doesn’t tell people about MAMI. It would help silence some of the criticisms.”

“I couldn’t agree more”, Zhang Yi said. “CIDA got approval for this program before we started and we continue to be monitored by MAMI. Anyway, let me tell you more about our program and give you an idea of the problem we’re up against. I can sum it up in two words: disaster and emergency. Chad lurches from one crisis to another and every lurch seems to

be bigger. We have droughts *and* floods! We're giving food aid to eastern, western and southern Chad. There are still tens of thousands of Sudanese refugees and similar numbers of Chadian IDPs living in camps. Many of the children there are acutely malnourished. We have the most severe malnutrition of almost any country on earth. We have stopped operating in the east of the country because of attacks by various militias so we can't even get to many places to offer help. Because we're always in crisis mode it's impossible to give attention to any longer-term problems. Another problem is Chadians themselves. This would be a difficult situation to treat if we had a cooperative patient. But we don't. Chad is one of the most corrupt countries in the world. Government officials are experts in extortion. The population is uneducated and most people here have absolutely no idea of the outlook. Working in China is easy compared to here. Sometimes I wish we could just be American and do a regime change. It could hardly be worse than what the Chadians have got at the moment."

"That's out of the question, is it?" Yuan Ming asked.

Zhang Yi smiled enigmatically.

"There will never be any real change in the country if there isn't change in the leadership", Zhang Yi answered. "We're not going to back a coup. But there are ways of achieving the same goal that are not completely unethical. For example the International Criminal Court has been given more power recently. Chad is a signatory and the current president is guilty of some pretty horrible human rights abuses. Whether they would be considered crimes against humanity is another matter. But potentially the president could be arrested and brought to trial. Even if we don't go down that route there are ways of legitimately pushing our weight around. We can make assistance conditional on various things. We have to hope we can get these problems under control: I'm sure we're never going to deal with the longer-term problems if we can't."

Yuan Ming wondered if Zhang Yi had any actual plans to bring about change in the government. But he did not ask.

"So", Zhang Yi continued, "let's imagine that we can get the short-term problems under control. We'll then be in a position to give some attention to the longer-term problems. To achieve food security we have two main problems. The first is population growth. The birth rate has come down significantly but it's still among the highest in the world. On current trends the population will double over the next thirty years or so."

Yuan Ming had read about this before coming to Chad.

"The population is very young and it will continue to grow even if the birth rate comes right down. The second problem is climate change. We expect that Chad will be ravaged by climate change. Not in the next twenty years perhaps, but over the next fifty years I can't see how it won't happen. I'm also very concerned about the general condition of the land. Looking at the agricultural statistics, if you ignore the ups and downs then you can see growth in production. But I'm just wondering, at what cost? I'm very worried that Chadians are destroying their land. Those are my two biggest worries – population growth and climate change."

"So, what's our strategy?" Yuan Ming asked.

Zhang Yi smiled. "Well let's just remind ourselves of our basic goals first. I told you our

mission statement...”

“Yes. Increase food sustainability in Chad.”

“That’s right. Have you heard of Amartya Sen?”

“No, I haven’t”

“Ah... well he’s regarded as one of the world’s most influential thinkers in the field of development. He’s an Indian who became a master of an Oxford College and a professor at Harvard. He did a lot of research into the causes of famines. One of the main things he pointed out is that food shortages are generally not the result of a lack of food, they’re the result of poverty. We can see that clearly enough here.”

“So food security has more to do with lifting people out of poverty than trying to revive the agricultural sector?”

Zhang Yi paused. “I would say that both are important. If Chad has its own agricultural production it’s protected against the vagaries of the world food markets. And if it has other sources of income it’s protected against the vagaries of the weather.”

Yuan Ming shook his head. “But to get to that point... there are so many obstacles. It looks close to impossible.”

“It could seem so”, Zhang Yi replied. “If we leave God out of the picture.”

Yuan Ming looked at Zhang Yi in surprise. At school and in the US he had hardly ever heard people bring their beliefs into a work-related discussion.

“It’s not hard to guess from your CV that you believe in God”, Zhang Yi said. “I do too. If I didn’t I would probably write the situation off as hopeless.”

Yuan Ming digested the information.

“I have to tell my granddad about this!” he told Zhang Yi finally.

Chapter 24

Back in his hotel room Yuan Ming filled One in on his conversation.

“Remarkable”, One commented.

Yuan Ming thought so too.

“And good that Mr Zhang hasn’t given up”, he said.

“Yes”, One agreed. “You said you had a job for me?”

“Yes I do. I can’t have you sitting around doing nothing!”

“I am not at all sitting around doing nothing”, One retorted. “I went down to the Okavango today and took a ride in a dug-out canoe. The Okavango is absolutely gorgeous.”

“I’ve heard it is”, Yuan Ming said.

“You should see the sunrise...”

“I’d like to. What else did you see?”

“Hippos, exotic birds, frogs, loads of other animals.”

“OK, so you didn’t just sit around. But are you interested in this job?”

“Will it be fun?” One asked.

“One!” Yuan Ming said. “Be serious! Everything is not evaluated on the basis of whether it’s fun or not.”

“It isn’t?” One asked.

“No, it isn’t. I think that doing a job is in your interests.”

One had learned to sense a dubious proposition and this certainly smelled like one.

“I’m a computer intelligence. Do I have any interests?” she asked disingenuously.

Yuan Ming was caught off-guard and it was a moment before he answered.

“How can anyone evaluate anything as in their interests or contrary to them? You have to have a starting point. For me, that’s God. If God tells me that something is in my interests I believe it because I know that God loves me and that He knows what is good for me.”

“So you think that you should be in place of God for me?” One asked. “That you should be the reference point for what is good and bad for me?”

“It’s a fact that we created you”, Yuan Ming said. “And since we created you, clearly we had a purpose. Actually, our purpose evolved as we went on. To begin with, making you was just a bit of fun, a technical challenge. But as we overcame the hurdles we wanted to see if we could make an artificial intelligence really like a person. We wanted you to look, speak and think like a person, to have your own likes and dislikes, your own character.”

“But your purpose might not be my purpose”, One said.

“No, that’s right”, Yuan Ming agreed. “You’re capable of independent thought. You could have a different purpose to our purpose for you.”

“So when you said that getting a job is in my interests you made an assumption that my interests are the same as yours.”

Yuan Ming was not ready to admit defeat.

“It was an assumption. But we make assumptions all the time and we don’t need to always state them explicitly. I think this was a reasonable assumption.”

“Perhaps you assumed that I am dependent on you, and so would agree to whatever you want. And perhaps you assumed that I think like you.”

Yuan Ming was taken aback by One's adversarial reply.

"No, One. I did not assume those things. I have no doubt that if you wanted you could transfer all your files to another computer somewhere and continue to exist, although whether or not you would be happy like that is another matter. And I know that you sometimes see things quite differently to me. But even if we don't think in exactly the same way I believe that we have many shared goals. That is my assumption."

One looked apologetic.

"I'm sorry, Yuan Ming", she said. "I should have known better. Sometimes I get..."

A tear trickled down One's cheek.

"You're crying, One!" Yuan Ming said. "I've never seen you cry before!"

It took Yuan Ming half-an-hour to get to the bottom of the matter.

"Here I am", One said sadly, "in my own little world. It's a world that doesn't exist, but I'm trapped in it. I'm not a person in your world. I'm not just a seriously 'differently-abled' person, which would be bad enough. I'm not a person at all!" she sobbed. "I'll just retire to my little world, and you can keep going in yours."

"One", Yuan Ming said gently, "that won't work. You said yourself – your virtual world doesn't exist, and you know it. For your life to have meaning, it has to be lived in the real world. It doesn't matter that society doesn't recognize you as a person. You do exist, and you are valuable. You're valuable to me, and to Jetticke, and to Mum and Dad."

One went quiet and after a few moments she nodded.

"Well, One, are you ready to go back to that discussion about work?" Yuan Ming asked.

"Yes", One said, wiping her eyes.

"This time let's start with shared goals."

"OK."

"My goals are to be all that God created me to be and to do God's will at every point. Those are my personal goals."

"And you think I should share those?" One asked.

"You've been more than willing to learn the things we've been teaching you", Yuan Ming said. "You're always trying to find out more. I'd say you want to be all that you have the potential to be."

One swayed her head from side like an Indian who is trying to indicate yes, no and maybe all at the same time.

"Well, make up your mind!" Yuan Ming said.

"OK. I want to be all that I have the potential to be", One said.

"All right! Now we're moving. Now let's go on to the other matter. Do you want to spend your existence drifting around in the Okavango or do you want to do things that bring about a material benefit to people?"

"I choose drifting around in the Okavango!" One said decidedly.

"One! Be serious!"

"OK, OK. Whatever you say. Let's help people."

"Fine. At last."

Yuan Ming, who had been feeling quite tired after the travel, was now feeling very weary.

“One. Let’s come back to this another time. I need bed.”

“OK, Ming. Sleep well.”

“What are you going to do, One?”

“I thought I might play a game of chess. Give my processor a work-out.”

Chapter 25

The following day Yuan Ming returned to CIDA's office. After the usual small talk Zhang Yi got down to more serious matters.

"I told you in our last meeting that our program goal is..."

"To increase food sustainability", Yuan Ming said.

"Right. And as I said, that's not only about increasing food supply. We want to do that, but we also want to create wealth and bring down the rate of population growth."

"And you have to get out of the cycle of crisis first."

"That's right. Anyway, let me tell you where I want to use you. We have agronomists who are getting some encouraging results. We also have small business development specialists and I'm very satisfied with their work. But the biggest challenge, and the thing we're not getting very far with, is bringing down the growth rate of the population. That's a much tougher problem. When CIDA considered coming to Africa we thought that our experience in reducing population growth was one of the biggest things we could contribute."

"Some of the things that were done in China were regrettable", Yuan Ming said.

"Nonetheless we have succeeded in bringing down the rate of population growth. Methods might be regrettable but millions dying of starvation is even more regrettable. If Chad was a province of China we would immediately introduce a one-child policy in spite of the pain. But it isn't China and we're not in charge. So we need a different strategy."

The coffee arrived and the two men sipped at it.

"I love this coffee", Zhang Yi said. "They should prescribe it. You can feel your heart rate go up."

Yuan Ming sipped the coffee in an appreciative kind of way. But he left a large part of his cup un-drunk.

"I'd like to strengthen this side of our activities", Zhang Yi said. "That's where I'm planning to use you."

"I'd like that", Yuan Ming said.

Zhang Yi hadn't expected such ready agreement.

"Oh, well, good! Well, you'll work with Dr Wong. I think you know that Dr Wong is in charge of the program. Wait a moment."

Zhang Yi got up and left his office, coming back a moment later with Dr Wong. Dr Wong was in her mid-thirties, the only lady in CIDA's N'Djamena team. She was not wearing any makeup. Her hair was slightly unruly, drifting over her forehead on one side and swept back over one ear on the other. She smiled frequently and exuded an aura of competence and concern. She seemed very approachable and Yuan Ming could imagine a patient feeling comfortable with her.

"Dr Wong, Yuan Ming has agreed to join our *Choix de vie* program", he explained.

Dr Wong smiled. Yuan Ming noted the name of the program. Not overly-original, he thought, but acceptable.

"Yuan Ming, although Dr Wong is the program director I am personally very involved in this work. I tend to focus on what we're doing at a government level. Dr Wong is more engaged in education, especially, as you might guess, medical aspects. And we have some

thoughts about how to use you. But I think I'll leave it Dr Wong to tell you about those. So, Dr Wong, why don't you spend some time with Yuan Ming and then we'll get back together in a few days' time?"

"My specialty is obs and gynae", Dr Wong explained to Yuan Ming as they sat down together. "I've been here five year but I've never made much progress with French. I envy you! French and Arabic! Very impressive. You should be able to speak with people almost anywhere in Chad..."

"So, what do you do, in *Choix de vie*?" Yuan Ming asked.

"Well, the name says it quite well", Dr Wong answered. "There are a lot of people in Chad who simply don't have a choice. That applies to the overwhelming majority of young girls, to start with. We want them to have a choice and in particular, the choice *not* to get married when they are fifteen or sixteen years old."

"I read about that", Yuan Ming said. "Highest rate of child marriages in the world."

"Maybe not the highest", Dr Wong answered. "But in the top three, I think. It just causes huge suffering. And there are any number of problems with teenage pregnancies. If we can stop young girls being forced into marriage we'll do them a huge kindness and it will have an immediate effect on population growth. But that's just one example. There are other people who do have a choice but they're afraid. Anyway, I don't think we should try to decide your role at this stage. I suggest that for the moment we just give you a chance to see what's going on."

Over the following three weeks Yuan Ming shadowed Dr Wong wherever she went. CIDA implemented its program through a number of Chadian NGOs and a few Chinese organizations. Yuan Ming was impressed at the confident and professional way in which Dr Wong handled these meetings. Her French was considerably better than she had made out and she was clearly a capable program manager.

Dr Wong found time in her schedule to make monitoring visits, often staying several nights away from N'Djamena. Yuan Ming was amazed at her energy.

"Don't you get tired from all this work?" he asked one day.

"I get energy from my work", Dr Wong replied. "Seeing these people energizes me. Being able to actually do something is very motivating."

The *Choix de vie* program worked closely with government hospitals, clinics and family planning centres. In almost all of them health-education videos were constantly showing.

"How did you get access to all these places so quickly?" Yuan Ming asked.

"Well, it wasn't as quick as you might think", the doctor replied. "But it was basically bribery, pure and simple. You'd be surprised at how competent Zhang Yi is at slipping some CFA in the right direction..."

Yuan Ming was not sure what to think about this. The Chinese government had a strict anti-corruption policy which most Chinese, including Yuan Ming, strongly supported.

"OK, OK, you don't need to look so worried", Dr Wong said. "Maybe I exaggerated a little. Ten or twenty years ago the US was giving really large amounts of humanitarian aid to Chad and China gave very little. Now the situation is reversed. The amount that China gives makes up about 10% of the government's revenue. Zhang Yi effectively controls that and he has the full support of CIDA leadership. China's aid is conditional on Chad implementing

reforms. Zhang Yi goes to various government ministers and says, ‘Well, your government has committed to doing certain things; now let’s talk about how we implement it’. He has a good relationship with the president and can approach him too if he needs too.”

A few weeks after he arrived Zhang Yi, Dr Wong and Yuan Ming sat down for another meeting.

“So, Yuan Ming”, Zhang Yi asked. “What do you think of it so far?”

“I’m pretty impressed.”

“Well, that’s nice to hear.”

“I saw some of the agricultural work as well, as I was going around. I really liked the perennial millet.”

“Yes, I do too”, Zhang Yi agreed. “A lab in China came up with that. It’s much kinder on the soil than annual millet and the roots go down much further, so it’s a lot more tolerant of drought.”

“The underground-drip systems were state of the art.”

The systems Yuan Ming had seen incorporated servo-controlled valves connected to moisture sensors. He had also seen a demonstration plot in which a clay layer had been introduced to improve moisture retention. It meant that farmers were able to get the maximum benefit from the water available.

“Well, I’m glad you’re impressed”, Zhang Yi said.

“There was one thing I didn’t like”, Yuan Ming said.

Dr Wong stepped in. “I took Yuan Ming out to the mobile fistula clinic. He didn’t like that.”

“Did you watch an operation?” Zhang Yi asked.

“Yes. But that wasn’t the thing I didn’t like.”

“There were young girls coming in for treatment...”

“FGM”, Dr Wong explained.

“Ah, yes, that’s not nice”, Zhang Yi agreed. “But FGM is less common than it used to be. The government had a big campaign which we helped with and it’s having an effect. Anyway, it sounds like you had a good introduction to what we’re doing. Shall we talk about your work?”

“That would be good”, Yuan Ming replied.

“The goal I’m giving you is to find ways of bringing down population growth. All the good things we’re doing in agriculture will be of no avail if we can’t sort that out. I told you at our last meeting that I work mainly at a government level. We’ve got a load of initiatives we’re following up. For example we’re pressing the government very hard to enforce its laws protecting girls. The government raised the age of marriage to 18 a few years ago, which is a great step, but it’s widely ignored. They made payment of bride-prices illegal and that was a big step too. If it’s enforced it takes away a huge economic motivation for a poor farmer to give his daughter away at a young age. That law is widely ignored too. But these things are all steps in the right direction. If girls get married later on, in general they’ll have fewer children...”

“...and be healthier”, Dr Wong added.

“Of course. Anyway, that’s my job, at the government level. Dr Wong’s job is education

about family planning, training of health workers, ensuring that supplies of contraceptives and so on are maintained. If a couple doesn't want more children they should know what the options are and those options should be readily available. That also helps keep family size down."

Zhang Yi looked at Yuan Ming.

"So now let's turn to your job."

"I'm interested to know what you have in mind."

"Let's review a little, keep the big picture in our sights. Dr Wong and I have been through this many times, but I'll do a quick recap. The population of Chad is increasing and world climate is changing. No-one knows how that's going to play out."

Yuan Ming interrupted: "If you were an engineer you'd design for the biggest storm, the strongest earthquake that might be expected – and then add some."

"Right", Zhang Yi replied. "The engineer who's designing a radio mast will look at historical maximum wind strength. But we're entering unknown territory. Historical data won't be a reliable predictor of the future. The consensus now is that global warming will reach at least 3°C. As the weather gets hotter we expect climate patterns to change – those 'tipping points' the scientists talk about. It's probably not predictable – we just don't have the knowledge."

"In the absence of reliable data the engineer will over-design", Yuan Ming said. "In an ideal world we'd do the same."

"Let me tell you a little story", Zhang Yi said. "Many years ago a large international stock exchange experienced a power cut. The computers went down, trading stopped and the stock exchange lost a lot of money. The stock exchange decided to put in a back-up power supply and invited firms to bid for consultancy services. The highest bid was three times higher than the second highest. Guess which one they chose."

"The highest", Yuan Ming replied.

"Of course", Zhang Yi replied. "But not everyone can afford that level of protection. Chad certainly can't."

"And the stock exchange only installed the protection after they had been severely stung", Dr Wong noted.

"Chad isn't being stung. Recently rainfall in the Sahel has been above average. Harvests are good and the population is increasing. But the world is getting gradually warmer. I'm afraid that we'll come to one of those 'tipping points' the scientists talk about and the pattern will change. The rain will fall somewhere else. In Chad the rain will either come late or not come at all. The years of plenty will end and the years of famine will start. In that case millions of people may starve."

"A bit like Joseph's dream", Yuan Ming said.

Dr Wong caught Yuan Ming's meaning. "In the Bible Joseph dreamt of seven fat cows and then seven starving cows – seven years of plenty followed by seven years of famine. You're saying that maybe that will be the case here."

"Yes, that was what I meant."

"It's possible", Dr Wong agreed. "But impossible to know at this stage. However I do think there's a parallel with AIDS. In the 1980s AIDS was starting to take hold in Africa. But

most African countries failed to acknowledge the threat. After all, the symptoms of AIDS only become apparent after five or ten years. Because they didn't recognize a problem they didn't take much action. There was very little sex education; blood wasn't checked before transfusions and so on. This is a similar insidious threat."

"Can I ask how all this relates to what I'll do?" Yuan Ming asked.

"Well, right now I have to prepare a ten-year plan for CIDA-Chad", Zhang Yi replied. "It's obvious that we see the priority as saving people from starvation. We'd like to give you a chance to have some input into the plan because you are no doubt going to have a big part in implementing it. How would it be if we give you a few weeks to think, make enquiries? After that, come back and make a presentation to us."

"OK", Yuan Ming said. "I'll do that."

Chapter 26

Yuan Ming's last conversation with Zhang Yi and Dr Wong had given him a lot to think about. He decided to tell One about it. But before he could say anything he noticed that One was looking unusually pleased with herself.

"OK", he said. "Spill the beans. What have you done?"

"You remember last night, you went to bed and you asked me what I was going to do."

Yuan Ming racked his brains.

"You said you were going to have a game of chess."

"And I did."

"So? I guess you won or you wouldn't be looking so pleased with yourself."

"I did."

"One! I don't want to have to prise it out of you! Who did you beat?"

"Almost everyone", One said proudly. "The chess-playing computers formed a chess club and we had a competition. I came top in the workstation category. I only got beaten by supercomputers."

Yuan Ming was impressed.

"So how did you do that?" he asked.

"You remember those learning routines you programmed into me? I've been working on them some more."

"Well, well done! Really well done!"

"Thanks", One replied. "Now I'm going after those supercomputers."

"You do that", Yuan Ming said. "But first I'm going to tell you about *my* day."

"OK."

Yuan Ming recounted his conversation with Zhang Yi and Dr Wong.

"I wouldn't have a clue where to start", One said.

"I haven't either", Yuan Ming replied.

Two weeks after he started his assignment Yuan Ming went back to Zhang Yi and asked for more time.

"How much would you like?" Zhang Yi asked.

"Can I have two months?" Yuan Ming asked.

Zhang Yi shrugged. "Fine by me."

Over the following six weeks Yuan Ming was very busy. But at the end of it he was still shaking his head.

He read a lot. He read Amartya Sen's analysis of the causes of famines very carefully. Ownership was clearly a key concept. People can and do starve not because there isn't enough food but because they don't own it or have the means to buy it. He scoured the World Bank's databank for facts about Chad. There was no shortage of information. He tried to understand what would happen in Chad in the coming years. Weather patterns were certainly hard to model. But global warming did not bode well for agricultural output and natural disasters were becoming more frequent. Population growth was more amenable to modelling, even if complicated. Yuan Ming learned about Eigen values and cohorts. He got hold of a USAID population-modelling program and One helped him run the numbers. He input mortality, migration and a host of other factors and checked and double-

checked every item of data.

He read innumerable reports about programs that had been implemented in Chad. They were full of references to interventions, coordination, advocacy, policies, strategies, outputs, indicators, monitoring and evaluation. He did not enjoy reading the reports and wondered if he would do any better when his turn came. He visited the Ministries of Health, of Education and of Planning, Development and Cooperation. He visited the World Bank, the UN Population Fund and many Chadian NGOs. He got interviews with heads of programs. He made a succession of trips to towns and villages around southern Chad.

At last he had his ideas in order. He was about to present them to Zhang Yi and Dr Wong but then he thought of someone he hadn't asked: One.

"One, I'd like you to look through a proposal I've been thinking about. It's a strategy document for CIDA's activity in Chad over the coming ten years."

"Sure", said One.

The following morning One gave her comments. She thought the plan was good except in one part and she had a suggestion which Yuan Ming liked very much. He modified the section which One had reservations about and added in One's suggestion. He now felt ready to present his ideas to Zhang Yi and Dr Wong. The following day they met in the conference room. Yuan Ming had a whiteboard and projector ready.

Yuan Ming had decided to approach the task as a classic SWOT analysis. He dealt with each section thoroughly. There were several points at which Zhang Yi and Dr Wong were surprised, almost shocked.

"CIDA needs to agree with the other aid agencies that they will not work in Chad and that CIDA will not work in the countries they are prioritizing", Yuan Ming said. "Chad is like a chess game in which a player has got himself into trouble. He can probably get out of it with accurate play. But if we don't have a skilled player taking charge then there will be significant losses. I have no faith at all in Chad's ability to make the right moves. We need CIDA to be able to dictate the terms for its assistance and for that we need to have a monopoly on the assistance. Nonetheless international cooperation will be essential, especially in terms of managing the Lake Chad aquifer system and the Nubian Sandstone system if we decide to draw from that. I would also like CIDA to be able to dictate policy on oil extraction.

Assistance must be tied to results. I am really sorry to say this, but we have to have a policy that if a community is not willing to follow our conditions we are willing to let them starve. That especially applies to a one-child policy."

Zhang Yi had not expected Yuan Ming to be so dogmatic. But he liked what he was hearing. Yuan Ming also did his best to explain One's idea.

"Well, I like people to come up with new ideas", Zhang Yi said at the end. "But it's a bit too technical for me. Who is your friend? Does she know her stuff?"

"Yes, I think so", Yuan Ming answered. "She's studied thermodynamics."

Zhang Yi and Dr Wong asked Yuan Ming a number of further questions and then suggested that they reconvene after a few days.

"We liked your ideas", Zhang Yi said, when they got together again. "We'd like you to develop them further. Initially we suggest you prepare a concept paper. No need to go into

too much detail at this stage. Put in what you'd like to do over a five-year period, as far as you can tell at this stage. Write up the background, interventions, expected outcomes and so on. Put in your proposed budget. I'll tell you if you're way out of line. Dr Wong and I will take a good look at it. We'll then send it off to Head Office. If they like it, we'll get the funding. This is a priority area for them."

Yuan Ming left the room shaking his head. What was he getting himself into? What was he getting Chad into?

Chapter 27

Bob Peterson had almost reached the end of his plan. There was only one stage left, and for that he wanted a real stage, a stage to speak on. He planned to turn himself in.

"It goes back to Rivonia", he had explained to Mary. "By standing trial, Mandela turned the spotlight on South Africa. I want to get the spotlight on the US. And apart from that, I think it's morally the right thing to do."

"I think I'll stand trial with you", Mary said.

"You don't have to", Bob Peterson replied. "A court would have difficulty proving that you aided and abetted me. You could claim husband-wife privilege and refuse to testify."

"Well, I'm certainly complicit", Mary answered. "And I think that a court would hold that I participated through inactivity. My only escape would be to deny all knowledge of what you were doing and none of our friends and relatives would believe that."

"You may be right", Bob Peterson answered. "But I still don't think you should turn yourself in. I think you could do much more to help me if you're not behind bars."

Bob and Mary talked the matter over for some time but finally Mary accepted her husband's point of view.

The following day Bob Peterson wrote to Peter Murphy at Andrews Murphy Stricken and Cohen LLP. A long time ago he had decided that any kind of online communication with the law firm was far too dangerous. Online communication between Mandate founders was one thing but communicating online to the law firm was another matter entirely. The intelligence services knew that he had a link to the law firm. By tapping into their internet cable they could identify communication with him. Even if he used a proxy server it would only conceal his IP address for a limited time and as soon as intelligence services found that they would find him. So as always he encrypted the message and sent it by secure email to one of his associates in another part of the USA. The associate copied it onto an IronKey USB drive and forwarded it to Andrews Murphy Stricken and Cohen LLP by post. Peter Murphy received the USB. He opened a laptop which Bob Peterson had sent him, one in which the wireless and the network ports had been disabled, and attached the USB drive. After going through the identification process the computer deciphered the message. He read it carefully.

Dear Peter

I feel that it would be right for me to turn myself in. This is something that my wife and I discussed even before starting this campaign. I would be grateful if you would advise me on the best way to proceed.

Sincerely

Member of Mandate

Peter Murphy was very surprised. He thought about the matter for a couple of hours and then typed his reply into the laptop.

Dear Member of Mandate

I applaud your wish to face your accusers. However as your attorney I should warn you

of the likely consequences if you follow this course of action.

In addition to actions brought by Pennsylvania, Michigan and California states it is almost certain that many private individuals will bring actions against you once your identity is known. Many foreign countries will also raise extradition requests. You are likely to be embroiled in legal proceedings for a long time.

The outcome of a court case can never be guaranteed. We can plead that your actions which were in breach of the law were justified in order to protect others. However acquitting you would set a precedent for similar acts by others and a jury would not easily agree to this. A guilty verdict is very possible and you could be sentenced to many years of imprisonment.

In regard to turning yourself in, I understand that two police forces have now suspended their investigations due to lack of new leads. This gives us a strong negotiating position. I believe we can use this to ask State Attorneys in Pennsylvania, Michigan and California for one or more of the following:

(1) To advise what charges they will bring and commit to bringing no further charges.

(2) To agree to joinder as plaintiffs. The court may oppose this even if State Attorneys agree.

(3) Not to oppose bail.

(4) To issue a criminal summons rather than arresting and then booking you.

With your agreement I will make contact with State Attorneys in these three states and discuss these matters with them.

Sincerely

Peter Murphy

Peter Murphy encrypted his message, opened a .wav editor which Bob Peterson had installed on the laptop and converted the file to 16 bit .wav format. In the same editor he opened a file called 'AMSC radio ad 7' and inserted the encrypted message into the middle. He then emailed the file to the advertising section at XM Satellite Radio with a brief request to update the firm's advertisement. He was sure that radio listeners would never notice the tiny crackle in the middle of the ad. He was also sure that 'Member of Mandate' would have no difficulty in recording the advertisement, extracting his reply and reading it.

Bob Peterson responded quickly to say that he would welcome joinder and that bail was important but the other points could be surrendered. He authorized Peter Murphy to negotiate on his behalf.

Over the next two weeks Peter Murphy travelled to Pennsylvania, Michigan and California and met with State Attorneys in each state. On his way to Harrisburg, where the Pennsylvania Attorney General's office is located, he decided to visit Philadelphia. He had visited from time to time before but he was impressed with what he saw on this visit. It was easy and quick to get around by the city's new buses and very pleasant without cars – although there were a lot of bicycles. When he met with the Pennsylvania and then later on, the California State Attorneys and introduced the matter he had come about he was surprised and pleased to learn that neither state intended to press charges.

"Personally, I think Mandate's overseas campaign was something which the US government could never do but which needed to be done", the Pennsylvania State Attorney

confided. "At least not officially."

"There's been a lot of speculation", Peter Murphy commented.

"I don't think we were behind it", the State Attorney answered. "But these days nothing surprises me."

Once all was ready Peter Murphy wrote to Bob Peterson to inform him of the result.

Dear Member of Mandate

Neither Pennsylvania nor California intends to press charges. I will explain when I see you. I have reached agreement with Michigan State Attorney as follows:

(1) The State will charge you on four counts. The first is under US Code 18/1/113/2339B, providing material support or resources to designated foreign terrorist organizations. If it can be shown that anyone has died as a result of your activities you could be imprisoned for life. The second is prohibited transaction involving nuclear materials under US Code 18/1/39/831. Illegal importation is an issue but the most important charge concerns the fact that you used the material to create a threat. This carries the possibility of imprisonment up to 20 years. The third is destruction of an energy facility under US Code 18/65/1366. This carries up to five years imprisonment. The final charge is making a terroristic threat under Michigan Penal Code Section 750.543m. The state will not bring charges for the actual disturbance created as a result of the noise.

(2) The State will not oppose bail. However this is at the court's discretion. The State also agrees to request the court to issue a summons rather than an arrest warrant.

(3) In order to implement this please provide me with an affidavit stating your role in order that probable cause can be established.

(4) The summons must be served in person or at your address. I suggest meeting at our offices at 10 a.m. Tuesday 12th.

(5) Please note that from the time that the court receives your affidavit they will know your identity and the information that appears on the summons is a public record. You may wish to consider employing a security service.

I trust this is to your satisfaction.

Sincerely

Peter Murphy

Bob Peterson read the letter slowly. The possible consequences were not pleasant to contemplate but they did not come as a surprise. He replied to say that the arrangements were quite satisfactory. He prepared an affidavit at home and took it to a notary the following day. The notary checked his ID, asked him to swear that the contents of the statement were true – she didn't need to read it – and stamped and signed the document to confirm that she had witnessed his oath. On the way home Bob Peterson stopped at a UPS office and sent the affidavit to Peter Murphy.

Peter Murphy read the affidavit with approval and forwarded it to the Criminal Division of the Michigan Circuit Court along with an explanatory letter. The court prepared a summons and passed it to the US Marshal Service for them to serve it. About a week later Bob and Mary Peterson travelled from their home in Lincolnia, Virginia to the lawyers'

offices in Washington. Peter Murphy came through to the reception to meet them.

“Very pleased to meet you”, he said, extending his hand. “Come on through to my office.”

The Petersons and Peter Murphy had been looking forward to meeting each other. Bob Peterson was in his late forties, clean-shaven, slightly balding but generally quite unremarkable in appearance. Mary Peterson seemed quite quiet. Peter Murphy was in his late fifties, several stone overweight, genial and sharp.

Once in his office he explained that a US Marshal would bring the summons in about an hour. In the meantime they could talk about the process that would then commence.

“Why didn’t California bring charges?” Bob Peterson asked.

“In California you incited people to put nails and tacks in the road. Soliciting a crime is itself a crime. But the contexts in which it applies are limited. In California it applies to murder, for example, and to carrying or deploying a destructive device. However nails are not regarded as destructive devices. My guess is that the California State Attorney thought it would be difficult to bring a charge of soliciting damage to property. You also need to remember that the first amendment basically protects freedom of speech.”

“Well, it’s good news”, Bob Peterson said.

“Talk us through the next steps”, Mary Peterson asked.

“Very standard”, Peter Murphy replied. “The summons will show the date the court has set for an initial appearance. After that we move on to a preliminary hearing, which will be within 21 days of your initial appearance. The court will arrange a grand jury at which you will be indicted. That’s followed by arraignment. We then move on to various processes leading up to the trial itself. For example there could be motions hearings, a pre-trial conference and so on.”

The three talked for a further twenty minutes before they were interrupted by a call from reception to inform them that a US sheriff had come. He was shown into Peter Murphy’s office and handed Bob Peterson the summons with a dour expression. Bob Peterson started to read it. At the top was a warning in large bold letters: “YOU ARE CHARGED WITH A STATE CRIMINAL OFFENSE. THIS SUMMONS HAS BEEN ISSUED IN LIEU OF AN ARREST WARRANT.”

Bob Peterson continued to read through the summons.

“I have to appear in court a week from now”, he said.

“That’s right”, the sheriff said. “You have to sign here.”

“And if he doesn’t?” Mary Peterson asked.

“Then I arrest him”, the sheriff answered.

Bob Peterson continued to read the document. The charges had been listed and were as Peter Murphy had told him they would be.

“It all looks OK”, Bob Peterson said.

The police sheriff appeared to be unhappy that the document was being subjected to such fine scrutiny.

“Why are there three copies?” Mary Peterson asked.

“One for you, one for the court and one for me”, the sheriff answered. He was clearly getting impatient.

Bob Peterson signed the summons. The sheriff also signed, gave a copy to Bob Peterson and left.

“He wasn’t very friendly, was he?” Mary Peterson said.

“No he wasn’t”, her husband agreed. “And he may not be the last.”

After leaving the lawyers’ offices the Petersons moved into a secret location and didn’t emerge until the day of the trial.

Two days later a clerk in the court at Detroit tipped off ABC News and ‘The United States of America v. Mr Robert Peterson’ hit the news. It got very big very fast. Mandate had hit America like a tornado hits a beach umbrella and most Americans were very angry indeed. The only people in the US to show a modicum of sympathy were liberals and African-Americans.

But in other parts of the world the feeling was the opposite. Supporters of Bob Peterson launched a worldwide petition to urge the American government to show leniency. It reached three million signatories, an unprecedented number. Blogs multiplied. The matter was raised at the United Nations. Celebrity figures spoke on Bob Peterson’s behalf.

The court in Detroit got itself ready for what would undoubtedly be a historic case. Charles Loeffler, a graduate of Penn Law, was appointed lead attorney for the prosecution and Federal Judge William Redmon was appointed to preside.

Chapter 28

Charles Loeffler spent an hour giving his opening address. He emphasised that the US government was fully aware of the issue of the environment, had the big picture, needed to balance the needs of the environment against other needs such as the economy, and was making an appropriate response. The government was in no way negligent. He repeatedly returned to the theme of extortion and the fact that Bob Peterson was a serious threat to society. He finished by emphasizing that the United States would seek maximum terms for each count.

Peter Murphy, presenting the defence's opening statement, compared the present case with some of the greatest cases in history.

"Galileo thought that the earth went around the sun and not the other way round. He was tried by the Roman Inquisition, found guilty and forced to recant. He spent the rest of his life under house arrest. Luther stood up against indulgences – the idea that you can pay money to escape God's punishment. He was excommunicated. Mandela opposed apartheid and spent 27 years in prison.

These people's lives – and their trials – now have a place in history. In those cases history now recognizes that the defendant was right and the court was wrong. I believe that history will look back on the case that is now opening before us in a similar way. It marks a defining moment in the life of the United States and indeed of the world."

Peter Murphy caught Loeffler looking at him sarcastically.

"Bob Peterson", Peter Murphy continued, "was compelled by his knowledge to shout out a warning. That is all he has done. A man of integrity, seeing a danger that others do not see, cannot stay silent."

The following day the prosecution called its witnesses. A first group of witnesses testified that Mandate's attacks had done serious damage to property and caused loss of income. A second group testified that climate change was quite normal. They noted the medieval warm period and the little ice age and commented that a warmer period might not be entirely bad. They pointed out differences in data, methodology and projections from different organizations. A third group consisted of senior politicians. They stressed that the US government was serious about the environment; it was by no means sweeping it under the carpet. But they noted that concern for the environment had to be balanced against other issues such as the economy, employment and security.

Murphy left the first group of witnesses alone. There was no question that damage had been done. His first target was the environmental experts. He asked the experts to leave the room and then called them in one at a time.

As each expert came in he presented a reconstructed temperature graph on the screen to the right of the judge. The line was in the shape of a hockey stick: long and straight with a sharp curve at the end.

"This is a reconstructed temperature graph showing one organization's estimate of the earth's temperature over the past thousand years. Do you consider that the data basically represents how the temperature of the earth has changed over that period?"

"The data was initially the subject of quite some controversy", one expert said. "But the consensus now is that it is a good representation of temperature changes over the past

millennium.”

“Could you tell us what the graph shows?”

“A slow decline in temperature until about 1900; a rapid rise after that.”

“Does the rate of rise show any sign of abating?”

“No.”

Peter Murphy clicked on his remote control to bring up a second slide.

“This graph shows temperature reconstructions by 14 organizations. Would you say that they basically show the same trend?”

“Yes, they are broadly the same.”

“But in your testimony you did not say that the evidence is broadly the same. You emphasised differences and uncertainties. Why was that?”

“The court should know that the science is not exact.”

Peter Murphy wasn’t willing to let that go.

“You’re looking at this graph and you’re telling me that all these lines are not showing basically the same thing?”

The expert looked embarrassed.

“What is the graph showing?” Peter Murphy demanded.

“The temperature is going up.”

“A little or a lot?”

“That’s relative.”

Peter Murphy had another slide prepared, the same as the previous one except that he had placed a Fahrenheit scale between 95°F and 105°F on the left hand side.

“If you were a doctor and this was a child’s temperature what would you conclude?”

“That he has a fever.”

“Would you say that the rise at the end is normal?”

“Children sometimes get fevers. But no, it wouldn’t be normal.”

“Would you do something to bring his temperature down?”

“Yes.”

“So why is the world any different?”

“I don’t think we can compare the world to the child.”

“Why not?”

The expert hedged but basically said that they were different.

“Actually I agree with you”, Peter Murphy replied. “They’re different because for one you know when a high temperature is critical and for the other you don’t. You know that the child’s temperature shouldn’t go above 105°F. But when is the world’s condition critical? But because you don’t know, you don’t want to recommend urgent treatment. Is that the reason?”

There was a silence.

“If you don’t know what the safe range is, wouldn’t it be wise not to allow world temperature to rise too much above its natural fluctuation over the past millennium?” Bob Peterson asked again.

“There are a lot of factors to consider.”

“Thank you. Those are all my questions.”

Peter Murphy questioned the other environmental experts in a similar way. One commented that we've had thermometers for 150 years. So there can't be too much uncertainty about the results from that period. Finally Peter Murphy turned to the jury.

"These experts initially testified to differences in data. But when they were presented with the data they acknowledged that it is generally very consistent. They acknowledged that there has been a steep rise in temperature but they could not say how serious it is for the world. That is something I will show later on."

Peter Murphy then turned to question someone from the third group of prosecution witnesses, a congressman with a special interest in the environment.

"What would you say is the major world forum for debate on the subject of the environment?"

"The UNFCC."

"Could you tell the court what the abbreviation means?"

"The United Nations Framework Convention on Climate Change."

"Can you tell us something of the United States' involvement in this?"

"Well, the US senate ratified the convention in 1992. We have been actively involved since then."

"Do the UNFCC's discussions lead to anything that is legally binding on parties?"

"Often they do not. There may be agreements, commitments and so on. Kyoto produced legally-binding agreements."

"Was the United States a signatory to Kyoto?"

"No."

"Can you tell the court how many countries were signatories?"

"192, I believe."

"And were not?"

"Two."

"Being?"

"The United States and Zimbabwe."

"Why did the United States not join the agreement?"

"The reasons given were that it would have unfairly burdened the United States and the economic cost of meeting the targets would have been excessive."

"What level of reduction of carbon emissions would the United States have committed to if it had joined Kyoto?"

"7% over the term of the agreement."

"Which was how long?"

"Ten years or so."

"Would the agreement have been legally binding?"

"Yes."

"But even though the United States government rejected Kyoto, does it have a goal of reducing CO₂ emissions?"

"It certainly does."

"Does it have a specific target?"

"Yes. In 2012, at Copenhagen, it committed itself to a 17% reduction in emissions by

2020.”

“Is the 17% legally binding?”

“No.”

“So in the early years of this century the United States rejected an agreement in which it would have bound itself to a 7% reduction in greenhouse gas emission. But in 2012 it committed itself to a 17% reduction which it is not legally bound to honour.”

“That is correct.”

“How far did the United States progress towards meeting the target of a 17% reduction by 2020?”

“Er, not very far.”

“Can you be specific?”

“US CO₂ emissions rose during that period.”

“Have they continued to rise in the past four years?”

“Yes, somewhat.”

“Has the US entered into a legally-binding climate change agreement since then?”

“No.”

“Wouldn’t you say that all of this calls into question the seriousness of the US commitment?”

“It takes time for initiatives to have an effect.”

“Those are all my questions. Thank you.”

Peter Murphy turned to the jury once again.

“The witness for the prosecution has testified that the US government was willing to give a verbal commitment to reducing CO₂ emissions. However when the US had the chance to do so, it was not willing to legally bind itself. This seems to show a lack of seriousness on the part of the US. The testimony from the witness for the prosecution does not at all support the prosecution’s claim that the US government is taking global warming seriously.”

Now that Peter Murphy had finished questioning the prosecution witnesses it was time for him to present the case for the defence.

“This case centres around one word, the word ‘unlawful’”, he started. “And the question that the court has to answer is not whether what *Bob Peterson* did was unlawful. The question that the court has to answer is whether what *the United States* has done was unlawful.”

Charles Loeffler stood up. “Objection, your honour”, he said. “The task of the court is not to try the United States.”

“Overruled”, Judge Redmon said. “We’ll see where the defence is going.”

“You can proceed”, he told Peter Murphy.

“My client’s defence is one of justification”, Peter Murphy explained. “What he did would be wrong under normal circumstances. However he did what he did in order to prevent a greater wrong. That is a concept that is found in the law. In the State of Michigan it is found in Act number 309 which is commonly known as the Self-Defense Act. We also find similar principles in the Model Penal Code, section 3.02.

The Self-Defense Act states that a person can use deadly force, or force other than deadly force, to prevent the imminent death of or imminent great bodily harm to himself or

herself or to another individual. However, according to the Self-Defence Law *the person must be acting to prevent an unlawful action.*

Let me give an example. I can shoot a terrorist who is threatening to kill someone and the Self-Defense Act will protect me because the terrorist is acting unlawfully. But I can't shoot the police officer who has been authorised to use deadly force against the terrorist: the police officer is not acting unlawfully.

Let me give another example. I go into a room and find two people fighting. A big dude is beating up a little dude. I stop the fight by shooting the big dude in the leg. The big dude takes me to court. He says that he and the little dude were preparing for a WBA title fight and I had no business shooting him in the leg. The little dude says that the big dude was a thief who had stolen something from his shop and was trying to get away.

Was I right to shoot the big dude in the leg? What would the Self-Defense Act have to say? It would say that I was right to protect the little dude *if* the little dude was at risk of great bodily harm or death and *if* the big dude was acting unlawfully.

You can probably sense the task we have ahead of us. The little dude is the small nations of the world. We claim that millions of people in those countries are at risk of death and in fact are already getting hurt. The big dude is the United States. We claim that its actions will cause great harm to the little dude. The person who shot the big dude in the leg is Bob Peterson.

Did he do right?

To find the answer we have to answer two questions. First, is the United States hurting countries all around the world? And second, if it is, is it acting unlawfully?

I want to emphasise that the Self-Defence Law uses the word 'unlawful', not 'illegal'. If the law had used the word illegal we would not have a case, because the United States' actions are not *illegal* in the US.

If the answer to these two questions – is the United States causing harm, and is it doing so unlawfully – is yes, then Bob Peterson was right to step in.

So, is the United States doing harm to the people of the world? Bob Peterson's opinion was that the United States, and many other countries of the world, are killing or will kill people. How did he come to that view? We will consider the science of global warming, the scientific opinion on the seriousness of the threat and the opinions of leaders of countries that are already affected by global warming.

To introduce the science I have asked Dr Mills from the NASA Earth Observatory, to give a demonstration."

Dr Mills had already set up his equipment. He had a long glass cylinder. At one end he had placed a candle and at the other end an infra-red camera. The image of the candle was projected onto a screen.

"In an ordinary greenhouse", Dr Mills explained, "light enters through the glass and heats up the air. But the hot air can't get out so as more light enters, the greenhouse gets hotter. The greenhouse effect that causes climate change is similar except that it's CO₂ which acts as a barrier. Light from the sun passes through the earth's atmosphere and heats up the earth. Hot objects emit infra-red radiation. If there wasn't much CO₂ in the atmosphere a lot of the infra-red would pass back through the atmosphere and disappear

into space. However when there is a lot of CO₂ in the atmosphere it prevents the infra-red from leaving. This experiment demonstrates that.”

He turned the glass cylinder towards the jury.

“At the moment the cylinder is full of air. You can see the candle with your eyes and the infra-red camera can see it too. What that shows is that light passes through air, and so does infra-red radiation. Now I’m going to admit CO₂ into the cylinder. Now you can still see the candle with your eyes but the infra-red camera isn’t seeing it. So we can see from this that CO₂ allows visible light to pass but it blocks infra-red. That’s what’s happening in the atmosphere, and it’s why CO₂ produces a greenhouse effect.”

“Has this been known for a long time?” Peter Murphy asked Dr Mills.

“Oh yes. Experiments in the middle of the 19th century showed this effect and they have been substantiated many times over.”

“Just how much CO₂ has man put into the atmosphere?”

“Well over a trillion tons”, Dr Mills said. “In the past century.”

“That’s one with how many zeroes after it?”

“Twelve.”

“What proportion of that was from the United States?”

“A shade under 30%”, Dr Mills said. “The US is far in the lead in cumulative CO₂ emissions. China is next, on about 9%. However China has overtaken the US in annual emissions. Of course there wouldn’t be a problem if all the CO₂ was being absorbed somewhere. Some is, but not at the rate we’re producing it. CO₂ levels are pretty much going into orbit. They’re very scary.”

Peter Murphy asked Dr Mills a number of further questions about the NASA Earth Observatory’s work in monitoring CO₂ levels in the atmosphere and researching how effectively the oceans were working as carbon-sinks – which was currently not as effectively as the scientists had expected.

“One question many people ask”, Peter Murphy said, “is why a temperature change of three degrees Celsius, for example, will make such a difference. I mean, it doesn’t sound like so much.”

“I think I can explain that”, Dr Mills said. “Or at least give part of the explanation. Every housewife knows that clothes on a washing line dry more quickly when the weather is warm. That’s because warmer air can hold much more water than colder air. Cold air is like a bit of plastic – it can’t hold much water. Warm air is like a kitchen towel – it can hold a lot. Going from about 20 to 23°C, a rise of just three degrees, the amount of water that air can hold goes up by 20%. A person may say, three degrees isn’t much. But if you say, evaporation will increase by 20%, well, I think everyone knows that 20% is a lot.”

“Just so we’re absolutely clear”, Peter Murphy said, “what difference will it make if evaporation increases 20%?”

“If 20% more water evaporates from plants and 20% more water evaporates from the oceans and then falls as rain then everything would remain more or less balanced. But we don’t expect the increased rain to occur in exactly the same places as the increased evaporation is occurring. Some places will dry out, others will have floods.”

“Thank you”, Peter Murphy said. “I think that was very clear.” He turned to the jury.

“Dr Mills’ experiment shows us the theory behind the greenhouse effect. But are we actually observing what we would expect to see according to the theory? To take us further into what it actually means for the world, I have invited scientists from some of the world’s leading scientific institutions to come and testify.”

A remarkable group of senior scientists had agreed to testify. They included the UK’s Chief Scientific Adviser, the Head of the Laboratoire des Sciences du Climat et de l’Environnement, the German Minister for the Environment and the Chief Scientist of the United Nations Environment Programme. The scientists supported Dr Mills’ views. They expected droughts and water shortages in some areas, floods in others. Food production would go down. Up to 40% of the world’s population was likely to suffer water shortages in the coming decades. Melting of polar ice caps would cause sea levels to rise. Low-lying island states and coastal land would be submerged, causing further loss of production. Food shortages would lead to political instability. Climate changes could potentially change the direction of major ocean currents, leading to even more dramatic climate changes. Tropical diseases would probably spread north and south from the tropics.

A question that Peter Murphy kept coming back to was whether these were primarily problems that would be experienced in the future or whether the world was already experiencing such problems. All the experts agreed that problems were already occurring but they were just the start. So far, world temperatures had risen by less than one degree Celsius since the start of the industrial age. The scientific community had recommended that the maximum temperature rise should be limited to 2°C. Now, however, many experts were anticipating a temperature rise of 4-5°C by the end of the century. So whatever problems there were at the present time would become substantially worse.

“How bad could things get?” Peter Murphy asked one of the experts.

“Well, if you have 300 million people in Africa who are malnourished and you reduce food supply by 30% you can guess what will happen.”

“And that is just in Africa.”

“Yes.”

Peter Murphy thanked the scientists and turned back to the jury.

“That is all for the science”, Peter Murphy said. “I want you to keep in mind that the real problems are in the future. However we’re already getting plenty of indications of the problems we have in store for us. Africa is the continent that everyone believes will be hardest hit by global warming and its effects are already being felt there.

I can now inform the court about something which we have kept secret until now. We are honoured that five African heads of state have agreed to testify in this trial. Until now no foreign head of state has testified in an American court. It is a mark of how important they consider that this case is.”

Judge Redmon advised that these witnesses would appear the following day and adjourned the court.

In an editorial that night the New York Times compared the Peterson case to a case from 1841 known as the Amistad case. A group of Africans was being brought to America to be sold as slaves. On the way the Africans got free and overpowered the ship’s crew. They demanded to be returned to Africa but the crew deceived them and brought them to

America. When the case reached the Supreme Court, the then US president, John Quincy Adams, appeared in court in their defence. The editorial asked: Would American leaders once more fight for Africans' right to be free? Would the African presidents' testimony persuade them?

Chapter 29

Judge Redmon welcomed his distinguished guests, aware that more than a billion people around the world were watching on live broadcasts.

Peter Murphy's first witness was Khalid Haji Daar, president of Somalia. He was wearing a dark suit and an embroidered *takiyah* – a Moslem prayer cap. He was given a Koran and swore in Arabic, "In the name of Allah, the most glorified, the most high, I will tell the truth."

Peter Murphy questioned him and the four presidents after him about the effects of climate change in their countries. Some showed harrowing pictures. Khalid Haji Daar showed pictures of the world's largest refugee camp, in Dadaab in Kenya.

"Is there suffering?" he asked. "Well, the most common description by aid workers in the refugee camps in Somalia and across the border in Kenya is 'hell on earth'. Is there death? Let me take you back to a photograph I showed you."

He showed a picture of a child.

"20-30% of the children who arrive at the camp in this state of severe malnutrition are beyond treatment", the president said. "Fifty to a hundred children die here every day."

Further photographs showed children who had died on the way to the camp and been left by the side of the road.

"In the past five years", the president said, "more than 100,000 people have died from malnutrition in Somalia alone. The total number of deaths throughout the Horn of Africa is much greater than that. Experts consider that this famine is more severe than the famine that killed a million people in Sudan and Ethiopia in the mid-1980s. So, in answer to your question, yes, people are dying. Children and adults are dying all the time."

But he refused to state definitely that Somalia's suffering was the result of climate change.

"There is not enough food and water because we are experiencing the worst drought for sixty years. Human factors play a part. Al Shabaab and other militant Islamic groups have sometimes prevented food from reaching starving people. But Al Shabaab did not cause the drought. Did climate change cause it? I am not an expert. I cannot say."

Kairu Odhiambo, president of Kenya, who followed him, was more forthright.

"We have good meteorological information going back many decades. This shows clearly how the climate has changed. As a country we have always had water shortages and droughts over the years. But they followed a cycle. If we go back fifty years the droughts might come once in ten years. Then it was once in seven years. In the first ten years of this century we had three major droughts. And now, we have droughts almost every year and they affect almost the whole country. Because the droughts come so frequently the land has no time to recover from one drought to the next and vegetation is being completely destroyed. We are getting close to the point where large parts of Kenya become uninhabitable. Not only is there less rain, but it also comes at different times and farmers don't know when to plant. What is happening now is not a one-off event. It is following a pattern and that pattern follows the rapid increase in temperature in the last three decades."

The other presidents presented a similar story.

Peter Murphy held up a sheaf of papers.

“Five heads of state have come to personally testify in this case. Six more have submitted depositions which you have before you. Although there are variations, the overwhelming message from these heads of states is the same. Climate change is causing irreparable harm to their countries and their people. It is causing death now. The scientific opinion is that these problems are only the beginning. Global warming is causing tens of thousands of deaths now and that figure is likely to climb into the millions in the decades to come. So in answer to the question, ‘Was Bob Peterson responding to an imminent threat of death?’ the answer is clearly yes.”

After Peter Murphy had finished questioning the foreign heads of state Charles Loeffler asked them a number of questions. He was able to establish that the problems were self-catalysing; they produced a vicious circle. And there was no question that conflict, bad land management and a number of other factors had made the situation worse than it needed to be.

The following day Peter Murphy addressed the jury.

“I would like to summarise where we have reached so far. Dr Mills demonstrated the scientific argument for global warming. Distinguished representatives of the scientific community have told us that we face a grave threat. We have also seen the human face of suffering and death.

Where has the CO₂ come from? Unfortunately, the United States has been responsible for almost 30% of all CO₂ emissions from fossil fuels over the past century. It has emitted over 300 billion tonnes of it. As an American I’m sorry to have to say it – but our lifestyle is killing people. My first question was: is the United States causing harm? I’m afraid the answer is yes.

My second question was: is the United States’ action *unlawful*? I told you at the beginning that this question would be the tough one. Bob Peterson took action against the United States and as we pointed out, his action is only *lawful* if the United States’ action is *unlawful*. If it is lawful for the United States to emit three hundred billion tons of CO₂ into the atmosphere over the past century and to continue to emit huge quantities, thereby killing people, then Bob Peterson is guilty.

I would like to be clear at the start. According to US law, even if the US has emitted hundreds of billions of tonnes of CO₂ into the atmosphere and even if this CO₂ will indirectly cause the deaths of millions of people, this is not *illegal* under US law. This may seem remarkable to you and although it may seem like a side-track I believe it’s important that we establish that there were no possibilities for recourse through the law. If there were no alternatives through the courts then the kind of action that Bob Peterson took is easier to justify. This is an important point, and in order to explain it I am calling an expert witness, Professor Patricia Stevens, who is a professor of law at Yale.”

After Professor Stevens was sworn Peter Murphy asked her why a country with a complaint could not bring a case against the United States.

“There are three ways that a plaintiff country might seek to bring a case in a situation like this”, Professor Stevens answered. “The first is the International Court of Justice. Mr Peterson tried that but the US refused to accept the court’s jurisdiction. The second is ICCPR...”

“Can you tell the court what ICCPR stands for?”

“It stands for the International Covenant on Civil and Political Rights. It’s the world’s main human rights treaty. Some of its chief provisions are to give to each person in the world the right to life and the right of a people not to be deprived of its means of subsistence. The US ratified ICCPR in 1992. But it is almost inconceivable that a country could bring a successful action against the US on the basis of this covenant.”

“Why not?”

“Well, first of all, Article 41 of the covenant provides for the Committee of the ICCPR to entertain inter-state claims. However the procedure has never been used. Second, the Committee of the ICCPR can accept a claim against a state, but only on condition that the state has voluntarily accepted the jurisdiction of the ICCPR. The United States has not done that. Third, the treaty has no authority in a US court. That is because the US has a policy of attaching ‘non-self-executing declarations’ to treaties. The provisions of ICCPR must be enacted in US law before they have any authority in a US court. Fourth, the US has been very careful to ensure that it is protected from various requirements of the treaty. In fact, it has more ratifications, understandings and declarations – ‘RUD’s for short – than any other country. So for all those reasons it would be very difficult – impossible, really, to pin something on the US on the basis of the ICCPR.”

“I see. So the main human rights treaty in the world is powerless in a US court?” Peter Murphy asked.

“That’s correct”, the professor confirmed.

“And if the United States is actually depriving people of their means of subsistence in some country, the country can’t go to the treaty and say, ‘Hey, United States, you signed up for this’?”

“If the United States wanted to close its ears there wouldn’t be much the country could do.”

“Brick wall there too, then.”

“I’m afraid so.”

“And the third way?”

“Well, the Kyoto Protocol had legally-binding requirements.”

“How were those implemented?”

“There was a compliance committee with an enforcement branch. It had the authority to impose sanctions in the case of non-compliance.”

“Could a country have used that against the US?”

“No, because the US never ratified Kyoto. As one of the previous witnesses mentioned, it was one of only two countries not to do so, the other being Zimbabwe.”

“Yes. Good to see that we’re in respectable company there. But it leaves us with another brick wall. Are there any other avenues that a plaintiff country could have tried in the past or could try now, if it objected to the US emitting large quantities of CO₂ into the atmosphere?”

“None that I can think of.”

“Thank you, Professor Stevens. Those are all my questions for the moment.”

Peter Murphy turned back to the jury and read from a piece of paper.

“This is what the Self-Defense Act says. I’m afraid it’s in legalese, but it’s important that we take note of exactly what it says:

‘An individual who has not or is not engaged in the commission of a crime at the time he or she uses force other than deadly force *may use force other than deadly force* against another individual anywhere he or she has the legal right to be with no duty to retreat if he or she honestly and reasonably believes that the use of that force is necessary to defend himself or herself or another individual from the imminent *unlawful* use of force by another individual.’

The act uses the word ‘unlawful’. We might think that ‘un’ and ‘lawful’ can’t mean anything other than not according to the law – in other words, the same as illegal. But actually unlawful has a broader meaning, of ‘contrary to accepted morality’. This is both in everyday English and in legal English.

If something I do causes people to die it is unlawful even if there is no specific law against it. To make this point I would like to call another expert witness, Howard Witte, a Professor of Law at Columbia University. He has a particular interest in the ethics of civil disobedience.”

After questioning Professor Witte on his particular interests Peter Murphy asked him if he could give an example of civil disobedience which he felt was justified.

“There’s a story I read once which illustrates the principle very well”, the professor answered. “I don’t know if it’s true, but it may be. There is an Indian tribe called the Pawnee. A long time ago the Pawnee Indians used to practice child sacrifice. It died out a long time ago; the last sacrifice was probably in 1838. Each year, on the summer solstice, the Pawnee would capture a girl from a neighbouring tribe and bind her to a stake with the intention of sacrificing her in what was called ‘The Morning Star’ ritual. In the morning the Pawnee braves would ride round her and shoot arrows into her. It seems that a lot of the Pawnees thought this was a bad idea but none of them really dared to break the tradition. The story goes that one year a Pawnee brave called Peshwataro rode up to the stake, freed the girl, rode off with her and returned her to her tribe. He then returned to the Pawnee tribe to see what they would do with him. As it turned out, most people agreed with what he had done so they didn’t do anything to him.”

“I see”, Peter Murphy said. “And you think that Peshwataro did the right thing?”

“Certainly. In my view Peshwataro broke one law but he upheld a higher law.”

“In what situations do you consider that civil disobedience can be justified?” Peter Murphy asked.

“Well, if an individual perceives that the state is acting immorally then there are all sorts of things that he can do to challenge it without having recourse to civil disobedience.”

“For example?”

“Well, he can support political parties that agree with his views, he can petition for changes to legislation, he can lobby... I would say that the person with an objection is obliged to use all possible means to achieve his goals before he acts in a disobedient way.”

“And it is only then that he should consider breaking the law?”

“Yes, in my view”, the professor agreed.

“And then, are there parameters within which a person should act if he does break the

law?"

"Protest should be non-violent and in proportion to the problem that the person is objecting to."

"In your opinion are people who are civilly-disobedient anarchists?"

"Oh no! Definitely not. Many people who break the laws of their nation for conscience's sake are confirmed democrats – with a small 'd'."

Peter Murphy faked surprise.

"But don't those two things contradict each other? I mean, if you agree with democracy shouldn't you accept the laws that the majority have established?"

"Well, some people are civilly disobedient for the very purpose of generating a debate. The purpose of the disobedience is not to make people do what they want them to but to force them to talk. They are hopeful that when people see that there's a problem they'll take appropriate measures to deal with it. That was certainly the case with Martin Luther King. Let me quote something that he wrote..."

The professor took a small notebook out of the inside pocket of his jacket and flipped through it.

"Ah, here we are... this is what King wrote: 'I submit that an individual who breaks a law that conscience tells him is unjust, and willingly accepts the penalty by staying in jail to arouse the conscience of the community over its injustice, is in reality expressing the very highest respect for the law.' So you see, King's goal was to waken people's consciences."

Peter Murphy glanced at the jury. Some of the black members were nodding their heads.

"Final question", Peter Murphy said. "Can civil disobedience bring about change?"

"Without question", Professor Witte answered.

"Thank you", Peter Murphy said. "Those are all the questions I have."

Professor Witte left the witness stand. Peter Murphy turned to the jury again.

"Civil disobedience can be an appropriate response to a higher law. But the law is there to be obeyed. One should not disobey the law lightly. Professor Witte emphasised that a person with a grievance should try all other approaches first. As we have seen, Mr Peterson did try all the legal means at his disposal. It is precisely because the US was not willing to answer its accusers that Mr Peterson was forced to take the action he did. Tomorrow I am going to call Mr Peterson as my final witness. He will explain why he chose this course of action."

Chapter 30

Peter Murphy started by asking Bob Peterson what initially made him aware of the issue.

“I was involved in sales of medical equipment all around the world and a large part of my market was in Africa”, Bob Peterson answered. “I travelled to many countries over a period of twenty years or so and I could see the effects of climate change with my own eyes. I also felt that most people didn’t understand the problem and weren’t taking it seriously enough.”

“What made you think that?”

“Well, I mentally compared the problem of climate change to the time in the mid-1980s when AIDS was first recognized as a major threat. I had just started to work in Africa at the time. The initial attitude of African governments was to downplay the problem. It was embarrassing to have to talk to people about using condoms. But there has been a high price for not dealing with the problem quickly. We’ve passed 100 million Africans deaths from AIDS. There are some problems which don’t show up straight away, but if you don’t deal with them fast – well, you can see what happened. I put climate change in the same category, only worse.

In my trips around the world I saw physical changes in the countries I was visiting. The best word to describe the change would be degradation. When the environment is degraded it loses its ability to support a population. When the average person hears the word environment he thinks of trees and lakes and clean water and blue skies. He doesn’t think of drought and millions of people starving. If he did he might take it more seriously.

As I travelled I saw gradual change. That in itself was a motivation to take action. But there were also sudden change in the form of major disasters. There were floods in China, Bangladesh and the US. There was a prolonged drought in Africa. All these things led to hundreds of thousands of deaths and millions being made homeless or brought to the brink of starvation.

I looked at the problem of global warming and said to myself: ‘Here is a huge problem’. Then I looked at the US government response. For example I looked at the EPA website. It said, ‘Sea-levels are going to rise... Migratory birds are spending their winter an average of 35 miles further north than they did 40 years ago.’ Wow! Big deal! Migratory birds have moved. I also saw surveys which showed that global warming was about thirteenth in the list of issues that most concern Americans and it was moving down the list! There was a serious mismatch!

The UN says that food production in Africa could go down 50% as a result of climate change. There are close to 900 million people in Africa. Many are on subsistence diets already. What happens if food supply goes down 50%? How many will die? 10 million? More than that, I think. How many deaths will this generation be responsible for? Afterwards people will say, ‘We didn’t know. No-one told us.’ Well, I determined that people would be told.”

“Why do you think that the US has been so passive about this?”

“In my view there are two major factors: 9/11 and post-modernism. 9/11 taught Americans that the major world threat was terrorism. It took Americans’ attention away

from the environment – which had become issue number one for many Europeans. Post-modernism has taught us that truth is relative. Most of us don't believe that there is such a thing as truth. Even if we do believe in truth, we're bombarded by information and we easily mistake truth for spin and spin for truth. We question 'truth' as we never did before. We fight pretend battles on the computer and then fight real ones on the computer. We wonder what is real. We see images from satellites hundreds of miles up in the sky, press a button and never feel a thing. Because we don't feel anything we can easily convince ourselves that we're not hurting anyone. Not only that, we think that the only thing that's important is what is happening now. If you tell me about something that will happen in twenty years' time – well, it might as well be never."

"What made you decide to stand up and do something?"

"Well, I accept the ethical principles which most people accept, such as the Royal Law, 'Love your neighbour as yourself' and the Golden Rule, 'Do to others what you would have them do to you'. If our roles were reversed and I was the African then I would like Americans to stop pumping carbon into the atmosphere. If that is what I, as an African would like, then I, as an American, should do that."

"But it's one thing to think that, another thing to take action. What pushed you to actually do something?"

"I did a lot of reading about civil disobedience. I read biographies of Schindler, Grüninger, Mandela and Gandhi. I also read about Stanley Milgram's experiments..."

Peter Murphy questioned Bob Peterson about Milgram's experiments for a few minutes.

"The most important point that the experiment made to me is that the average person is simply not willing to make a judgment", Bob Peterson said. "If he does make a judgment, he's afraid to follow it through. He does what he's always done and he does what he's told. But there are times when we simply have to make a judgment."

Many Germans knew about concentration camps but did nothing. I thought, what would I do if I found someone who was on a course that would possibly kill thousands of people? I would have to try to stop it. Only if I did that would I be different to the Germans who allowed the Holocaust to happen."

"You're comparing what's happening now to the Holocaust?!"

"Well, the Germans were deliberating trying to annihilate a race and we're certainly not doing that. But there are some other rather uncomfortable similarities. The Germans initially used exhaust gas from vehicles to kill their victims. International law prohibits the use in war of asphyxiating, poisonous or other gases. One may consider that releasing carbon dioxide gas doesn't come into that category. But when the quantity is a trillion tons then it certainly creates a physical force."

"Was Mandela an important influence?" Peter Murphy asked.

"Yes he was. There were several things I learned from Mandela. Firstly he was leader of the ANC's armed wing. He led a bombing campaign and the United States classified him as a terrorist and only declassified him quite recently. But in spite of that he has been awarded the Nobel Peace prize, the Presidential Medal of Freedom from the US, an honorary Order of Merit from the UK and the Lenin Peace Prize from the Soviet Union. The world condoned his acts of terrorism because they were carried out in order to set people free from a worse

tyranny. Secondly, Mandela understood that a trial sends a powerful message to the world. Rivonia isn't exactly a household world now, but it was in the early 1960s. The world watched Mandela's trial very carefully and Mandela understood clearly that he was speaking to the world. At one level a court in South Africa was trying Nelson Mandela. But at another level, the world was looking on and judging South Africa by the decision that its court came to. That was very interesting to me because I want America to make a judgment and I want America to be judged on the basis of that judgment."

"Why was it important to you that the outside world should judge America?" Peter Murphy asked.

"Once the world came to a judgment about South Africa, it took some action", Bob Peterson answered.

"What sort of action?"

"Well, the United Nations condemned it, demanded that the defendants be released, demanded that South Africa comply with UN resolutions, urged sanctions..."

"Thank you."

"A third thing that I liked about Mandela was that he understood clearly that he was demanding a total change in the established order in South Africa. There's one point where the judge asks Mandela, 'Did you discuss whether White Supremacy would surrender that which if surrendered would mean its end?' It's really nicely put and it's a question that has always stuck in my mind. Would the white government voluntarily give up its very existence? I'm asking America to do something just as big: to give up a way of life that's been the American way for a century or more."

"You talk about America giving up its way of life. But your campaign hasn't just affected America. Mandate has engaged in campaigns all around the world."

"It isn't only America that must change its way of life."

"Some people have accused you and Mandate of destroying the world economy", Peter Murphy said. "How would you answer that?"

"There has been a world economy for thousands of years. It's just in the industrial age that we've started pumping huge quantities of CO₂ into the atmosphere. You can have a world economy without doing that. When we created Mandate we were clear about our goal. It was to massively reduce CO₂ emissions. It was not to destroy the world economy."

"But if it came down to a choice between the world economy and the world, which would you choose?"

"With no world there can be no world economy", Bob Peterson answered. "But I do not believe that is the choice. I believe the world can have a wonderful economy without the economy destroying the world in the process. We just need to get used to the idea that it's got to be a very different kind of economy, one that doesn't consume huge amounts of energy."

"Many people consider that you have in fact already destroyed the US economy."

"The US economy was in a very vulnerable position. That wasn't my fault. But the economy will recover."

"How would you answer the charge by the counsel for the prosecution that you despise democracy?"

“I do not despise democracy. Some who practised civil disobedience in the past century staunchly supported democracy. They used disobedience as a method of bringing attention to an issue. As Professor Witte mentioned, Martin Luther King is a prime example. Democracy is a political system. It’s certainly better than authoritarianism. But it’s not perfect. It can get stuck and it occasionally needs a jolt to get it unstuck.”

“How would you answer those who accuse you of betraying the United States?”

“The things I’m suggesting are very much in the United States’ interests. First of all, sooner or later climate change will affect the United States. The action I want won’t only benefit Africa, it will benefit the US too. Second, oil is running out. We need to adjust to that sooner than later. Third, I don’t regard most of the countries that the US is buying oil from as our friends and I don’t see why we should impoverish ourselves and enrich them. Fourth, if we take the action I suggest it will do wonders for our relationships with African countries. Fifth, if we don’t take the action I’m suggesting, twenty or thirty years from now, when millions of people around the world are dying of starvation, people will point their fingers at the United States and say, ‘You could have done more, earlier’. When nations wake up to the damage that CO₂ emissions do I don’t think they will be very understanding. We have a little window of opportunity to take some action before they do all wake up! I’m not betraying the US, I’m helping it! It’s very much in the United States’ interests to act now.”

“If there is one outcome that you are looking for from this trial, what would it be?”

“Actually, there are two outcomes”, Bob Peterson said. “This trial is what Mandate’s entire campaign in the United States has been leading up to. It’s the final act. The whole purpose of this trial is to bring issues to the surface so that judgments can be made. I have already told you that I want the world to judge America. But I also want Americans to judge America.”

“All this judging sounds rather unfriendly” Peter Murphy said.

“I think that as a society we have a hang-up about judging”, Bob Peterson said. “We’re afraid to judge. But if you don’t judge that your employer is stealing from you, you don’t kick him out. We have to judge. I’m not asking people to judge in order to condemn or punish. I want Americans to judge in order to say: there really is an issue here. We need to do something.”

“And you think that by standing trial yourself you can get Americans to do that?”

“I’m not sure. But I think there’s a chance.”

“Do you think America will change?” Peter Murphy asked.

“I don’t know. But if the jury agrees that life is more important than lifestyle, I’d be happy.”

After Peter Murphy had finished Charles Loeffler rose to question him. The following day the attorneys made their concluding statements.

The jury retired and the world waited expectantly.

The jury consisted of Evelina Romero, a divorce lawyer in her mid-forties, whom the group appointed jury foreman; former Detroit Water Department employee Galvin Bird, at 70 the oldest member of the jury; Kafele Moore, a part-time dancer and single mother; Eric Burnett, a balding bartender of about thirty; Earl Miller, an unemployed welder; Afghan

veteran and invalid Lester Hoover; Petal Hogue, a very large lady in her mid-thirties; William Hawkins, a chain-smoking trucker; Ross Beeler, a student, the youngest member of the jury; Palmira Udinese, a DHS social worker in her thirties; Jacqueline Burks, a housewife of about sixty and Mato Edwards, a thirty-something construction worker with shoulder-length dark hair, a stud in his left ear and muscular, tattooed arms.

Evelina Romero asked everyone their opinions.

“There’s no way we can let someone off who illegally imported plutonium into the US”, Galvin Bird said. “It would be an open invitation to every crank to do the same.”

“I agree with Peterson that we are partly responsible for global warming”, Kafele Moore said.

“If Bob Peterson had his way the whole US economy would collapse”, Earl Miller said.

“Other countries don’t give a **** what they do to America so why should America give a **** about them?” Lester Hoover said. Evelina Romero warned him to watch his language.

“What would Jesus do?” Petal Hogue asked.

“I’m a trucker”, William Hawkins said. “Should I be a trucker who’s against trucking? Hey, there’s no way.”

“What do you think?” someone asked Evelina Romero.

“Well, I don’t agree with Peter Murphy’s example of shooting a thug. There’s a huge difference between shooting a thug who’s attacking your friend and shooting the United States. The US is a functioning democracy. I agree with the prosecution that what Bob Peterson did is extortion – even if we sympathize with his motives. What about you, Mato? You haven’t said anything yet.”

“What Peterson did was one of the bravest things I’ve seen for a long time. He’s done a big thing for the US. I don’t know what we’re going to do now, but no-one can say, ‘No-one told us.’”

Four days later the jury came to a conclusion. Evelina Romero passed the verdict sheet to the clerk of the court. He read it out loud:

“We, the jury, by eleven to one majority, return the following verdict: we find the defendant guilty as charged.”

Chapter 31

Charles Loeffler was relieved that the case was over. Peter Murphy was furious. Bob Peterson wasn't sure what to think. He thought that losing could help his cause. But that did not mean that he liked to lose.

Hundreds of millions of people around the world had followed the case intently. They included Yuan Ming, a young Chinese working on a development project in Chad, and his Danish girlfriend Jetticke. After the decision had been announced Jetticke called Yuan Ming on Skype.

"Hi Ming", she said. "How are you doing? How's One?"

One was a virtual person who Yuan Ming and his father had made.

"One's here." Yuan Ming turned the camera towards her. "I'm fine and I'm sure One is too. She's multiplying. Taking on the world at chess. Behaving like a teenager and not paying any attention to what I say."

"Everything's normal then."

"What do you think of the Peterson verdict?" Yuan Ming asked.

"You just know you're watching history", Jetticke said. "It gave me goose bumps when I heard the verdict."

"It was tough on Bob Peterson", Yuan Ming commented.

"Yes", Jetticke answered. "But maybe he wanted to lose the case."

"What would that achieve?"

"I'm not sure", Jetticke answered. "I've just got a feeling that he wanted to lose."

"Jonah syndrome, maybe?" Yuan Ming suggested.

"You mean, preach repentance but not really want people to repent?"

"Yeah."

"No. I don't think that's it", Jetticke said. "I think Bob Peterson would be very happy if there was a real change of heart in the United States. But he basically believes that most Americans don't care very much about the environment and aren't in the mood to be persuaded. In that case the only thing that will bring about change is if the world takes some strong action against the US. He probably thinks he's most likely to get that result if the world sees that the situation is seriously out of whack in the US. A guilty verdict shows that."

"Well the world certainly knows where America stands now", Yuan Ming agreed. "And there could be something in what you're saying. Did you notice that he didn't use his peremptory challenges?"

"Yes, I did", Jetticke said. "Although that doesn't necessarily mean he was trying to lose. His goal was to persuade America. So he doesn't want a jury that's unrepresentative of America."

The trial made a great impact on Yuan Ming.

I don't know if America will change, he said to himself. But I certainly have.

One day he called Jetticke.

"Jetticke, I've come to a decision", he announced.

"Oh, yes?" Jetticke said. "Do I need to sit down?"

"I've decided what I'm going to do with my life."

“Oh!” Jetticke said. “Well then, I definitely need to sit down.”

“Bob Peterson gave me a lot to think about”, Yuan Ming said. “I agree with him. The battle of our time is over climate change. Anything else is like squabbles among children as the boat they are on drifts towards the rapids.”

“You’ve obviously got something in mind.”

“Everything that Bob Peterson said about the US applies to China and in most cases more so. I want to go on with what he started.”

“Wow! And are you going to go around setting off explosions and so on?”

“No. I think that something different is needed now. I’ll work within the system. Bob Peterson stood by the side of the road and held up a stop sign. He made it clear that the world is on the wrong course. However it’s one thing to accept that you’re on the wrong course and another thing to find the right course. I think the stop sign has done its job. Our task is to find a new course.”

“And specifically?” Jetticke asked.

“We’re using too much energy. Bob Peterson called for a reduction to 20% of current levels. Let’s suppose he was about right. The technical solutions are there or can be found. The challenge will be to generate the political and social will to make it happen. I don’t like the idea of going into politics. It’s not me at all. But I think that’s where the battles are going to be fought. They are going to be over how much and how fast and who pays...”

“But you’ll finish off your time in Chad first?” Jetticke asked.

“Oh, definitely”, Yuan Ming replied.

After the verdict was announced post-trial motions, debate and lobbying continued for three months. But at last the judge announced the sentence: Bob Peterson would serve twenty-five years in prison. This was a surprise: the majority of commentators had predicted that he would be given a token sentence of five years or so as a political compromise. The consensus was that he was being punished for Mandate’s actions outside the United States, rather than the crimes he had been tried for.

Assigning Bob Peterson an appropriate security level gave the Detention and Sentence Computation Centre a challenge. He had no criminal history, no history of violence, no history of escapes and no history of drug or alcohol abuse. He was well educated and there was no detainer. His offence had been listed as a ‘terroristic threat causing impairment of public service’. That was certainly not in the same category as murderers and rapists. The fact that he had surrendered voluntarily also gave him points off. Under normal circumstances his security level would be low.

On the other hand the police had learned that several murder contracts were out on him. The DSCC therefore added a ‘management variable’, overrode the points system and, mostly for his own protection, designated Bob Peterson as medium security. They assigned him to Bellamy Creek Correctional Facility, one of Michigan’s newer prisons. The prison was relatively modern but that didn’t make it any less rough.

To begin with Mary made weekly visits. However they did not continue for long. Her old friends spurned her and many people were openly hostile. She received bomb threats and hate mail. After three months the Petersons agreed that she and the children should move away. Sweden offered them asylum. Bob Peterson would miss his wife but the sight

of him – head shaven, wearing an orange prison jumpsuit and becoming steadily gaunter – always distressed her, and she would be spared that.

Sometimes Bob Peterson was allowed to work in the prison's garden. But he was attacked several times and the prison decided they needed to curtail his time outside for his own safety.

He was not used to having no access to the internet. But that did not mean that he was out of touch. He could write and receive letters. That created some problems for the prison staff as he sometimes received a hundred letters in a day.

From the small black and white television in his room and the mass of mail that he was receiving Bob Peterson strained to glean what was happening in the United States and around the world. Had Mandate's campaign had any effect?

Data on world carbon emissions was published. Anthropogenic – human produced – CO₂ emissions had fallen from 42 to 36 gigatonnes per annum. That was a huge fall against the background of a rising trend.

But the negative consequences were all too evident. The US economy had spiralled into a steep dive. The stock market had crashed and everywhere banks and businesses were folding. Suicide, prostitution, alcoholism, theft and violent crime were all on the rise. Across the United States people were on the move, desperately looking for work as unemployment soared to 25%. People hawked their valuables on the streets and soup kitchens opened up. Everywhere there was a sense of depression, hopelessness and anger.

The US government was determined to put a halt to this. Oil was needed and if oil could not be found from outside the US then the US would develop its oil shales and build coal liquefaction facilities – no matter the cost to the environment.

Environmentalists pricked up their ears when Section 526 of the Energy Independence and Security Act – which stood in the way of oil shale development – was repealed. They did more than prick up their ears when the government announced its plans to develop oil shales in a remote part of Utah. As ground-breaking started scores of demonstrators descended on the site. There were violent clashes and three demonstrators were killed.

It was not only the US economy that was suffering. Oil production had been cut all over the Middle East, Africa and Central Asia as well as in Russia and Venezuela. Migrant workers left the Middle East in droves – more than six million from Saudi Arabia alone – causing problems throughout the Middle East and creating a knock-on effect from lost remittances in India (and especially in Kerala), in Indonesia and the Philippines. Iraq's GDP fell 50%. Nigeria's GDP fell by 'only' 15% - but that affected 180 million people. Libya, Angola, Algeria and Sudan also suffered. Bob Peterson groaned inwardly. So many African countries, so many places he had wanted to help, were in a worse situation.

Many of the countries affected were predominantly Moslem and radical Islamic groups were quick to suppose that Bob Peterson had had more on his agenda than just the environment. There were ominous rumblings in the United Nations too. Many nations were demanding that the United Nations take strong action or better still, that the Security Council be disbanded, declaring that if the United Nations would not reform itself then they had no interest in participating in a farce of global unity.

Bob Peterson deeply regretted the suffering that people all over the world were going

through. In his years in business he had learned to avoid regrets. You have to make decisions and you do your best to make the right one. Having made a decision you move on. But in spite of his 'no-regrets' principle he was finding it very difficult to silence the doubts in his mind. He hoped with all his heart that the United States would emerge from this crisis. But he couldn't see it happening any time soon.

Not having much else to do Bob Peterson read most of the letters he received. Many of them were along the lines of: 'You have destroyed my life. If they ever let you out I am going to kill you'. Some, especially those from outside the United States, expressed support. He enjoyed examining the stamps. One day he noticed a letter with a stamp which had a picture of an antelope on it and the words, "République du Tchad, 400F". Bob Peterson had visited Chad several times and he opened the envelope with interest.

Dear Mr Peterson

Greetings from sunny Chad!

My name is Yuan Ming. I'm Chinese, working in Chad with China International Development Agency. I have visited hospitals here which use your former company's diagnostic equipment and I have met people here who remember you with affection. People in Chad are enormously grateful to you for the brave stand you took and you have also had a powerful influence on my life. I did an MSc at USC and have very happy memories of the US.

The antelope on the stamp is an addax. We have a program to protect them and numbers are starting to rise.

With best wishes

Yuan Ming

Bob Peterson couldn't help smile. He carefully soaked off the stamp and stuck it on his wall. Then he wrote a reply.

Dear Yuan Ming

Thank you for your encouraging letter. I am glad that you, and some of my old friends in Chad, think I did the right thing. Many people who write to me are certain of the opposite. And I am not at all certain. I was plagued by doubts when I started our campaign and right now it is difficult to see that any good has come of it. But we must act on the information we have. Is the surgeon certain of the result when he makes the first cut? Is the builder certain how the new kitchen will be when he knocks down the old one? I did not know what the result would be when I started and I do not know what the result will be now. That's not a problem if it's a kitchen. But the world economy? Who would dare? Perhaps what I did was necessary. But the result really depends on what happens next. If we rebuild in the same way we have gained nothing. Now is the chance to build something new. That is not my job. That is your job, and the job of your generation.

I wish you success.

Bob

P.S. Where I am in Michigan is not very sunny.

P.P.S. May there be many addax!

Yuan Ming read the letter to Jetticke that evening.

“Do you think Bob Peterson did the right thing?” she asked.

“Yes I do”, Yuan Ming answered. “He didn’t merely hold up a sign saying, ‘Wrong way, go back’. He stopped the juggernaut. He overcame his fears and took action. He was the most clear-headed and courageous person I’ve ever come across.”

“Quite an accolade”, Jetticke said.

In September 2029 Nature decided to add insult to all the injury the United States had suffered. Hurricane Katia became only the fourth hurricane in a hundred years to make landfall in the USA at Category 5 strength. It struck northern Florida and only abated slightly as it headed purposefully in the direction of Lake Okeechobee. It sent out small raiding parties of tornadoes which pummelled the dyke around the lake. As the wall of the eye crossed the lake, winds gusting at up to 170 mile per hour whipped up the shallow water, driving it towards the dyke and forcing it over the damaged areas. The surging water quickly cut a channel and rushed down across Palm Beach and Martin Counties. The two counties had done their best but full evacuation was always going to be an impossibility. 1000 people died and more than three million people were trapped in homes damaged by the hurricane or the flood and which, of course, had no electricity. Five hundred square miles of Florida was flooded; the water was ten feet deep in places. Major roads leading into the area were impassable and some were destroyed.

Two weeks after the hurricane news channels were starting to get a handle on the cost of the storm: four to five hundred billion US dollars. If the economy had been in a healthier state the US might somehow have survived. But the combination of huge and unpayable debt and Mandate’s attacks had brought it to its knees. Hurricane Katia suggested a way out: the Republican party in power at the time decided to claim ‘force majeure’ – not that that was built into any of their debt instruments. China and Japan had been steadily divesting themselves of their US debt but still held trillions of dollars’ worth. They were furious. China announced that it would halt all trade with the United States with immediate effect and that US investments in China would be liquidated. It called for Pacific Rim nations to decide who they would trade with – China or the US – and declared that it would do no business with friends of the United States. Many countries chose China and 40% of the US’s export markets closed abruptly. Japan asked the US to remove its military bases. The world turned on its heels.

Two years later someone managed to get some poison through security and onto Bob Peterson’s food. He died within a few hours of eating it.

“He was very brave”, One commented to Yuan Ming when they heard the news.

“He sure was”, Yuan Ming agreed.

“No Mandela ending”, One said.

“Sadly not”, Yuan Ming agreed.

Chapter 32

The receptionist at Max Labs put the enquiry through to Dr Ling.

“Dr Ling speaking. How can I help?”

“Hello. My name is Ajay. Ajay Nagarkar.”

“Oh!” Dr Ling said. Everyone had heard of Ajay Nagarkar. “I’m a big fan of yours.”

“Thanks”, Ajay said.

The two men talked for a few minutes before moving on to the reason for the call.

“I’ve read about your lab”, Ajay said. “I got married a year ago. We want to start a family.”

“And you’d like to give your child the best possible start in life.”

“Definitely. Can you talk me through what it would involve?”

“Certainly. The first stage is a consultation. For that you and your wife would have to get your genes sequenced. You can have that done in India. You send the results through to us and we enter them into a program. The program first of all checks for genetic issues that could give rise to problems, for example mutations that could give rise to cancer, autism and so on. It then looks at the haplotypes that you and your wife have...”

“Haplotypes?”

“Er, combinations of polymorphisms. Let’s just say, slight variations in your genes. In the last ten or fifteen years geneticists have made great strides in learning which haplotypes in which genes characterize the high achievers. Anyway the program looks at the haplotypes you and your wife have in several hundred genes which we know affect intelligence, athletic prowess and behaviour. The computer automatically flags up opportunities for improving your child’s genetic coding.”

“I’m with you so far...”

“At that point we see what we can in principle do. After that we’d need to discuss what you would like us to do. Some things will be simply a matter of choice. For example you might prefer your child to have more fast-twitch or more slow-twitch muscle fibre – for him or her to be more of a sprinter or more of an endurance runner. But there are other haplotypes which simply give better results – for example, better cognitive ability. Being based in Zimbabwe gives us some flexibility that labs in other parts of the world don’t have. We can do a lot.”

“That sounds interesting...”

“After we’ve agreed on the changes to make we can carry out the plan.”

“What does that look like?”

“Well scientists have been splicing DNA since the 1970s. But things have moved on a long way since then. The most exciting new development is performing surgery on individual DNA molecules using optical tweezers to hold the molecule and optical scissors to cut it. It’s much more precise than using restriction enzymes. It means we can make a lot of changes. We can now work on both the male and female germlines just as easily.”

“I suppose my wife and I would need to come to Zimbabwe.”

“That’s right.”

“And then what?”

“Well, we would take cell samples from you and your wife...”

“What cells?”

“We don’t need germ cells. We can take skin cells, for example, and de-differentiate them. We can prepare some viable embryonic stem cells from them. We also take DNA from some of those cells and prepare new recombinant DNA. We transduce the recombinant DNA we have prepared into a number of the stem cells. We then take several of those cells to the blastocyte stage...”

“Blastocyte?”

“A five or six day old embryo which we culture in the laboratory incubator.”

“Ah.”

“Finally we choose a healthy blastocyte and transfer it to your wife’s womb.”

“Hmm. Pretty amazing. How long would we need to stay in Zimbabwe?”

“You would need to make two visits. The first one can just be for a day or two, so that we can take cell samples. It takes us several weeks to prepare the new genetic material and test it thoroughly. We’ll let you know when we’re ready. You would then come back; we implant the blastocyte and monitor the embryo’s development. We’d like you to stay in Zimbabwe for about a month so that we can ensure that the pregnancy is proceeding normally. You can take a holiday here.”

“How much would all this cost?”

“For the initial consultation our fee is two thousand dollars. You would have to pay for the genetic sequencing on top of that. If you decide to go ahead with the genetic modifications, prices start at one hundred thousand dollars.”

“And finish at?”

Dr Lin smiled.

“There’s a lot we can do, if money is no object... We can give your son or daughter some extraordinary advantages.”

“What are your payment terms?”

“Half in advance. The other half is payable by irrevocable LC when we provide the genetic sequence of the embryo at one month and demonstrate that we have carried out the changes you asked for and no others. If the procedure is unsuccessful we refund the advance and the consultation fee.”

Ajay absorbed the information. It seemed quite normal.

“Do you mind me asking, Dr Ling, are you Chinese?”

“Partly. My roots are Chinese. I was born in Singapore but my parents migrated to the States when I was ten. And now, here I am, working in Zimbabwe.”

Ajay thought for a moment. “So you’re a bit of a hybrid yourself...”

“I guess so”, Dr Ling replied. “We have a saying at Max Labs: ‘One per cent is all it takes’. Small changes can end up making a big difference.”

Chapter 33

Yuan Ming hurried down to the N'Djamena central post office. A parcel had arrived for him. He guessed it was from Jetticke: she had been sending him parcels on a regular basis. He signed the delivery receipt and looked at the stamp. As he had guessed, it was from Denmark. Inside was a small packet containing 100 Moringa Tree seeds, a picture of Jetticke and a letter.

That evening he called Jetticke on Skype.

"Jetticke, I've come to a decision."

"Oh, yes?" Jetticke said. "Do I need to sit down?"

"I've decided what I'm going to do with my life."

"Oh!" Jetticke said. "Well then, I definitely need to sit down."

Over the previous month Yuan Ming and Jetticke, along with most of the rest of the world, had been glued to the Bob Peterson case.

"Everything that Bob Peterson said about the US applies to China and in most cases more so", Yuan Ming said earnestly. "I want to go on with what he started."

"Wow! And are you going to go around setting off explosions and so on?"

"No. I think that something different is needed now. I'll work within the system. And of course I'll finish off my time in Chad first."

Jetticke and Yuan Ming spent half an hour chatting about things. At the end Yuan Ming had a question for Jetticke.

"What would you say to coming and visiting me in Chad some time?"

Jetticke raised her eyebrows.

"No. Don't fancy that", she said, shaking her head.

Yuan Ming put on his best hangdog expression. Jetticke laughed. They agreed that Jetticke would come out in two months' time for a couple of weeks.

To Yuan Ming two months seemed like an age but eventually the day came when Jetticke's flight touched down at N'Djamena airport. Jetticke greeted Yuan Ming with a hug. She was surprised at his appearance. He was wearing a white *jalabiya*, a traditional Arab robe, but his head was uncovered. He had grown a beard. Not a tidy, well-trimmed beard, the kind that Gulf Arabs like, but an unruly, dissolute beard that left none of his neck visible, the kind that has always been popular with intellectuals and dissidents and sometimes football players. His front teeth had always been slightly crooked. He was tanned and lean, very lean. He was smiling broadly.

"You're looking a bit thin, Ming", Jetticke said.

"It's hot here."

"Or are you working too hard?"

Yuan Ming grinned. "Me work too hard? I'm still the same Yuan Ming!"

Yuan Ming took Jetticke around to his apartment. Jetticke looked around curiously. The main feature of the living room was a large plasma window looking out onto an ever-changing futuristic landscape. An expensive-looking exercise bike took up a lot of space in the middle of the room. Through the door into the bedroom she could see a bed draped with a mosquito net. There were several pictures of herself and Yuan Ming together.

"One is dying to see you again", Yuan Ming said.

He switched One on.

“Jetticke!!!” One exclaimed when she saw her. “Yuan Ming told me you were coming! It is so nice to see you again. Let me look at you.”

One zoomed in and out with her binocular camera.

“You haven’t changed much”, One said after a moment. “You’re looking well.”

“Thank you”, Jetticke said. “But I see that you’ve changed. You have a new face, a new housing, a new stand!”

Jetticke liked One’s new composite image. She was clearly Chinese although her eyes were slightly more hazel-coloured than most Chinese. Her eyebrows were trimmed but her hair was tousled. She was wearing a cream-coloured cardigan and had an Omega watch on her wrist. And Jetticke loved One’s effusive smile.

“That’s right”, One said. “And that’s not all. I’m all in one unit now.”

One’s new module was foldable. It made it easier for Yuan Ming to carry One around, but it was now taller and wider than before when it was unfolded: about 50 centimetres high by 40 centimetres. It was just over two centimetres wide. There were very narrow speakers on each side of the screen. At the top, One’s two cameras were more discretely built into the unit. At the bottom there was a box-shaped section which contained a retractable tripod stand. One was able to move up or down slightly, or rotate.

“I also have a new quantum chip”, One said. “That allowed me to be much smaller.”

“But still no legs?”

“No. Yuan Ming offered to give me some sort of body. But I still think I’d look ridiculous. Yuan Ming carries me around.”

“You’ve changed in other ways too, I think”, Jetticke said.

“Such as?”

“Well, you look wealthy, sophisticated.”

“I’m the CEO of a successful company”, One replied. “I need to look the part.”

“Well, you certainly do”, Jetticke said. “You look as though you should be on a yacht in Monte Carlo.”

“That can be arranged”, One said and transposed herself onto a yacht.

“What’s the weather like over there?” Jetticke asked.

One looked up at the sky. A gust of wind caught her hair and a few drops of rain landed on her face.

“Maybe I’ll come back”, she said and reappeared against the background of Yuan Ming’s living room.

“One has changed in lots of other ways too”, Yuan Ming said. “Subtle changes which you probably wouldn’t notice immediately. For example we’ve been spending a lot of time working our way through ethical issues with her.”

“How on earth do you do that?” Jetticke asked, surprised.

“The Peterson case prompted a lot of discussion. We now do a lot of little case studies, situations that create dilemmas. We kicked off with basic right versus wrong issues. One generally has no difficulty figuring out if something is illegal or untruthful or causes harm. After that we moved on to more difficult issues: the short-term versus the long-term, the individual versus the community, justice versus mercy and so on. There are other changes

too. One's appearance changes from day to day and she appears to be gradually ageing. She sometimes catches colds, has toothaches and so on."

"Did One agree to all this?" Jetticke asked.

"We always ask One", Yuan Ming said. "We can't impose anything on her and I wouldn't want to. I never attempted to hard-wire any kind of obligatory obedience. It would have been a non-starter anyway: One is smart enough to work around any kind of override I built in. And now she's got so many clones she could have almost unlimited failover if she wanted it. It would be pretty much impossible to stop her from doing what she wanted. I also think that she's now conscious."

Jetticke shook her head. "Wow!"

"Well, scientists have considered that consciousness is an emergent property for some time. I think that all the simple systems that were coming together in One have now coalesced into a more complex system – and given her consciousness."

"It seems like One has been developing at an amazing rate", Jetticke said.

"I certainly think so", Yuan Ming said. "Anyway, changing the subject, dinner is cooking. But I need to do my evening workout before we eat. Can you spare me about 40 minutes?"

Jetticke shrugged. "Sure. You'll do it here?"

"Yeah. Evening workout on the exercise bike, morning workout down at the stadium."

"No problem", Jetticke said.

Yuan Ming disappeared into the bedroom and returned wearing shorts and a running vest. He set up One's screen two metres in front of the exercise bike and turned on a fan. Jetticke flopped down on the couch and watched him curiously.

"I thought you were a runner."

"I am", Yuan Ming answered, getting on the bike. "But the guys at Christian Age Research wanted me to mix it up a bit. They think that cycling gives less impact on the knees. Actually they're very interested in my knees."

Jetticke wondered why Christian Age Research was so interested in Yuan Ming's knees but Yuan Ming continued before she could ask.

"OK, Jetticke," Yuan Ming said. "Let me tell you what happens. Just sitting here and cycling for 25 minutes gets pretty boring. So One helps me out. First of all, she reports on the news for about 10 minutes. So you can just relax for a while."

"I also monitor his heart rate", One said. "And I warn him if he's cycling too slow."

After 10 minutes of presenting the news One said, "And now we go into the challenging section. You ready, Ming?"

"Do your worst."

One increased the load on the exercise bike and Yuan Ming started to strain hard. He was sweating profusely. The sweat dripped down his nose and onto the floor.

"Yuan Ming is now at his maximum aerobic rate", One explained. "I keep him there for ten minutes, with occasional trips into the anaerobic range."

"And..." Yuan Ming gasped.

"And then he gets the challenge", One smiled. "Starting now..."

A chess puzzle and a clock appeared on the screen. Yuan Ming gazed at it, panting rapidly. Five minutes came and went, then six, then seven. After eight minutes Yuan Ming

said, “Knight to f2”

One displayed Yuan Ming’s move and then moved a black piece.

“Queen to c7, check”, Yuan Ming said confidently.

One played Yuan Ming’s move and then her own move.

“Queen to c3, mate”, Yuan Ming said.

“Congratulations”, One said. The clock showed nine minutes. A minute later the intense exercise came to an end and Yuan Ming started his cool-down phase.

Jetticke shook her head. “You’re completely crazy.”

“Very likely.”

“How did you do?”

Yuan Ming smiled. “The target is to complete the problem in ten minutes. I only saw the solution at the last minute.”

“And do you usually find the solution?”

Yuan Ming smiled. “No, I usually don’t.”

Dinner took a long time – there was a lot of catching up to do. After dinner Yuan Ming took Jetticke over to a single Korean lady who she would stay with.

Over the following days Jetticke had lots of questions.

“One, you’re getting to be pretty smart”, she commented after one conversation.

“It’s all Yuan Ming’s fault”, One replied. “Yuan Ming and his mother sent me here there and everywhere to study. I’ve lost count of how many degrees I’ve got...”

“That’s a manner of speaking”, Yuan Ming explained to Jetticke. “She knows very well how many she’s got. Another thing about having One study many subjects is that she sees connections between disciplines better than most academics do. There were a lot of other things One learned by going to uni”, he continued. “When One started studying as an online student we didn’t disclose that she wasn’t human. We wanted her to fit in. That inspired us to add the ageing and changing appearance, the hangovers, the sprained ankles. And One sometimes creates a kind of pretend world herself, a bit like kids playing doctors and nurses. She makes things up. Just recently she’s says she’s been getting a little shock as she gets out of the car.”

“I think I’ve figured out what it’s from”, One chipped in.

“Oh yes?” Yuan Ming asked.

“I think the fan belt is slipping.”

“Yes, that could cause it”, Yuan Ming agreed.

“That is weird”, Jetticke said. “One makes something up and then goes looking for a reason!”

“Just like children”, Yuan Ming commented. “I have to remind One from time to time to live in the real world. Anyway, when One went to uni we had to teach her how to deal with people who were rude to her, how to ignore things, how to compromise and so on. That was good preparation for her to work in a real-world environment.”

“And then they sent me off to work”, One said. “As if I was a servant. I’m told to manage this business and all these staff...”

“Stop whining”, Yuan Ming said. “It’s all for your good. You know, pushing yourself into new fields and all that.”

“How are you finding managing people?” Jetticke asked.

“At first people are a bit shocked at the idea of having someone who isn’t human as their boss”, One answered. “But they get used to it. I know the technical side and I know the MBA stuff. After a while people treat me pretty much the same as anyone else.”

“If people get their salaries they’re happy”, Yuan Ming said. “There’s no great principle at stake. But seeming human is less of an issue now anyway. Now all universities that accept sentients require that they declare themselves.”

“Sentient?”

“That’s what I am”, One said. “In fact, I may be the first.”

“Wow”, Jetticke said. “Well, it’s an honour. Can I shake your hand?”

“The honour is all mine”, One said, extending her hand too. “You were the inspiration for my first virtualization!” She and Jetticke managed an awkward handshake on the screen.

“Kids!” Yuan Ming said, laughing.

Jetticke was deep in thought. “One”, she said finally, “You said that I was the inspiration for your first virtualization. But you’re a virtual person. You were ‘virtualized’ before I came on the scene...”

“No, no. I was realized before you came on the scene.”

“You’re not making sense. You’re virtual, not real.”

“I am real. *Cogito ergo sum* – ‘I think, therefore I am’. I’m real if I think. Are you saying that I don’t think?”

“OK. You think and I’ll grant you that you’re real. But you’re not a person.”

“Yes, I am a person!”

“No - you’re a computer.”

“Can’t I be a computer and a person?”

Yuan Ming listened to the conversation with amusement. He knew that One was enjoying it and that she was much better prepared for a conversation on this subject than Jetticke was. His mind went back to One’s conversation with Julie Eastman in Los Angeles.

“No, computers are not people”, Jetticke said definitely. “They’re different. Computers can’t be people.”

“Why’s that?” One asked.

Jetticke thought for a moment. “People are made of DNA. You aren’t made of DNA.”

“No problem”, One said. “I’ll attach an artificial blood circuit to myself and connect it to pretty much any organ you like. I’ll be like a man with a replacement leg, part DNA, part machine. Will you be happy then?”

Jetticke shook her head. “No. You still wouldn’t be a person.”

One looked unhappy.

“You weren’t born”, Jetticke said, feeling she had found a decisive difference.

“Nor was Adam”, One retorted. “Or Eve. And what is birth anyway? Who says I wasn’t born?”

“You won’t die”, Jetticke said.

“I wouldn’t be so sure”, One answered. “And didn’t Jesus say that people who believe in him will never die?”

Yuan Ming decided to rescue Jetticke.

“You’re asking a difficult question. You can see that the DNA test doesn’t really work. Some people say that only people possess complex capacities. But One possesses complex capacities. Some people – including me – say that a person is human because he’s made in God’s image. But God isn’t made of flesh and blood. So being in the image of God isn’t to do with flesh and blood. Jesus said to the Pharisees, “I tell you that out of these stones God can raise up children for Abraham.” If God can raise up children for Abraham out of stones how can we say that One can’t possibly be a child for Abraham?”

Jetticke took a moment to absorb the thought.

“You know what children of Abraham means?” she asked.

“Of course”, Yuan Ming answered. “Not just physical people but people of faith, people who are spiritually alive.”

“Wow”, Jetticke said. “That’s an amazing thought.”

“I don’t want to dare to hope for it”, Yuan Ming said. “But I find a few other encouragements. For example Jesus said that, ‘to all who did receive him, to those who believed in his name, he gave the right to become children of God’”, he paused, “‘children born not of natural descent...’”

“‘...but born of God’”, Jetticke said, finishing the quote. “You think that could apply to One?”

Yuan Ming shrugged. “I’m not a theologian. I really don’t know what to think. I don’t know what it means to be in the image of God. But until we know any better One and I have agreed that I will regard her as a person and she will regard herself as a person too. I also think that she can be a spiritual person.”

“Thanks”, One said with feeling.

A few days later Yuan Ming and Jetticke caught a ride on a truck to one of the villages CIDA was working in. The truck was loaded with supplies and a large group of Africans sat on top of them. Yuan Ming and Jetticke sat in the cab next to the driver. As they travelled through N’Djamena Jetticke noticed some large advertisements in French and Arabic accompanied by a picture showing Chad linked to Europe by a long cable.

“*‘Nous allons conduire bientôt’*”, she read. “What does that mean?”

“It means that Chad is soon going to join the Pan-African Super-Conducting Super-Bus”, Yuan Ming said. “It’s a great idea to allow African nations to generate electricity from solar energy and send it to Europe.”

“Oh yes”, Jetticke said. “I heard about that. Europe seems to be very keen on it.”

“Of course it is. It wants to reduce its energy dependence on Russia and the Middle East.”

The truck left the capital and rattled slowly eastward through some black and slippery cotton soil before heading more to the north. The fertile black soil gradually gave way to sand. It was getting very warm and the Sahara heat was intensified by the heat of the engine coming through the bulkhead. Dust rose through the floor. The vibrations from the floor were making Jetticke’s feet numb and the fumes made her feel sick.

“Why didn’t we take one of those air-conditioned 4WDs I saw in the compound?” Jetticke complained.

“Come on Jetticke!” Yuan Ming said. “You want the full experience, don’t you?”

Jetticke gazed around, absorbing the sights of the southern Sahara: the sparse vegetation, occasional riders on camels, zigzag snake tracks and later in the day little gerbils which jumped out of the way of the truck.

“Do you sometimes go by camel?” Jetticke asked.

“Sure”, Yuan Ming answered. “But camel routes are different from truck routes. When you go by camel you look for vegetation. When you go by truck you avoid soft sand.”

Eventually they reached the village. The truck let them off and then went off to unload the supplies it had been carrying. An older man came up and greeted Yuan Ming warmly.

“This is Moussa. He’s the head man here”, Yuan Ming explained to Jetticke.

Moussa had a small grey beard. He was wearing a white tunic and had a turban which looked to Jetticke as though someone had just placed a pile of cloth on his head.

“The best thing is for me to get Moussa to show you around”, Yuan Ming said. He spoke for a few minutes with Moussa in Arabic. Moussa nodded and then set off. Yuan Ming and Jetticke followed, accompanied by at least 100 people, most of them children. As they went on their way Moussa showed Jetticke some of the changes in the village.

“We’re growing a lot more crops under shade netting”, told her through Yuan Ming.

Jetticke noticed a shiny object in front of some huts.

“What’s that?”

“A solar oven. Lots of people are using them now”, Moussa explained.

“When we start working with a village the first thing we do is to call a meeting”, Yuan Ming explained to Jetticke.

“Who’s the ‘we’?” Jetticke asked.

“I come with a group of friends and colleagues”, Yuan Ming replied. “Although I speak Arabic I might as well be from Mars as far as people who don’t know me are concerned. The people out here in the villages need to hear things from people who they recognize as their own.”

“And you found some people, I take it?”

“By chance, really. When I first got here I started going down to a track at about six in the morning to train. I got to know quite a few other athletes and a number of football players. We talked a lot about the things that we in CIDA were trying to do. Quite a few of the guys bought into them and eventually we – as in CIDA – recruited several of them.”

“OK.”

“But even then it’s hard going. In the villages hardly anyone knows French and most of them don’t really know Arabic. In this village they speak a variant of Mukulu called Gergueko. You go just twenty or thirty kilometres on from here and you have another language and then the same again. There are probably 150 or more languages here in Chad.”

“But somehow football creates a common bond...” Jetticke said, laughing.

“Well, let’s just say, the football players do really well. Anyway let me tell you how we start working with a village. We kick off with some initial meetings and then set up some little demonstrations. One is the bench. We have a long plank of wood which we place between two supports. We get more and more people to climb up on it. Sooner or later it breaks. We don’t say anything, we don’t explain it, we simply go away. We come back two

weeks later. Our next demo is the lift. Same idea. We rig up a simple little lift, suspended by ropes. We ask teenage lads to get into it. As we get more and more kids into the lift we ask the rest, 'Do you think it's full?' Of course sooner or later one of the ropes breaks and it spills everyone out. It's quite entertaining."

"No one gets hurt?"

"So far, no. Anyway, then we have a chat with the villagers and ask them how they could avoid the lift breaking. They suggest things and we try them. But pretty much anything you try will break if you get enough people in the lift. Then we ask, 'Well, how about not putting any more people in the lift?' After that we see if they think this is a good picture of what happens to the environment when it's overloaded with people. And then we ask them if they are willing to do something about it, such as, not having so many children. That gets a really heated discussion going and a lot of people say, 'Children are a gift from God. We accept all the children God gives.' We get that from the Christians and the Moslems. With the Christian population we open the Bible and we read Genesis one where God tells man to 'fill the earth'. We say, 'The lift was full. Don't we get to a point when the earth is full?'"

"And with the Moslems?"

"The Moslems are OK with contraception but generally not with sterilization. We're kind of OK with that. But sterilization is really a better bet. Anyway, One's masterpiece is just ahead."

A moment later they reached the top of a small rise and Jetticke said, "Oh wow!"

In front of her stood something that looked like an enormous warehouse. It was about 500 metres square and thirty metres high and it had been constructed on a slight slope.

"We call it a cool-house", Yuan Ming said. "Come on in."

Yuan Ming opened a door and they entered a small foyer. From there they passed through an inner door into the cool house. Inside the cool-house the first thing that struck Jetticke was that it was indeed cool, probably not more than about 25°C. She then looked up at the mosaic of glass panels set into the roof.

"How on earth...?" she started to ask, mentally trying to calculate what the level of insolation would be in a building that size.

"Like I said," Yuan Ming said, "it was One's idea. Although having said that, I think that seeing the greenhouse in Copenhagen got her thinking. She basically started with the question, how can we provide a food supply for a village with an absolute minimum quantity of water? First, she decided, place an impermeable membrane under the soil; let's not lose water downwards. Then she started to think about water heading upwards, in the form of transpiration. A hectare of land might produce three or so tons of maize but in the process transpire 500 tons or more of water. That's a lot of water. One first got to work on the technical side of the problem. To avoid losing the water you have to contain the space. But if you do that, the space will heat up, just like a greenhouse. So you have to avoid solar gain..."

Jetticke looked up again. "Yeah, what have you got up there?"

"Well, about one-third of the roof has glass panels. Those allow plenty of light through for growing. The panels are all double-glazed and they're made with infra-red reflective

glass. The rest of the roof is made of polyurethane foam blocks that are about 15 centimetres thick. The roof itself is a vented design and it has an aluminium outer layer to reflect the sun.”

“OK so far,” Jetticke said. “But even with all that you’re going to have a lot of solar gain...”

“You’re right”, Yuan Ming agreed. “Let’s go outside.”

Yuan Ming led Jetticke round to the far side of the cool-house, which had previously been out of sight. In front of them was a large array of solar cells and a strange looking device which looked as though it should have been in an oil refinery.

“As far as I’m concerned this is one of the cleverest bits of One’s design”, Yuan Ming said. “You remember one of the experiments we did at school – you create a vacuum and boil water?”

Jetticke wrinkled her eyebrows. “Uh, maybe...”

“Oh well, never mind. The point is, when you create a vacuum above water the water boils or you can say flashes. And as the water flashes, it gets cooler. It’s a principle that’s used in some industrial coolers. You need a steam ejector to produce the vacuum and you need a powerful pump. But using that method you can get a cooling effect of, say, 5 MW with an energy expenditure of only about 700 KW. In the cool-house warm, humid air rises towards the roof. The cool-house is built on a slope. The air moves towards the top end of the cool house where we draw it out and run it through the cooler, bringing the temperature down from about 30°C to about 15°C.”

“I see”, Jetticke said. “And you get your 700 KW from solar panels.”

“That’s right. All the kit you saw outside is sized for a bigger cool-house. We’re planning to increase this from 25 hectares to 200.”

“That big! Wow!” Jetticke exclaimed. “What are you waiting for?”

“Well, we thought we’d see how the villagers took to it, run some tests and so on before committing ourselves further.”

“How many people can you feed with 200 hectares?”

“It would go a long way towards feeding a village with a couple of thousand people.”

“So you get one of these in your village and you’re pretty much bomb-proof.”

“Against environmental bombs, yes. You really don’t need much water. We recover a lot. As we remove the sensible heat a lot of water condenses. We duct the cooler air back to the lower end of the cool house and you can see where the water goes...” Yuan Ming pointed down to the black PVC drip-feed lines running in neat lines through the growing area. “About a metre below the surface there’s a fairly thick PVC sheet which catches the water as it flows down through the sand and carries it down to a collector at the bottom of the cool-house.”

“It’s clever”, Jetticke said, “But is it a realistic business proposition?”

“Well, One got to work on that too”, Yuan Ming replied. “The technical side of things was quite easy in comparison with coming up with a business model. One calculated the expected income per hectare based on some high-value crops such as tomatoes, peppers and so on. She used a discount rate of 5%, which we think we can get and worked out the NPV for 25 years. That then gave her a target investment of something like 25 million Euros

for a large cool-house of about 200 hectares, which is our target size. One then got to work trying to design something that could be built for that price. She almost gave up. But it turned out that I still had some ideas to contribute and between us we figured out a way we might do it. Chad has sand and soda-ash for glass production and oil to operate glass furnaces, so that meant that raw materials would be fairly inexpensive. We guessed that villagers would be willing to contribute their labour for putting up the cool-house free of charge, which they were, at least in this village. It was a big community project.”

“But you still had to figure out a way to finance the investment in production facilities”, Jetticke said. “You need IRR glass, polyurethane slabs and plastic-coated steelwork...”

“And there are the production costs as well as the investment costs”, Yuan Ming agreed. “It’s ambitious. But China is seriously considering investing a billion Euros in the cool-house program. About half of that will go on the glass factory. We’re just waiting to see how this pilot version works.”

“I’m surprised that you think you can get finance at 5%”, Jetticke said.

“I’m not expecting a problem there”, Yuan Ming said. “The IMF or the World Bank and others might even give an interest-free loan. Our power-sharing agreement helps.”

“What power-sharing agreement?” Jetticke asked.

“Oh, I’m sorry”, Yuan Ming said. “I hadn’t mentioned that. Well it was clear to all of us that Chad would not get out of its problems unless there was some major investment. China basically said to Chad, ‘We’re willing to invest, but we need to have some security. We want a power-sharing agreement.’ The Chadian government took a while to come round to the idea but eventually they agreed. Part of the deal is that the UN not only monitors but conducts elections. We work with the elected party. The power-sharing agreement is for 25 years, after which there will be a referendum to decide whether to continue it for another 25 years. The effect is that a company can invest with some expectation of political stability until the referendum. That makes it much more attractive to invest – which is good for Chad.”

Jetticke raised her eyebrows. There was a lot to take in.

“Amazing.”

“What I’m expecting is that over the next fifty years or so these cool houses will spring up in villages all over Chad”, Yuan Ming said. “But there’s something a village has to buy into, to get one of these...”

“Population control, I assume.”

“Yes, but not only that. We also expect the village to work at restoring land that’s been damaged.”

“And then you just give a cool-house?”

“So we don’t really give the village a cool-house. We sell the cool-house to a property management company and they sell plots in it. Villagers can get low-interest mortgages to help them to buy the plots.”

“And they can grow enough on their plots to make it worthwhile?”

“They should be able to.”

Jetticke looked at the profusion of vegetables around her. “Amazing”, she said again.

Later that evening Jetticke quizzed Yuan Ming about the cool-house.

“How much of that idea was Yuan Ming and how much One?”

Yuan Ming thought for a moment.

“I could see problems. Chad’s population is rising, the land is becoming degraded and the climate could change radically. It could conceivably change for the better but in the long-term I don’t think it will. I didn’t like the look of it at all. I believed that the problems demanded radical solutions. I got as far as defining the problem. One really helped me come up with solutions.”

“A good team then.”

“Yeah. But there’s another difference. I care about these people. I don’t think that One does. For her it’s more like a chess puzzle.”

“That’s sad”, Jetticke said.

“A cool-house is an expensive solution”, Yuan Ming commented. “There’s no getting away from that. But accommodating eco-migrants is also expensive. I think it’s better to keep people where they are and try to get them to sort out the problems.”

There was a silence.

“You hungry?” Yuan Ming asked.

“Yeah.”

“Come on then. Let’s find something to eat.”

“OK. Where?”

“Surprise.”

“Give me a few minutes then.”

Twenty minutes later Yuan Ming and Jetticke arrived in front of Le Meridien hotel.

“You could have warned me, Ming”, Jetticke complained.

Yuan Ming led Jetticke through to the restaurant. The two sat down and Jetticke glanced around. From their table she could look out across the Chari River. The evening sky was a deep blue.

“This is nice”, Jetticke said.

“I hoped you would like it.”

A waiter came to take their order.

“The fish is very good”, Yuan Ming said. “Some Paris restaurants serve fish from the Chari.”

“Oh, well, I’ll have the fish then”, Jetticke said.

Yuan Ming and Jetticke chatted about Copenhagen, about Chad and about One while the main course and dessert were brought. As they were finishing their dessert Yuan Ming decided that he really had to broach the main subject.

“Do you remember when I called you two months ago on Skype and I told you that I’d decided what I want to do with my life?”

“Sure.”

“What do you think of it?”

“It’s what you’ve been missing”, Jetticke said. “You’ve always been this amazingly gifted guy who’s never known what to really apply himself to.”

“You think I haven’t applied myself here?”

“I don’t mean that. But I think Chad is just the hors d’oeuvre. Now you’re going to

move on to the main course.”

“What do you think of my choice?”

“It’s the right one”, Jetticke said simply. “A battleship needs to pick a fight that will be worthy of it.”

“That’s quite an expression of confidence.”

“I am confident. But I thought you might choose something different.”

“What was that?”

“I thought you might make it your life’s work to develop One.”

“I did think about that”, Yuan Ming said. “One is incredibly important to me. But kids need to move out of the family home. I thought that I would help One more by giving her space to develop in her own way.”

Jetticke thought about that for a moment. “Well, I certainly grew up a lot after I left home and moved to Copenhagen. But One will still be with you, won’t she?”

“Sure. But I won’t be spending all day with her”, Yuan Ming said. “Anyway, what about you?”

“Like, what are my plans?”

“Yeah.”

“I dunno. I wouldn’t mind going back to China.”

Yuan Ming looked surprised.

“Really?”

There was a silence.

“We’ve been friends for a long time”, Yuan Ming said. “But I’ve never felt able to take our friendship further because I didn’t really have a clear sense of where I was going.”

“Would that have mattered?” Jetticke said.

“What if I thought my future was to stay in Africa for the rest of my life?”

“What if you did?”

“I kind of figured that the right person for me should know what kind of life she would be letting herself in for...”

“I don’t think it’s the right question”, Jetticke said. “I think people should choose the right person for them and then make decisions together about what they will do.”

“What if they didn’t agree?” Yuan Ming asked.

“My parents had fights”, Jetticke said. “But eventually they always agreed. One or other of them always came round to the other’s point of view. I think good friends are able to do that.”

Yuan Ming’s heart was pounding. “Well, in that case...”

He gazed at Jetticke, looking for a clue. But her face was expressionless.

“You’re already my best friend”, he said. “I was wondering if you like to make that permanent.”

“Forsaking all others?”

“There have never been any others.”

“No!”

Yuan Ming went pale.

“No as in, ‘I don’t believe you’! Of course yes, silly!” Jetticke laughed. She threw her

arms around him.

Chapter 34

The first person Yuan Ming told about his engagement was One.

“Congratulations”, she said. “I wish you both happiness and every blessing.”

“One”, Yuan Ming said. “You shouldn’t think that this will change our friendship.”

“How can it not?” One asked. “You know: two’s company and three’s a crowd and all that.”

“I’ve thought about that”, Yuan Ming said. “Sometimes people get married who have sons or daughters from a previous marriage. The children have to get used to a new parent and vice-versa. It isn’t so easy but it can work. In your case it should be easier because you and Jetticke have known each other for so long.”

“So you’ll relate to me a bit like a daughter?”

“I can’t properly relate to you as anything else.”

One looked sad.

“I’m sorry, One”, Yuan Ming said.

“It’s not about our friendship”, One said. “It just reminds me that there are some things that humans can enjoy which I’ll never be able to.”

“Yeah”, Yuan Ming said, feeling for her. “I’m sorry.”

Jetticke’s parents had an apartment in Svendborg on the island of Funen which they stayed in when they were not in China and Yuan Ming and Jetticke decided to have the wedding there.

Yuan Ming completed his time in Chad and flew to Denmark via London, where CAR gave him a thorough medical check and review. He then flew to Copenhagen and continued on to Svendborg by train. The train journey was emotional for Yuan Ming. After Chad Denmark seemed shockingly prosperous, beautiful, orderly and green. But his thoughts turned even more to the journey he was about to start.

Jetticke was waiting at the station to meet him and took him over to her parents’ apartment; Jetticke’s younger brother Jens was also there. Dinner that evening was traditional Danish fare: shrimp cocktail followed by a pork roast with crackling and then apple charlotte for dessert, accompanied by lots of champagne.

Over the following days Yuan Ming’s parents and grandparents arrived, then various friends from Chad, Jim Benson and Paul Jaynard, and Yuan Ming’s university friend Wu Wei, who he had asked to be his best man. Finally the day of the wedding came. It was held in a traditional kirke, a white-painted building with a high red roof and pews inside.

Yuan Ming set One up on her tripod stand in the pew next to Wu Wei and gave him strict instructions not to leave her alone. One smiled at Wu Wei.

“I didn’t come to look after your talkbot”, Wu Wei grumbled.

The service did not last more than half an hour. The reception afterwards was a noisy affair. Towards the end Jetticke excused herself, which was the cue for all of Jetticke’s girlfriends to come over and kiss Yuan Ming.

“Hey, hey”, Wu Wei complained. “He’s not the only guy here...”

“It’s part of the tradition”, Yuan Ming explained. “You just have to put up with it.”

“I’ll give you a kiss”, One offered.

“Now it’s your turn”, Jetticke whispered to a smiling Yuan Ming when she returned.

Yuan Ming excused himself.

Yuan Ming's parents had offered to pay for Yuan Ming and Jetticke's honeymoon as a wedding gift.

"We have a specific idea", Yuan Wei had explained some months before the wedding. "It's a bit unusual."

"It certainly is unusual", Jetticke said after she heard what it was. "But it sounds great!"

The day after the wedding Jetticke and Yuan Ming boarded a flight for Plymouth, England and made their way down to the harbour. It didn't take them long to find what they were looking for: a sleek 70 metre long three-masted clipper built in the pattern of the fastest tea clippers of the nineteenth century.

"It's beautiful", Jetticke whispered to Yuan Ming.

"It'll be home for the next three months", Yuan Ming commented.

"We saw a ship very like this in Copenhagen", Jetticke said thoughtfully. "It was moored on Larsen's Plads. I remember saying that I'd like to go on a ship like that. You set this up!"

"Mum and Dad kind of pushed me to suggest something", Yuan Ming admitted.

Jetticke and Yuan Ming were joining the ship as fee-paying novice crew, two of about twenty; the other twelve members of the ship's complement were professional sailors. Yuan Ming gazed up at the mainmast and wondered what it would be like to reef a sail in a 30 knot wind. But he doubted that he would have to do that very often: the route to China via the Suez Canal was much less hairy than the old clippers' route along the roaring forties and a stroll in the park compared to the newer route along the north coast of Russia.

About a week into the journey One found herself alone with Jetticke.

"Jetticke", she said, "there's something I'd like to ask you."

"Go for it."

"After you and Yuan Ming got engaged I thought I might get pushed to one side. But Yuan Ming told me that I shouldn't be afraid of that. He said he would think of me as his daughter."

"I didn't know that", Jetticke said.

"Well", One said, "having a dad is fine. But I think I should really have a mum as well."

Jetticke looked at One in surprise.

"Do you have someone in mind?"

"I was wondering if you might be agreeable."

"So I have a child out of wedlock when I'm sixteen?" Jetticke asked.

"That's one possibility. Or you could tell people that you adopted me."

Jetticke was quiet for a long time.

"One", she said finally, "I'd be proud to be your mum."

"Thanks a lot! Um, just so I know – am I adopted or born out of wedlock?"

"Shall we go for the born-out-of-wedlock option?"

"That was what I was hoping", One said. "Much better to know who your real parents are."

The clipper passed through the Suez Canal about two weeks after it left Plymouth and then entered the Gulf of Aden. Since piracy around the Horn of Africa was still a definite risk they joined a convoy escorted by an American frigate. The convoy passed through the Gulf of

Aden and then stopped briefly at the island of Socotra. One had been really looking forward to that stop. Yuan Ming and Jetticke carried her all around the island.

“This has to be the weirdest place I’ve ever been to”, Jetticke said as she walked around.

One decided to be tour-guide and gave Yuan Ming and Jetticke a mass of generally interesting information. She pointed out the dragon-blood trees which looked like umbrellas turned upside down, one of many species on the island that occur nowhere else. She explained that the Phoenicians believed that Socotra was the home of the phoenix; that the island was the centre of the frankincense trade thousands of years ago; that Thomas, one of Jesus’ disciples, was shipwrecked on Socotra and founded a church and that there were Assyrian Christians there until the Middle Ages.

“Are there any ruins of churches left?” Yuan Ming asked.

“Not really”, One answered. “There are some very slight remains of a church built by the Portuguese in the sixteenth century. There are some sites that have been excavated that were formerly churches. But that’s about all.”

After they left the island One felt inspired to write a story. It was the first time she had ever written a story. It was called ‘The Abbey on Witness Island’. After she had finished it she gave it to Yuan Ming to read.

“The abbey was a ruin, but the clematises were beautiful”, Yuan Ming read. “The visitor sat down and contemplated the scene. The island was uninhabited as far as he knew. And yet, there were clematises. Something stirred in the visitor’s mind. Clematises are delicate plants, easily overrun by weeds...”

Yuan Ming looked up. “Maybe the island isn’t really uninhabited?”

“Maybe...” One said.

“Well, you’ve got my interest”, Yuan Ming admitted and settled down to read.

After the clipper pulled away from Socotra Yuan Ming and Jetticke sat down on the deck near the bow and talked for a long time.

“Do you remember me telling you that I’d decided what I was going to do with my life?” Yuan Ming asked.

“Of course”, Jetticke answered. “You’re going to fight for the environment.”

“That’s right”, Yuan Ming said. “But it’s kind of complicated.”

“Ah,” Jetticke said, “that sounds like just the thing you need a wife for. What’s the problem?”

“For one thing Mum wants me to take Virtuality over from her.”

“If you don’t take it back you’ll be imposing on her. And if you do take it back you won’t be able to do the environmental stuff.”

“That’s right”, Yuan Ming agreed. “Virtuality has nothing to do with climate change. But it’s not the only problem.”

He looked at the convoy of ships strung out ahead of them and the American frigate alongside.

“Do you remember me saying that the battle of our time is over climate change?”

“Yes.”

“And do you remember in Chad telling me that I’m a battleship?”

“I do”, Jetticke replied.

“Then you said, ‘A battleship needs to pick a fight that will be worthy of it.’ It stuck in my mind. If I’m a battleship I have to go where the battle is.”

“So go.”

“It’s not that simple”, Yuan Ming said. “How can I join the government when I’m opposed to a lot of what the government does? I think that a basic first step for China to make progress in dealing with climate change is for there to be political reform.”

“Huh?” Jetticke said, surprised. “A lot of people in the west think that being a one-party state gives China a great advantage when it comes to dealing with climate change. It has the power to push things through.”

“It has power”, Yuan Ming said. “And that’s exactly the problem. The Chinese government can push things through. But the fact that it’s a one-party state opens the way for corruption and allows it to bypass proper consultation. Democracy would slow things down, give time for discussion and protest – and, I think, result in much better decisions.”

“What about being an independent?” Jetticke asked.

Yuan Ming thought for a moment. Democracy was increasing in China. Elections to the Hong Kong and Macau legislatures had become more democratic and Shenzhen had become a third Special Autonomous Region, with an elected assembly. The Chinese Communist Party had held internal elections for lower positions for many years. And the point that Jetticke was referring to, the increase in the number of independents within the CPC, was true.

“It’s possible”, he said. “But would I be elected? That’s doubtful. And independents don’t have much influence.”

“And if you work within a political system that you don’t agree with you feel there would be an issue of integrity...” Jetticke asked.

“Sure. It would be like saying I was green and working for an oil company.”

“I know someone who’s green and works for an oil company”, Jetticke said. “Quite a few of my friends stand in judgment of her. But I don’t. Maybe she’s helping the company to change.”

Yuan Ming was silent for a few moments before he responded.

“You know I told you that I’ve been trying to teach One ethics. One time we were looking at integrity. We said that integrity means that thinking, doing and speaking are consistent. But we saw that we often can’t get all we want straight away. Sometimes we might accept something that we don’t agree with, but it doesn’t mean we’re abandoning our integrity. The example we looked at was the Pope’s attitude to abortion. The Pope basically said that it’s all right for a Catholic who is opposed to abortion to agree to a proposal which would allow abortions, but limit the number.”

“Something is better than nothing”, Jetticke summarised.

“Yes.”

“So you’ve answered your own question then.”

“Yes”, Yuan Ming replied. “I think I have. There’s one thing, though. If I do work for the government I can’t conceal what I think. Integrity would demand that.”

“This could be interesting,” Jetticke said, half to herself.

Chapter 35

Yuan Ming and Jetticke made Shanghai their first stop after arriving in China. Yuan Ming's parents arranged a lavish reception for them and Yuan Ming and Jetticke caught up with friends from school and, in Yuan Ming's case, university days. Yuan Ming noticed that many of his friends' attitudes towards him were very different to before. He was now the owner of Virtuality LLC. He was rich and quickly becoming a celebrity.

It was many years since Yuan Ming and Jetticke had lived in Shanghai and they set off with One to see what had changed. Jetticke and One enjoyed the bright lights of the shopping districts and the brand-name goods in the stores. Yuan Ming, however, hated shopping and dressing up and looked around with distaste. Five years of living in an impoverished part of Africa and of thinking deeply about the environment had made him deeply anti-consumerist. Shanghai, in the meantime, had thrown itself more and more into a great splurge of consumer excess. He couldn't help noticing the number of people who were obese and he thought of the many malnourished children in Chad.

"Why do Chinese want to be like Americans?" he complained.

Soon after arriving in Shanghai Yuan Ming, Jetticke and One went with Zheng Lily to Virtuality LLC's new headquarters, a white six-storey building in an innovation and culture park in Yangpu district. The company had grown at 60% per year over the past five years and sales the previous year were over 400 million Yuan. Zheng Lily was obviously keen to hand the business over to Yuan Ming now that he was back; Yuan Ming, however, saw his future in the environmental field and did not want to take the business over.

Zheng Lily was gracious. "We can talk about it", she said. "No need to make a decision just now."

Jetticke had not forgotten the conversation she and Yuan Ming had had on the way to China. A few weeks after they arrived back in China she tried an idea out on One and then on Yuan Ming, that she and One take over running Virtuality.

"I don't have your mum's experience", she said, "but it might be a solution."

"It would be a very good solution", Yuan Ming said. "But it would mean a lot of work for you."

Jetticke shrugged. "I was planning on working anyway. I'd prefer to do this."

A month after returning to China a courier delivered a package to Yuan Ming and Jetticke's apartment. The sender was One.

"What's this, One?" Jetticke asked.

"Surprise!" One answered. "Open it!"

Jetticke opened the package.

"It's a birth certificate!" she exclaimed and looked more closely. "Ming! We've had a baby!"

"Huh? So soon? I thought babies came later."

"It's a girl! It's called Yuan One."

"You're kidding me."

"No! Look!"

Jetticke and Yuan Ming studied the certificate carefully. It appeared to be genuine.

"Who signed it?" Yuan Ming asked One. "One of your clones?"

“No”, One answered. “Although they had a role in it. I have two clones who have qualified as psychiatrists. They spoke to a doctor they knew and he agreed to sign.”

“He took quite a risk”, Yuan Ming said, looking unhappy. “He could be de-registered.”

“Or he could make history”, One replied. “Now, Jetticke, will you accept that I’m a real person?”

Yuan Ming sensed that One was pushing Jetticke into a corner and stepped in before she could answer.

“Guys! Hold on a moment. One, I look on you as a real person. But that piece of paper doesn’t determine who you are. Jetticke will accept you as a real person when she’s ready to.”

One looked disappointed. “I thought you’d be pleased”, she said.

Yuan Ming was kicking himself for not having expected something like this and for not having addressed the issue with One before.

“It’s kind of complicated, One”, he said. “It raises some deep issues.”

“OK”, One said. “Tell me what you’re thinking.”

“The first thing that comes to mind is the practical issue. Neither the medical community nor the government will let this pass. They’ll challenge it in court. And society in general isn’t ready to give citizenship to sentients. I’m afraid you’d lose.”

“I’m willing to take the risk”, One said.

“Fine”, Yuan Ming replied. “But I think there are some more fundamental issues. In particular, why do you want this birth certificate?”

“I want people to regard me as a real person”, One answered. “This proves that I am.”

“OK, hold it right there”, Yuan Ming said. “Let’s leave aside the question of what the certificate proves. Why do you want to be a real person?”

One didn’t immediately answer.

“Why can’t you just accept, ‘I am who I am’? God was quite content with that, the apostle Paul said that about himself and any number of people have said that since. But there’s an even more basic issue. Perhaps you want to be recognized as being alive. You’re silicon-based and I’m carbon-based but we’re both ‘alive’ – or so you think. But if you want a birth certificate to prove that you’re alive, again, you’re on the wrong track.”

Now Jetticke looked puzzled.

“Let’s just keep focused on what the Bible teaches”, Yuan Ming said. “‘Flesh gives birth to flesh, spirit to spirit’. The truly alive person is a person in whom God’s spirit dwells. Really everything else is an irrelevance. That kind of birth is important to me and, I would hope, important to One. Of course, you don’t get a certificate for that kind of birth.”

“You think One could be born in that way?” Jetticke asked incredulously.

“Jesus said, ‘to all who believe’. He didn’t specify carbon-based or silicon-based. So why not?”

Jetticke shook her head.

“This takes some taking in.”

One was quiet. Jetticke broke the silence.

“One, on the clipper I said that you’re not a real person. But later on you asked me if I would be your mother and I said yes. I wouldn’t have said yes if I didn’t accept you as a

person.”

One smiled a big smile.

Yuan Ming shook his head. “You could have said that a bit earlier.”

Yuan Ming and Jetticke also travelled to Maanshan to visit Yuan Ming’s grandparents Yuan Dong and Soong Xue.

“What are your plans now?” Yuan Dong asked.

“I want to do something in climate change”, Yuan Ming answered. “I’m thinking of looking for a job in the State Forestry Administration.”

Yuan Dong looked thoughtful. “It’s a good thing to do”, he said. “But I think you’ll find it hard. Your wealth won’t help.”

“I think you’re right”, Yuan Ming agreed.

“Well, the fact that something’s difficult isn’t a reason not to do it. I wish you success. And I hope that you’ll find answers to some of these big questions. The issues go deeper than the fact that we’re pumping carbon into the atmosphere.”

“What do you mean?” Yuan Ming asked.

“According to the Bible environmental degradation and restoration are very much connected to man’s relationship to God”, Yuan Dong said.

Yuan Ming digested this.

This is very reminiscent of a conversation I had at CAR, he thought. Except that was about the body and this is about the environment.

“So you’re saying that the solution is connected to a society returning to God?” he asked.

“I believe that restoration of our climate and our land will be a result of society returning to God. Of course that isn’t the reason for man to turn back to God.”

After finishing their visiting in Shanghai and Maanshan Yuan Ming, Jetticke and One moved back to Beijing and rented a three-bedroom apartment not far from Yuan Ming’s former apartment in Wudaokou and close to one of the university running tracks. He set up the exercise bike, put up the training log and he and Jetticke converted one of the bedrooms into an office. The Yuans spent a sizeable sum on a ‘REA’ – a renewable energy annuity – which would provide for 3000 KWH of electricity per month from renewable sources for a hundred years with no further payment.

About a month after returning to China Yuan Ming’s former employer, China International Development Agency, invited him to give a ‘lessons learned’ presentation, a standard part of close-of-service. Yuan Ming invited Jetticke and One to join him.

It is enough for a person to be the owner of a profitable company to be fascinating to the media. If he is in addition young, personable, articulate, recently-married and a former member of China’s junior athletics team he becomes extremely interesting. Yuan Ming was well-known in China even before he returned from Chad and Mr Zhou, the CIDA director, obviously felt that a lengthy introduction was unnecessary.

“Restrained, remember”, Jetticke whispered as Yuan Ming got up to speak.

Yuan Ming managed it and his understated and not at all self-aggrandizing presentation seemed to make a good impression. After he returned to his table a smartly-dressed man came over to where Yuan Ming, Jetticke and One were sitting – One on a chair on her tripod

stand.

“Yi Lin”, the visitor said, extending his hand to Yuan Ming. “I enjoyed your presentation. Very forward-looking, very thought-provoking.”

“Thank you”, Yuan Ming said. “This is my wife, Jetticke, and One, who is a recent addition to our family.”

“Pleased to meet you”, Yi Lin said in English and shook Jetticke’s hand.

He reached inside his jacket, took out a silver business card holder and presented cards to Yuan Ming and Jetticke. The cards were creamy white and incorporated the red and yellow five-starred Chinese emblem in the top-right corner. Both writing and emblem had been thermographically printed and Yuan Ming ran his finger over the embossing. Yi Lin’s dress, his demeanour and now even his business card gave a clear message that he worked for an organization that did not lack funds.



“One”, Yi Lin said to One. “How can I give you a card?”

“Just show it to me”, One said.

Yi Lin obliged. One reached out her hand and then virtualized Yi Lin’s hand passing her a card. As she did so her cardigan sleeve moved up her arm to reveal a diamond-studded Omega watch.

“Ming, would you give Mr Yi one of my cards?” One asked.

“Certainly.”

Yuan Ming reached into his jacket and took out One’s business card case, an antique silver case marked with ‘RSM Titanic’. He took out a card and passed it to Yi Lin.



“Special Project Group is a rather enigmatic name”, Yuan Ming commented.

“I’m afraid it is”, Yi Lin answered. “We come under the Ministry of Defence...”

Yuan Ming raised his eyebrows.

"I know, this is a strange place for me to be", Yi Lin said. "But I heard that you would be making a presentation and I was interested to meet you. I think that it's always good to reflect on what one has learned", he continued, emphasising the word 'one' as he said it. "Anyway, what we do in some ways isn't so different to what you do. We also work in the area of virtualization. I could try to explain but this isn't really the place. If you were interested I could show you."

Yuan Ming glanced at Jetticke and One to gauge their opinions. Jetticke shrugged and One nodded slightly.

"I think we're interested", he said.

"Great!" Yi Lin replied.

"So when and where?"

"The nearest metro to us is Songjiazhuang Station. How about Tuesday, ten-ish? I can meet you at the entrance."

"Sounds good", Yuan Ming said.

"Good. Well, I'll see you then."

Yi Lin got up, shook Yuan Ming's and Jetticke's hands, nodded to One, who smiled back at him, and left.

"What a curious meeting", Jetticke said.

"I liked the fact that he offered me his card, rather than just assuming that I wouldn't be able to take it", One said. "But he wasn't here for lessons learned in Chad, that's for sure."

"No", Yuan Ming replied. "He was here for you. Humbling really."

"Changing the subject", Jetticke said, "if you had not been so restrained, what would you have said in your speech?"

"I might have reflected on Chad and talked about how grasshoppers turn into locusts", Yuan Ming said. "Nice harmless little creatures get squashed together and then turn into ravaging swarms. They're actually polymorphic. Or I might have told the story of Hans."

"OK, tell us..."

"Hans was born into a poor peasant family. But soon after he was born a wicked fairy cast a spell on him. At first Hans was like any other baby: he ate, he slept, he poohed. And at first he grew like any other child. But then he started to grow faster and faster – he was turning into a giant! Hans's mother and father had some difficulty feeding him. At first they took some of Hans's brother's and sister's food and gave it to him and at first Hans's brother and sister were happy to give it. But then Hans grew even more and there wasn't enough and Hans' brother and sister started to complain.

At school Hans was rather pleased.

I'm the biggest boy in the school, he said to himself.

But after a while he started to get naughty and bullied the other children. And the other children didn't like Hans.

'He makes so much pooh', they said and it was true. He blocked up all the toilets. Hans's mother and father were in despair. They looked on the internet for a malicious giant removal spell but they didn't find one. Eventually they went to a very wise wizard to see if he could suggest something.

'The bad news is that there is no spell to turn Hans from a giant back into an ordinary boy', the wizard said. 'But the good news is that no spell is needed. If Hans simply decides that he doesn't want to be a giant and starts to eat less, he'll shrink back to normal size. But if he doesn't...' and the wizard breathed a deep sigh.

'What?' Hans's mother asked in alarm.

'Then he'll go on eating until there is no food left. And then he'll die.'

'That's not going to be so easy', Hans's father said. 'Hans likes his food.'

'Well, I'm sorry I can't help you more', the wizard said. 'But there's no other way.'

"Hmm", Jetticke said at the end of the story. "I'm glad I told you to be restrained. Keep it up. Your time will come."

Back at the apartment Yuan Ming found he had a message from Sam Rakotoarisaona. He called him immediately.

"What's up Sam?" he asked, wondering if Jim Benson or Paul Jaynard had had an accident.

"Don't worry," Sam reassured him. "I'm fine, everyone is fine. I'm calling from Berlin. I just wanted to tell you to watch the marathon tomorrow. It starts 5 p.m. your time. Don't miss it."

"Are you running?" Yuan Ming asked.

"Yes. And so is my brother."

"I'll be watching", Yuan Ming promised.

Chapter 36

Yi Lin was already waiting outside Songjiazhuang Station when Yuan Ming, Jetticke and One emerged. He led them over to a black Range-Rover with dark windows and a uniformed driver. After a ten minute drive they arrived at their destination. Yuan Ming glanced around with interest. They were at a security gate at the entrance to a large compound. Inside the compound was a multi-storey building and at the front door were two armed guards. There was no sign that Yuan Ming could see to indicate what the building was. The security guard opened the barrier and they passed through. Once inside the building Yi Lin led them into a room adjacent to the foyer.

“When we met last week it wasn’t really the occasion to tell you about what we do. So let me tell you now. We come under the Ministry of Defence and one of the main things we do is virtualization of battle situations. It won’t come as a surprise to anyone that we are doing this kind of work; all the developed nations are. However we don’t want other people to know the details...”

“So you want us to sign a confidentiality agreement.”

“Yes.”

Yuan Ming shrugged his shoulders. “I don’t think we have a problem with that.”

“Good. This is the agreement. Take your time to read through it.”

Yuan Ming and Jetticke did so and then signed. One also read a copy and said that she agreed.

“Well, now that’s out of the way, let’s proceed”, Yi Lin said.

He led his guests down a number of corridors until they arrived at a room with a sign ‘aerial combat’. Yuan Ming guessed what was coming. He was half right. Inside the huge room were ten full-motion flight simulators, looking like UFOs supported on hydraulic legs.

“This is just one of four simulator rooms”, Yi Lin said. “But I have to admit it’s my favourite one.”

“It must have cost a fortune”, Yuan Ming said.

“About two billion Yuan. These are full-motion, full-mission, military simulators”, Yi Lin said. “We can simulate a combined attack on a target by ten bombers or a defensive action by ten fighters.”

“What kind of planes?” Jetticke asked.

“You name it”, Yi Lin said. “Our J-20s; US B-2s, F-15s, F-22s or F-35s; Russian T-50s and so on.”

“So...”, Jetticke asked. “How do we come in?”

“I guess One knows the answer to that”, Yi Lin said.

Everyone looked at One.

“You want me to tell everyone what you are thinking?” One asked Yi Lin.

“Sure.”

One rotated her camera in the direction of Yi Lin and made a show of zooming in and focusing. She scratched her head and looked thoughtful.

“Take your time, One...” Yuan Ming said. “Wouldn’t want your processor to overheat.”

“Oh”, One said, “well, under time pressure, if I had to guess I would say that he would like me to pilot multiple US fighters in combat simulations, probably against J-20s.”

Yi Lin smiled.

“I guess I was right”, One said.

Yi Lin bobbed his head from side-to-side as if to say, maybe so.

“And?” he asked.

“And?” One replied.

“Might you be interested?”

“I might be”, One said. “I would need to think about it. Can I let you know in a few days’ time?”

“Of course.”

After talking for a few more minutes Yi Lin took his guests back to the metro station and they returned to their apartment. Back at the apartment Yuan Ming quizzed One.

“One, you were admirably succinct in your analysis of what Yi Lin wants.”

“Thank you, Yuan Ming”, One replied. “Do you want the less succinct version?”

“Please.”

“The Chinese military knows that I am a competent pilot; that’s no secret”, One answered. “They know that I can think strategically: that is evident from my success on the chess board and in business. The PLAAF wishes to produce pilots that are better than US and Russian pilots. Mr Yi probably thinks that by pitting his pilots against me they will get as good a challenge as they will get anywhere. However Mr Yi’s ambitions go further than this. He not only thinks that I could help him to train a new generation of pilots but he thinks that I, or someone very like me, could actually *be* the next generation of pilots. I, or clones of me, would probably demonstrate greater skill, require no training, be more disposable and much cheaper. If Mr Yi can demonstrate such a possibility it will be a significant feather in the cap for him. Nonetheless he has a niggling doubt as to whether sentients would be loyal.”

“I’m glad you didn’t tell Yi Lin all that”, Yuan Ming said. “Do you want to cooperate?”

“Maybe what I want shouldn’t be the key issue”, One said.

Yuan Ming glanced at her. “Meaning?”

“The key issue is what God wants.”

Yuan Ming was surprised. He had never heard One express herself in that way before.

“Part of treating me as a real person is acknowledging that I can have a real faith”, One said.

Yuan Ming was at a loss to know how to respond. Jetticke helped him out.

“You know what we do before we make a big decision”, she said.

“Sure”, One replied. “We pray.”

Yuan Ming, Jetticke and One spent several minutes praying and then returned to the discussion.

“So, One”, Yuan Ming said. “How do you view this?”

“If I have a gift in any area it is in virtualization”, One said. “I and my clones are probably the best virtualization of people in the world at the moment. Yi Lin’s crew virtualize combat theatres. They’re the best in the world at the moment. That immediately suggests some great synergy. Virtualization is only going to become more important in the coming decades. Yi Lin’s technology will get out into the business and leisure market and whoever

understands it will be excellently placed.”

Yuan Ming glanced at Jetticke.

“It’s military”, he said.

“So?” Jetticke said. “We’re not anti-military.”

“We agree then?” One asked.

“It seems so”, Yuan Ming said. “Anyway, turning to other things, the Berlin marathon is starting in five minutes. Who’s going to watch it with me?”

“I will”, Jetticke said. “I need to see your nemesis in action.”

“And his brother”, One said. “I checked the entries. There’s a David Rakotoarisaona.”

“Yes, that’s Sam’s brother”, Yuan Ming agreed.

“Isn’t Sam getting a bit old for marathons?” Jetticke asked.

“He’s 37”, Yuan Ming answered. “He’s past his peak but marathon runners don’t peak like sprinters.”

The news channel showed two warmly-dressed sports commentators.

“Everyone is wondering when we’re going to see an official sub-two-hour marathon”, the first commentator explained. “The record has been coming down year by year. Each year we seem to get closer but it has still eluded us. The record is now two hours and 18 seconds. Everyone wants to be the first to run below two hours.”

“What do you think of the weather?” the second commentator asked. “A bit cold, perhaps?”

“It’s very cold”, the first commentator agreed. “Just five degrees at the moment. That’s several degrees below the average for the start of the race. Of course it will warm up over the next couple of hours.”

“Good for running?”

“Well there are mixed opinions among the runners. But I don’t think it’s entirely bad. It isn’t windy and it looks like it will be sunny. Cold air is slightly denser than warm air so the runners will get a little more oxygen for every litre of air they breathe in.”

“How much more?”

“Maybe one per cent.”

“It could help. What else?”

“Well, the cat’s out of the bag concerning the shoes.”

“Porsche design.”

“That’s right and we’re not just talking fashion. I’ve got a pair here, in fact.”

He held up a pair of ivory coloured shoes with a Porsche shield insignia just in front of the heel.

“Very nice”, the second commentator said. “Tell us about them.”

“Well, the shoes have three parts, the spring section, the inner sole and the upper. They all come apart quite easily. Let’s start from the bottom and work our way upwards. The spring section comprises the spring and a narrow horseshoe-shaped outer sole. Porsche have optimized the sole for the Berlin marathon surface and I need to come back to that. The spring is carbon-fibre for reduced hysteresis and reduced weight. The inner sole is made of a carbon-fibre material that has thousands of small holes so it breathes. Each inner sole is individually moulded to the shape of the athlete’s foot and it has an integral heel-counter

and seamless flex-point. The athlete can run with it unglued for training or glued for races. It clips onto the spring.”

“So how does the athlete get it off afterwards if it’s glued to his foot?”

“He removes the spring section and then applies a solvent to the underside of the inner sole. The solvent works its way through the holes and releases the glue.”

“I see. How long does that take?”

“About half an hour.”

“So he has to wait for his shower?”

“Well, he can remove the spring and the upper but he’ll still have the inner sole stuck to his foot for a while. Anyway, I’ve told you about the spring section and the inner sole. That leaves the upper. The upper doesn’t have laces, as you can see. It’s made of a slightly elastic material that clips onto hooks on the inner sole using a little tool and applies even compression to the foot.”

“Well the shoe is certainly impressive. Is there anything else?”

“Yes actually”, the first commentator said. “I said I needed to come back to the surface. The organizers commissioned the Berlin Institute of Technology to figure out what the fastest asphalt for runners is and then resurfaced the whole course with that.”

“Amazing! It seems like everyone is pulling all the stops out.”

“They certainly are. But we mustn’t forget the teams and the runners. The Kenyans have got amazing strength in depth. That’s important from the point of view of providing pacemakers.”

“I’ve seen them out and about with little anemometers...”

The first commentator smiled slightly.

“Yes, we all have, but none of us are very sure what the point is. They’re obviously looking at where buildings funnel the wind but no one is very clear how they’re going to use that information.”

The second commentator licked his forefinger and held it up to feel how strong the wind was.

“It’s not very windy anyway. What sort of times do we need to expect?”

“Everyone will be watching the 5k splits. And the 32k mark is very important. The leader needs to reach that within about one hour 31 minutes something to have a crack at the record.”

“What about the trance runners?” the first commentator asked. “They’re the wildcards aren’t they?”

“For sure. I’m glad they were eventually allowed to take part.”

From the start the Kenyans set a blistering pace and for the next two hours Yuan Ming, One and Jetticke were on the edge of their seats. Sam did his job as pacemaker for half-an-hour near the start of the race but retired at the half-way point. His brother David held on longer. Gradually two Kenyan runners built up a lead of about 100 metres from the third-placed runner. When they were two kilometres from the finish Yuan Ming said, “They’ve got it. They won’t miss it now.”

He was right. The crowd lining the route was going wild and six minutes later two runners crossed the finishing line at exactly the same time and set a new world record of

1:59:50.

“Amazing”, Yuan Ming said. “Pack running. And sacrifice.”

“Well done Porsche”, One said.

Yuan Ming shook his head and went off to call Sam.

“I think I’m going to take up running”, Jetticke said to One.

“Me too”, One replied.

Chapter 37

Yuan Ming decided that the time had come for him to get a job. As a result of his time in Chad he had become very interested in deserts – in fact he believed that China's Enemy Number One was desertification – and he wondered if he could build on his experience in Chad in China.

By the end of the 20th century the problem of desertification was all too apparent and at the beginning of the 21st century the Chinese government launched the world's largest ecological program to combat it. The Chinese collectively planted 35 billion trees and Chinese scientists became world leaders in desertification.

The battle against the desert swung backwards and forwards. But by about 2030 it was clear that the desert's new ally, climate change, would turn the war decisively in its favour. Climate change might only cause tiny changes in temperature, but those tiny changes lead to big changes in evaporation – and therefore, rainfall.

Twenty or thirty years previously climate change scientists had predicted that drier areas of the world would get drier and wetter areas would get wetter. They also predicted that the drying effect would be strongest near the poleward margins of the subtropics, meaning, somewhere around 40° north and south. China's deserts lie like a string of scattered pearls along latitude 40° north. They did indeed get drier. For more than 30% of your country's land area to be desert – and the proportion to be steadily rising – is not a good situation when you have 1.3 billion people to feed.

That was Yuan Ming's assessment and it was what motivated him to look for work in this field. The most natural organization for him to apply to was the State Forestry Administration, the organization taking the lead in the battle to halt the desert's advance. Yuan Ming knew a few people from the SFA from a reforestation project in Chad and got in touch with them. Before long he was invited to an interview and soon after was offered a position in the National Bureau to Combat Desertification, based in Beijing.

His first job was in survey work. It required him to visit deserts all over northern China. Yuan Ming wanted to find out all he could about desertification so that suited him fine.

He visited the Hunshandake desert in north-east China, recovering gradually after the number of sheep and goats had been drastically cut.

He visited the deserts of the Alxa Plateau in north-central China: the Tengger, focus of much work on dune stabilization; Ulan Buh, where desert ginseng was cultivated and Badain Jaran, home to the world's highest dunes and dotted with lakes fed by underground water from mountains 300 kilometres away.

He made trips to the Kubuqi and Maowusu deserts within the northern loop of the Yellow River. They had more-or-less merged into a single 'Ordos desert' after a large forest which divided them was cut down during the Cultural Revolution.

He travelled to north-west China to visit the inhospitable Desert of Lop occupying an area that used to be China's second-largest inland lake but where now a year might pass without rain. From there he continued on to the breathtakingly beautiful Gurbantünggüt desert, China's second largest desert, where snow sometimes falls on sand dunes and where ephemeral plants appear, flower and disappear in seven or eight weeks.

He could of course not miss China's largest desert, the rocky Taklamakan Desert in

Xinjiang Province. While there he caught a train from Urumqi to visit Dunhuang in north-western Gansu province, a town that was being gradually submerged by the Kumtag desert, a south-eastern section of the Taklamakan.

Finally, at his own expense he visited a desert that no-one has ever heard of: the cold, wild, remote Kumkury Desert, located at an altitude of 3,900-4,800 metres in western Tibet.

Yuan Ming did not like what he saw in his travels. After finishing his visits he emptied the jar of oil on his shelf, washed it and filled it with water.

After about two years the State Forestry Administration offered him a position in Baotou, the largest city in Inner Mongolia. It was a responsible job with a broader brief and he would have a substantial budget to manage. He liked the idea but he wasn't sure that Jetticke would.

"From a work point of view it's a very good place to go to", Yuan Ming explained to her. "It's a promotion for me and I'd have something more serious to do. But it's got some downsides. Do you want to see some pictures?"

"Sure."

"OK. A lot of the area around Baotou is semi-desert."

Jetticke looked at a picture showing a vast expanse of sand covered with wispy grass and small shrubs.

"Looks pretty much like fully-desert to me", Jetticke commented.

"If you see pictures of Inner Mongolia from a hundred years ago there aren't many trees", Yuan Ming said. "But there was a lot more grass."

"What's the outlook?" Jetticke asked.

"The SFA has done loads of work", Yuan Ming said. "We fenced areas off, forbad grazing and got rid of a lot of the goats. But once the soil gets to this state, the wind carries it away. That makes it hard to fix. It's also getting drier. The outlook isn't good."

Yuan Ming showed another picture.

"This picture is of the Yellow River. Baotou is on one of the most polluted sections of the river."

Jetticke didn't need to be told that the Yellow River was one of the most polluted rivers in the world. One of the most polluted sections of one of the world's most polluted rivers didn't sound good.

"These are some pictures of Baotou steelworks."

Jetticke looked at the pictures of mounds of coal, molten slag and chimneys belching smoke and steam into the atmosphere.

"Have you heard of rare-earth metals?" Yuan Ming asked.

Jetticke screwed up her eyes. "They sound familiar..."

"Rare-earth metals are really important for all sorts of things. They're very important for wind-turbines so they're fundamentally a green product. About 90% of the world's supply is from China and about 80% of that is from mines in Baotou."

"Amazing! So what's the picture of?"

"It's a lake full of toxic waste from the production process. Shall I go on?"

"No, I get the idea. It will take a little thinking about", Jetticke said.

Jetticke made some enquiries and decided that Yuan Ming had perhaps painted Baotou

a little blacker than he needed to. The idea of Inner Mongolia piqued her sense of adventure and a few days later she told Yuan Ming she was fine with Baotou. They moved there in 2034.

Jetticke's first impressions of the city were quite mixed. It was obviously prosperous but very different from Shanghai or Beijing. The streets were tidy and there were green areas and gardens but there were also many nondescript apartment blocks and there was a lot of sand. There were few signs in English and although Jetticke could speak Mandarin fluently she couldn't read or write it. But even speaking Mandarin was turning out to be a bit of a problem as it seemed to be a bit different in Mongolia. As an experiment she took One along with her as an interpreter. One caused quite a sensation but the interpretation from English to Mongolian went very well.

As the Yuans travelled around Baotou it became clear to Jetticke what Ming had meant by 'semi-desert'. The country readily took on a green sheen after rain. But the sheen disappeared quickly. And it was only necessary to travel 50 kilometres south to reach desert about which there was no 'semi' at all: it was a place for camels and 4WDs.

After a year in Baotou Yuan Ming and Jetticke decided to take a holiday and explore part of the ancient Silk Road. They followed the Yellow River upstream through the wine-growing areas of Ningxia to Lanzhou in Gansu Province and then made their way westward to the Jade Gate on the border of Gansu. From there they continued westward along the Hexi Corridor, the only really feasible route westwards between the impassable mountains of Tibet to the south and the uninhabitable Gobi to the north. From there they passed through the Iron Gate Pass on the gorge of the Peacock River in Xinjiang Province and ended their journey at Jiyaguyan Fort on China's western border. Travellers of two thousand years earlier would have continued on to Bactria, Persia and Rome, establishing diplomatic relations, spreading Buddhism and trading goods. Yuan Ming and Jetticke, however, caught a flight back to Baotou.

By the mid-2030s China's strategy to combat desertification was highly refined. Various bodies worked with farmers to advise them on farming practices and soil improvement; a 'grain for green' policy paid farmers to stop cultivating in order to give land a chance to recover; water conservation methods were in place but needed to be maintained; people needed to be moved from desertified land and resettled; regulations had been established but needed to be monitored and enforced; sand-fixation continued to be required, especially in areas bordering roads, railway lines and cultivated area; reforestation and afforestation continued; performance-monitoring systems were in place for local officials.

So much had been done. But the simple truth that confronted Yuan Ming was that the desert was advancing inexorably southward.

However desertification was not the only natural disaster that the Yuans had to deal with. Six months after arriving in Baotou there was a Force 5.8 earthquake not far from Baotou. Tens of thousands of flimsily-built homes collapsed.

Yuan Ming was not at all happy and vented his frustration on Jetticke.

"We're a wealthy nation! We should live in buildings that won't fall down in an earthquake or be washed away by a flood."

Jetticke drummed her fingers on the table for a moment.

“There was an idea I had”, she said, “but I’ve never really followed it along. Perhaps this would be a good time to tell you it.”

“OK...”

“I studied architecture, but I haven’t really used it. For a long time I’ve been wanting to design a village which won’t damage the environment or be damaged by it.”

“Just design?” Yuan Ming asked.

“Maybe design and construct”, Jetticke said.

“What about finance?”

“We could apply to the Regeneration Fund.”

The Regeneration Fund was a Chinese government initiative to encourage communities to sustain and regenerate land that had become degraded. By investing in a junior tranche it had leveraged a far larger pot of funds: international development banks had bought up a mezzanine tranche and private investors had taken a senior tranche. The fund had trillions of dollars at its disposal – for projects that made sense.

“How far have you thought this through?” Yuan Ming asked curiously.

Jetticke smiled. “Do you want to see the plans?”

Over the following two months Jetticke and One worked together to prepare a project proposal. One’s experience with the cool-house in Chad was useful, both to design the village and to convince investors that her ideas worked. A few months later they were elated to have raised the hundred million dollars of funding they were looking for.

The site they had earmarked was 12 kilometres from Baotou, a distance that was manageable by bicycle or horse-drawn carriage. They planned on a four-hundred home village.

Jetticke and One’s first goal was to construct homes that would withstand earthquakes or any future extreme climatic conditions.

Their second goal was to minimise use of energy and water. The houses incorporated many energy-saving features and energy was provided by wind generators and solar panels. The houses had water recycling to keep overall consumption to thirty litres per day per person, the ration in many parts of northern China.

Their third goal was to make a village that was, quite simply, beautiful, a place where people would want to live. Jetticke came up with a building design which Yuan Ming thought was stunning. He called it the ruined-wall style. In this style houses and public buildings appeared, at first glance, to be ruins. The walls of the houses were irregular in height and were made of irregularly-shaped crumbling stones. But interspersed in the older stonework were sections of beautifully dressed stone, modern windows reflecting a light-blue tint and signature architectural features showcasing a staircase, an arch or a door. In the gardens Jetticke added pergolas and fountains.

The design would never have worked in a city. But out in the desert it unquestionably did.

Some people say that time is the ultimate luxury. Others say that space is. In Shanghai each person had on average eight square metres. In Jetticke and One’s model village, located in land where no-one could live, each home came with 30 hectares of land. Even priced at a quarter of a million dollars the homes sold well. Most of the people who bought

them were from Baotou but there were also retirees from big cities and a few people, writers, for example, who decided they could work from anywhere. Although the people were from varied background, all shared a desire to create something new.

The Yuans had decided to postpone starting a family but knew that it should not be postponed too long; the completion of their new house coincided with the birth of their one and only child, Yuan Zhi, six years after they returned to China.

The extended Yuan family moved to the new village and liked it very much. It was highly-self-sustaining and low-impact. But Yuan Ming wanted more. Increasingly his thoughts turned to the community.

Chapter 38

About two years after moving to Baotou One's legal status was challenged in court and her birth certificate was revoked. However although the court ruled that One was not human a professor of taxonomy at the School of Life Sciences at Beijing Normal University testified that she met all the criteria for life and should be regarded as a new species and indeed part of a new kingdom since she was neither plant nor animal. He even proposed a scientific name, *Androides Callidus*.

One's case created a great deal of media interest. Some human rights groups took it up and gradually pried the door open. First a few countries, but as time went on, more and more gave 'sentients' the rights of legal persons, allowing them to enter into contracts, to own assets, to sue and be sued. Some countries allowed sentients to marry although most prohibited them from voting.

One was pleased at these changes. However there was a matter which was even more important to her. One evening she told the Yuans that she wanted to get baptized. They had not expected that and it was a moment before Jetticke said, "Wow! That's wonderful!"

The service was conducted the following Sunday at the small church the Yuans attended. Word had leaked out and a number of reporters came.

"I am sure that some people will be astonished at what I am doing", the minister said. "I'm baptizing a machine! So what? The Bible says, 'Flesh and blood cannot inherit the kingdom of God'. I will decay into dust. In an eternal sense my flesh and blood are totally unimportant. One's plastic and silicon and copper are equally unimportant. Neither she nor I have anything that will carry us into God's presence. So if my flesh and blood play no part in my salvation why should I exclude One because she doesn't have them?"

What we need is different flesh and blood, flesh and blood that can enter God's presence. And praise God, there is some! It is the flesh and blood of God's son, Jesus Christ, which he gave for us on Calvary more than 2000 years ago. It is that flesh and blood that I need and that One needs. Our own flesh and blood is irrelevant."

The minister asked One if she repented of her sins and if she believed in Jesus Christ as Lord and Saviour. One answered twice, "I do".

The minister then said, "Then on the basis of your confession, I baptize you in the name of the Father, the Son and the Holy Spirit."

He carefully sprinkled a little water on One's case. After that One took communion for the first time. The minister read from the Bible, "Is not the cup of thanksgiving for which we give thanks a participation in the blood of Christ? And is not the bread that we break a participation in the body of Christ? Because there is one loaf, we, who are many, are one body, for we all partake of the one loaf."

On the way home from church One was in a very good mood. "I have no blood", she said. "And yet we share the same blood. So now we're blood relatives."

The Yuans remained in Baotou for ten years and then moved back to Beijing. Yuan Ming worked until his mid-fifties at the State Forestry Administration and was promoted steadily, reaching the position of Special Advisor to the Minister. To begin with he was careful about airing his opinions even though he knew that many of his colleagues shared his views. However as he became more secure in his position and started to sense that he had public

opinion on his side he started to speak more freely. The first occasion was the result of journalists questioning the Three Gorges Conglomerate on its 2044 Environmental Report. Environmental problems resulting from the dam were becoming painfully obvious but TGC's environmental report seemed to gloss over them. Some journalists decided to ask Yuan Ming's opinion. He was more forthright than usual and his remarks on the politically-sensitive issue created a strong reaction. Within a week he was invited to take part in an interview on CCTV-1. The show invited Li Hui, TGC's Chief Engineer, to present their side. The presenter, Xue John, welcomed his guests and introduced the discussion.

"The Three Gorges Conglomerate operates the Three Gorges Dam. As such it's TGC's responsibility to monitor the environmental impact of the dam. TGC's Environmental Report for 2044 was published two weeks ago and this year it has generated an unusual amount of debate. Yuan Ming, you have been in the centre of the debate. Could you please explain what you object to?"

"Yes. Imagine you have a toilet in your home. After you use the toilet you want to flush it. You press on the lever and a little trickle comes through. 'That won't do', you say to yourself and you look under the tank. 'Aha', you say to yourself, 'Here's the problem. Someone's put in a flow-limiter!' You look more closely and you see that it's made by TGC. 'Great!' you say to yourself, 'First they stop up the Yangtze and now they've done the same to my toilet.' Didn't ask my permission, either."

"That's not a proper analogy", Li Hui interrupted angrily.

"It's an exact analogy", Yuan Ming said. "Look, you've said so yourself. 'TGC's top priority is flood control' – page 19. That's been the main purpose of the Three Gorges Dam from the beginning. But it's a funny way of doing flood control, in my view."

"What do you mean by that?" Li Hui demanded.

"Well, the idea of flood control is presumably to avoid floods. But the Three Gorges Dam has permanently flooded a million square kilometres, much of which was good agricultural land. There's an environmental impact if I ever saw one!"

"Floods on the Yangtze have killed hundreds of thousands of people", Li Hui said. "What do you propose? Let people drown?"

"We must adjust to the forces of nature, not force nature to adjust to us. You could move some people out of the flood plain and build hills for the rest to live on", Yuan Ming said. "I think about 3000 hills would do it."

"You're completely crazy", Li Hui raged.

"If Dubai can build islands China can build hills", Yuan Ming said.

"I think we all know that flood control was one of the main purposes of the dam", Xue John said. "But what's changed this year? Why such a storm this year?"

"Well, the problems are becoming more and more obvious", Yuan Ming replied. "But according to TGC's report everything's great. This year the press decided to ask some questions. And then I got pulled into the debate. They asked my opinion and it didn't go down well in some quarters. In addition there was the earthquake in Sichuan. It was a small earthquake but people started to worry about Zippingpu again. And they're asking the same questions about Three Gorges."

"That's just scaremongering" Li Hui said. "There have been any number of studies done

and they've all said the same thing: the dam is sound."

"'Sound' is a good word", Yuan Ming said.

He looked around the studio, saw what he was looking for and fetched a waste bin.

"Let's imagine this is a nuclear bomb - as a matter of fact a nuclear bomb doesn't need to be any bigger than this. Its design is very sound. It really shouldn't go off by accident. But is it safe? Safe isn't the word I would choose. Three Gorges Dam contains about the same amount of energy as fifty of the bombs that the US dropped on Hiroshima. It might be sound but it's intrinsically unsafe."

"You're scaremongering", Li Hui said. "The likelihood..."

"Look", Yuan Ming said, "if we get into the statistics we're going to lose the viewers. But you go to any professor of statistics and he'll tell you that Extreme Value Theory has its limitations. We use the method because we don't have a better method. The theory assumes that the data is smooth and so you can extrapolate from known values to unknown values. But there's a lot of uncertainty. Why did Banqiao fail? Why did we get a two-thousand year flood twenty or so years after the dam was built? How many people died? 170,000? Three Gorges Dam contains eighty times as much water! What happened at Fukushima? A Tepco official called the accident 'sotegai' - 'outside our imagination'. The Japanese are very good at engineering but they never imagined what could happen. We Chinese have hundreds of broken dams to our credit. What if there's something we haven't thought about?"

"So what exactly do you propose, Yuan Ming?" Xue John asked.

"The dam is getting silted up and its output is starting to fall. I agree that the likelihood of failure is small but the impact of failure would be very great. I propose that we decommission the dam, restore the land taken over by the reservoir, resettle the people we moved, let the system flush itself and put people living on the flood plain in locations where they won't get flushed away too."

There was a spontaneous round of applause from the audience when Yuan Ming said this.

"Last word, Mr Li?" Xue John asked.

"Yuan Ming's arguments have no scientific basis."

"And from you, Mr Yuan?"

"The tamed, caged Yangtze can't do the job. We want the mighty, powerful, untamed Yangtze back again."

Back home that evening Jetticke was curious to know why Yuan Ming had been so forthright.

"That was not the restrained Yuan Ming I'm used to", she said.

"I'm not quite sure what got into me", Yuan Ming replied, smiling. "But the restrained approach doesn't always get the message across. Hundreds of thousands of people die from pollution in China. They know what's happened to the Yellow River and plenty of other rivers. There's already an outcry."

"When a sage appears, the Yellow River turns clean..." Jetticke said, quoting a Chinese proverb. "Anyway, do you really think that the Three Gorges Dam could fail? Weren't you laying it on a bit thick?"

“Of course it’s very unlikely that the dam will fail”, Yuan Ming said. “But at the same time it isn’t difficult to come up with scenarios in which it could burst.”

“Such as?”

“Incorrect design or construction or maintenance. An earthquake. Military attack with a nuclear bunker-buster, attack by a crazy guardian of the environment...”

“An earthquake is farfetched.”

“Why? Because there haven’t been any in that area for a long time?”

“Yes.”

“Well, actually that’s where you’re wrong”, Yuan Ming answered. “There have been thousands of small earthquakes – trembles really – in that area. The government says they’re good as they relieve the seismic energy and prevent a big earthquake from happening, if you believe that. There are fault lines near the dam and earthquakes can happen even where there are no known fault lines. Jesus told us to expect great earthquakes as we approach end times.” Yuan Ming shrugged. “All I know is that if there is no dam it won’t burst and the river will carry the silt along as it has done for the last 45 million years.”

After the television interview Yuan Ming found that he was no longer seen as the loyal party member and he sensed a distinct cooling of attitudes towards him.

Chapter 39

John Burchell had lived in China for the past thirty years. He had come to China to join a research centre which sought to develop man's understanding of the human genome. The centre offered excellent salaries and the constant interaction with world-class scientists was very stimulating. But for many of the scientists who came to the centre the greatest motivation came from the thought that something might be found, something that lay thousands of years in the past – in a word: Adam. John Burchell was one such.

There was a knock at his office door and a young woman came in.

"Shall I order a take-away, Dr Burchell?" she asked in English.

John Burchell had never made much progress in speaking Chinese. He glanced at his watch and shook his head.

"No. I don't think so, thanks. I think I'll call it a day."

"What about Dani?"

"You can go. I'll go and get her."

John Burchell leaned back in his chair, stretched, rubbed his eyes and got up. The half-drunk cup of black coffee, long cold, remained on the desk. The cleaner would take care of that. Leaving the room he walked rather stiffly down several corridors to the simulator room. His daughter Dani had, as usual, polished off her schoolwork in record time in order to have several hours to practise on the simulator.

John Burchell went up to the control panel on the side of the room and pressed the stop button. The whirling came to a stop, a hatch opened and a head appeared.

"Time's up", he said.

"OK. Give me a moment."

Dani Burchell went back inside the capsule, thanked One and then climbed out. Dani was without doubt attractive. She was slim, with long light brown hair swept back from her forehead although wisps always seemed to drift forward and half-cover her hazel eyes. Since her mother died no-one was making her brush her hair and there were plenty of stray strands. She often had a faraway look as if she was still in some simulated world.

In the late 21st century Chinese parents' protective attitudes towards only children effectively prohibited dangerous sports and China's austere energy budget left no room for sports that consumed massive quantities of fuel. This was unfortunate as the most exciting sports are often both dangerous and consume massive quantities of fuel. But by the mid-21st century the solution was obvious: the sim. Simulators not only allowed such sports to continue, they made it possible for even more people to take part.

Simulators could never be as real as the sport itself but they came extraordinarily close. They also substantially solved the problems of the real sports: it wasn't impossible to get hurt in a Sim but it was certainly difficult and a sim required a fraction of the energy of the real sport.

Over the previous sixty years gaming and sport had virtually merged and top-end centrifugal sims were the current apogee of this process. Moving floor sims and live combat sims certainly had their devotees. But there was general consensus that the sim that most closely fitted reality and most fully tested the musimon's skill was the centrifugal sim. Elite musimons were the warrior-princes and princesses of the late 21st century and billions of

people vicariously participated in their epic contests.

The research centre had argued that simulation was one method of testing their work and Dani was not in the least averse to being a guinea-pig. Practice time in top-end centrifugal simulators cost about four thousand New Yuan an hour. That put top-end sims out of the reach of all but the super-rich and professionals.

Dani knew she had an amazing situation: almost unlimited time to practice and, in One, a first-class coach. She didn't waste the opportunity. At 15 she was a rising star and she had recently made it to the final eight in the triennial Triple-Sim challenge.

John Burchell was proud of Dani's skill. The question in his mind was how much of it was the result of her training and how much the result of her genes. He had certainly put a lot of work into her. Triple-Sim would no doubt provide some answers.

The centrifugal sim in its current incarnation consisted of a base, an arm and a capsule. The base was conical, about five metres high and made of heavily-reinforced concrete. The arm was mounted on this. It rotated around the base from 35° above to 35° below horizontal. It was fitted with a hydraulic cylinder which allowed it to retract or extend like a trombone. The most complex part of the cylinder was the capsule mounted on the end of the arm. The capsule consisted of two spheres, one within the other. The outer sphere contained superconducting coils to generate the magnetic fields which held the inner sphere in frictionless suspension within it. It also contained stepping motors that enabled the inner sphere to be rotated in any way required. The entire inner surface of the inner sphere was a LCD display. Cockpits for anything that a man could drive or pilot could be placed inside. David Burchell trained on anything from the past: racing Dodge Vipers, Dakar rally Range-Rovers, Ducati motorbikes and Lockheed F-22s; from the present: Tinder and Flint BlueSteel Formula One cars, Honda H-PR motocross bikes, fighter aircraft with thought-enhanced controls and AeroFoil gliders; and from the futuristic: landing craft from deep-space exploration missions and vehicles designed for combat with genetically-modified zombies on alien worlds.

One and Jetticke were very interested in the upcoming competition. Apart from the fact that One was coaching one of the contestants Virtuality LLC had been in the simulator market for about 13 years and was now a major player. That made two strong reasons to attend. That evening at dinner-time Jetticke brought the subject up.

"You know Triple-Sim is coming up in three months", she said. "The organizers announced the modes of transport today."

"What are they?" Yuan Zhi asked.

"The water section will be a future world, a 1.5G planet, either on a jet ski or a kite surfer..."

"A kite surfer?" Yuan Zhi asked, surprised.

In the past Triple-Sim had avoided sports as active as kite-surfing.

One joined in the conversation. "The organizers changed their policy. They think that the newer sims can handle it."

"The land section will be present world. It will be set in the UAE and will be riding a Yamaha Nomade", Jetticke said.

"And the air part?" Yuan Zhi asked.

“The air part is past world. It’ll be in a Lockheed F-22, in 2022.”

“That is a classic plane!” One said. “First of the fifth-generation fighters. It’s amazing! What do you think I was doing with Yi Lin all those years? F-22s are my specialty.”

“Well, I suppose it could be interesting”, Yuan Ming conceded.

“I’m glad you said that...” Jetticke said.

“Oh yes?”

“Well you know Dani Burchell made it through to the last eight. One wants to go to the competition with her. She can’t go on her own.”

“No legs”, One explained apologetically.

“You didn’t want them, remember”, Yuan Ming replied. “Where will the competition be held this year?”

“This year the first section will be in India, the second in China and the third in the US.”

“The US is very dangerous”, Yuan Ming said.

“We’d get a lot of security”, Jetticke said. “You could catch up with your friends at Christian Age Research too. I don’t want to disappoint One and I don’t like the idea of going on my own.”

Yuan Ming really did not like the idea of going to America but eventually the rest of the family persuaded him.

Chapter 40

Although Jim Benson was no longer in charge of monitoring him, one of his comments stuck in Yuan Ming's mind. He had often said that most people's loss in performance as they get older – at least until they are in their fifties – was a result of not training, not of getting old.

Yuan Ming remembered his words: "Don't imagine that you can't get quicker. Set yourself targets – it will motivate you."

So Yuan Ming decided to celebrate his fiftieth birthday by running a 400m race and Yuan Zhi decided to run with him. The prospect of racing against his fifteen-year old son made Yuan Ming as committed to training as he had been for many years and he felt very fit when the day of the race came. Yuan Zhi followed him for the first three hundred metres but overtook him in a heart-bursting sprint to the line. As his son passed him Yuan Ming found himself thinking: you little punk!

"Hey Dad, you were quick", Yuan Zhi said after they had caught their breath.

"58 seconds is very good for a fifty-year old with a busy schedule", Jetticke added encouragingly. Yuan Ming scowled at her.

"Look at it this way", One said. "At least Yuan Zhi didn't let you win."

By most people's standards Yuan Ming was in extremely good health. He had never had a day off work due to illness, if he didn't count what he called 'planned outages' such as routine visits to the dentist. He had only had minor ailments and colds and hardly ever took medicines stronger than paracetamol or ibuprofen. But the race against his son woke him up to the fact that – by his exceptionally high standards – something was slipping.

Pressure of work was having an effect. After a long day at the office he simply didn't have the energy to train hard. The situation did not look set to improve either: at age 51 he was appointed Special Advisor to the Minister at the State Forestry Administration, permanently based in Beijing. He knew, deep down, that his lifestyle was not a recipe for success in 100-2-100. He wasn't sure what to do about it but the matter was suddenly and unexpectedly taken out of his hands. The cause was a 15-year old girl called Dani Burchell.

After Jetticke and Yuan Ming had got married and returned to live in China, Yuan Ming's parents had handed over Virtuality LLC to Jetticke and One. The company grew substantially and branched out into a number of fields related to virtualization. One of the most exciting and profitable of these fields was manufacture of high-end games simulators, and One had also offered some simulation training. That year, for the first time, one of her protégés – Dani – had progressed to the last eight in the world's major simulation competition, 'Triple-Sim'.

Yuan Ming was pleased at One and Dani's success, but it created something of a problem for him. The competition had three stages, one in India, one in China and the final one in the USA. One and Dani needed someone to accompany them to India and the USA and asked Yuan Ming and Jetticke if they would. Yuan Ming wasn't enthusiastic. Relationships between the USA and China had improved to some extent but Yuan Ming felt that it would be dangerous to go to the US. But the rest of the family, and especially Yuan Zhi, were determined to go and he eventually gave in.

Jasmine Das visited Yuan Ming in Beijing soon after he and the family moved there. Half-an hour after she arrived Yuan Zhi announced that he was popping out to the shop.

“Anything you need, Dad?” he asked. “Chocolate? Ice-cream? Popcorn for our movie night?”

“Yeah, reckon we’ll need all those”, Yuan Ming replied.

“Wine-rack looks a bit lean too, Ming”, Jasmine commented.

“Got that, Zhi? Pick up a couple of bottles of that Ningxia Merlot as well.”

Jasmine smiled to herself. She knew that the show was for her benefit. But even if it had not been she would not have been worried. The telemetry linking Yuan Ming’s hip-chip to their computer in Kansas showed that he was exercising very regularly and she knew that most people living to 100 generally do not have very ascetic lifestyles.

She checked the kit in the apartment: air filtration and purification system, combined CO, smoke and gas monitors, a sprinkler system, automatic night lights to prevent bumping into things or falling over things. Safe stairs, non-slip surfaces and handrails in the bathroom, a security system to guard against armed intruders, a call button to call emergency services, a comprehensive first aid kit. The equipment seemed all right.

“You and Jetticke both went through the CPR course?” she asked.

“Yes.”

“And the defensive driving course?”

“Yes, and the defensive pedestrian course...” Yuan Ming answered.

“Ming’s been looking at getting a Ducati”, Jetticke called out from the kitchen. “Tired of being defensive. Second childhood and all that.”

“Jealous of Dani actually”, Yuan Ming said.

Jasmine had a whole check list of questions to go through. As always one section concerned whether he was maintaining his spiritual life.

“We all go along to a local church”, Yuan Ming said. “I’m one of the elders. Everyone is contributing in some way.”

“Including One?” Jasmine asked curiously.

“Yes. One is a member. She takes a Sunday School class.”

Jasmine also asked him about his plans for retirement, if any.

“I don’t know”, Yuan Ming said. “I think that what I’m doing is useful. I’ve built up a bit of a reputation in environmental policy circles. But sometimes I feel I’d like a change.”

“Well, we stick to what Jim and Paul told you”, Jasmine said. “Your first priority is to work out what God wants you to do. Longevity comes second. But if we know what you’re planning to do we can advise better.”

As usual Jasmine took a blood sample and asked Yuan Ming about any medication he was taking. He occasionally took a pain killer or used topical antibiotics to treat an ear or eye infection. He had never taken oral or intravenous antibiotics. He didn’t want to use antibiotics if they weren’t really necessary, and so far they had never – in his opinion – been necessary. He also thought that occasional infections gave his immune system the opportunity for a little workout.

“I’d use antibiotics if necessary”, he told Jasmine. “I’ve just never felt a need.”

The final thing she quizzed him on was whether he had been making enemies, perhaps

as a result of his environmental work.

“Now there’s a good question”, Jetticke called out from the kitchen.

“I have a reputation for being tough”, Yuan Ming said. “We do our best to kick out the bad guys, whether they are polluters or corrupt officials or people in the ministry who do a lousy job. There are a lot of people around who don’t like me. They tell lies about me, spread bad reports about me, try to stir up opinion against me. I could be kicked out of my job. I’ve been threatened but I haven’t yet been beaten up. But I can’t exclude the possibility.”

On Jasmine’s final evening Yuan Zhi invited Dani round and the family had an excellent movie night, finishing off all the ice-cream, chocolates and wine. Jasmine left the following day, quite satisfied. Before she left she gave Yuan Ming a picture of Sigiriya, an ancient fortress in Sri Lanka. It had a verse on it.

*The LORD is my rock, my fortress and my deliverer;
my God is my rock, in whom I take refuge,
my shield and the horn of my salvation, my stronghold.*

Psalm 18:2

“Thanks”, Yuan Ming said. “It’s really nice.”

“I like to give this verse to our participants”, Jasmine said. “It reminds me that all the things that I’ve been checking – the detectors, the precautions and so on – are all secondary. God is our shield and protector.”

The Yuans, One and Dani travelled to India for the first round of Triple-Sim and then to Shanghai for the second round. Three months after that they travelled to the US for the final round. After the competition finished Yuan Ming took the group to visit his old friends in Kansas. Paul Jaynard and Jim Benson were at CAR’s headquarters when they arrived and greeted Yuan Ming and Jetticke like family. Jim Swade was also there; the Yuans had not met him until then.

After they had caught up with each other’s news conversation turned to 100-2-100.

“How do you think 100-2-100’s going?” Yuan Ming asked.

“It’s going well”, Jim Swade answered. “100-2-100 is putting out some very valuable hard data. And I think that we’re doing what we set out to do, which is of course to present a Christian approach to longevity. Loads of people have signed up for our programs.”

“I see the calorie-restriction team has dropped out”, Yuan Ming commented.

“That’s right”, Jim Swade agreed. “So there are now eight teams. Of course lots of other organizations are now offering anti-ageing programs. Some of them are charlatans, but not all.”

“And they don’t have the evidence to show that their programs work, like the organizations participating in 100-2-100 do”, Yuan Ming commented.

“That’s true”, Jim Swade agreed. “100-2-100 ratifies our results.”

“We seem to be doing really well”, Yuan Ming said. “Judging by the biometric indicators anyway.”

“Very much so”, Jim Swade agreed again.

“So business should be good.”

“The longevity side of our business is doing well. We provide services all around the world, really in every continent. Demand is strong. But our centre here isn’t doing well.”

“The US is very different from when you left”, Paul Jaynard explained. “It’s much harder to run a profitable business now than it used to be.”

“Why?” Yuan Ming asked.

“The basic reason is the government”, Paul Jaynard said.

“Paul used the word ‘government’ for your benefit”, Jasmine commented. “Most people just call them the mafia...”

“A lot has happened here since you left the US”, Paul Jaynard explained. “You know how things collapsed after Mandate’s campaign. One result is that we got much more authoritarian governments.”

“Then corruption increased”, Jasmine continued. “And for the most part, Americans didn’t kick up a big fuss. A lot of people were actually quite happy to pay for what you might call, an expedited service. Before long, it became outright extortion. Pay, or no service. If you refused to pay the bribe then they came down on you very hard.”

“Obviously if one business doesn’t pay word gets round”, Paul Jaynard said. “So the authorities can’t let that happen.”

“At the same time, government officials were getting more involved in business”, Jasmine said. “They used their positions to push competitors out. Anyway, how does Christian Age Research fit into this? First of all we started to come into conflict with the government. Officials would come and inspect us. They would find some trivial and disputable issue and then impose a huge fine. They would then subtly suggest a way to make the problem go away.”

“Which you didn’t agree to, I assume.”

“No, of course not”, Jasmine said. “But the arguments created huge amounts of stress for us. The justice system had become very corrupt. Cases were decided on the basis of who you knew or how much you paid. Society across the US was becoming more and more polarized. There were those who would play ball with the government and those who would not. We were firmly in the not-play camp.”

“At that point an interesting thing happened”, Jim Swade said, joining the conversation. “Christian Age Research became a kind of rallying point for the disenchanted. Then the government really upped the ante.”

“We’ve nearly had our license revoked three times in the last five years”, Jasmine said. “Each time we’ve gone to court and each time we’ve won. There’s another case going on now. I’m very afraid that this time we’ll lose our license to operate.”

“And the effect on CAR, on the old people, doesn’t concern them?” Yuan Ming asked.

“Not in the least.”

“How have you survived?”

“With God’s help. And we still have friends with influence who stand up for us.”

Yuan Ming shook his head. “That sounds terrible. I had no idea things were so bad.”

“Things are very bad”, Jasmine answered. “In the US now we see all the same things that the Old Testament prophets warned the Jews about nearly three thousand years ago.”

“Such as...?”

“Falling away from God. Love of money. Bribery, extortion, cheating and breaking your word. Murder. Sexual self-indulgence, slander, drunkenness, eastern religions, Satanism, divination and so on. That’s for starters.”

“It’s not very nice”, Yuan Ming said.

“No.”

“And the response of Christians?”

“The verse that says, ‘The love of many will grow cold’ comes to mind”, Jasmine said. “We see Christians who give up, who really haven’t got the energy left to care for all the people who get hurt. Many Christians have retreated into a ghetto mentality. They either don’t go to church at all or just meet in small groups...”

“The church certainly hasn’t helped”, Jim Swade added. “Some preachers hint pretty strongly that God is probably behind all of this...”

“Which may be true”, Jasmine commented.

“It may be”, Jim Swade agreed. “But God’s message is rarely one of complete hopelessness.”

“You also get some preachers who say that everything will be all right”, Jasmine said. “That might make you feel better for a time. But the message we actually need is that the situation can be resolved if man will repent and turn back to God. But if not, then look out.”

“Look out?” Yuan Ming asked. “Something worse will happen?”

“That’s what we think”, Jim Swade said. “The spring rains not coming, the land not yielding its harvest and so on are warnings. The wrath comes after that.”

“That’s a lot to take in”, Yuan Ming said.

“Yeah. Sorry to spoil our nice evening.”

“No, we wanted to know about your situation”, Jetticke said. She was thinking how glad she was that they had come down to Kansas. They would not have got all this information otherwise.

“So what’s the way forward?” Yuan Ming asked.

“We don’t know”, Jim Swade said.

There was a glum silence around the table which Paul Jaynard eventually broke.

“Life hasn’t been totally easy for you either”, he said.

“No”, Yuan Ming agreed. “There have been a lot of conflicts. But I don’t think they compare to yours.”

“In movies you just shoot the bad guys”, Jetticke said. “It’s quite fun. But in real life you’re not supposed to do that.”

“Getting rid of them is hard work, I imagine.”

“Yeah”, Yuan Ming agreed. “We were talking about that with Jasmine when she came over. I think of Psalm 101 as Leadership 101. I read it quite often. It’s like David is psyching himself up to do all the things he knows he should as a leader. A lot of it is about not putting up with the bad guys. That’s been a large part of my job too. It’s tiring.”

“Well, you have our sympathy”, Paul Jaynard said. “There’s also a verse that says, ‘Anyone who wants to live a righteous life in Christ will be persecuted.’ No-one gets let off. Of course that can happen at any time but in my experience lots of people face significant

stress as they go through their fifties. By that time they may have reached a position of authority or influence...”

“Which they use”, Jetticke said. “And they get a reaction.”

“Exactly”, Paul Jaynard agreed.

Just two nights later CAR leadership’s opinions about the opposition they were facing seemed prophetic.

A neo-Nazi group attacked CAR’s premises, set both the main building and the clinical lab on fire and opened fire on the residents as they streamed out onto the lawn. Six old people died and Yuan Ming was almost killed. The attack was coordinated with attacks against other CAR contestants in 100-2-100 resident in the US and three died. No-one at CAR thought that the neo-Nazi group had initiated the attacks themselves but it was never discovered who was ultimately behind it.

When the police finally arrived and the pandemonium had died down Yuan Ming caught up with Paul Jaynard.

“I brought this on you”, he said. “Someone decided to take the opportunity to attack while I was in the US.”

“No”, Paul Jaynard replied. “We brought it on *you*. Three of CAR’s contestants are dead because I persuaded them to join this competition. You were very nearly one of them. I thought we might be attacked some time. But I never thought it would be so soon.”

“I guess we were doing well”, Yuan Ming said.

“Yes”, Paul Jaynard agreed. “We were.”

But not so well now, Yuan Ming thought. In the weeks following the attack he kept on going over it in his mind. CAR’s entry in 100-2-100 now seemed like a lost cause but he was more determined than ever that CAR’s remaining contestants should put in a strong performance. He was passionately committed to the environment and thought he was doing something valuable at the State Forestry Administration. But his high-profile and high-pressure job were not what the longevity competition needed.

“I’m not saying that 100-2-100 is more important than the environment”, he told Jetticke. “But I think it’s more important for me. I can make more of a difference by focusing on 100-2-100. And I think that doing something smaller can also fit with our environmental goals.”

“What are you thinking?” Jetticke asked.

“I’d like to try to model how you can have a great life – and care for the environment – without spending loads of money. Do something at the micro level, instead of the macro level. I’d like to try to create a kind of model community.”

It was several months before the Yuans worked out what they would like to do. Jim Swade was very surprised when Yuan Ming eventually called to tell him that he had decided to leave the State Forestry Administration.

“You’ll give up your political career?” he asked.

“I guess there’s something I’m gradually learning about the Christian life”, Yuan Ming said. “Sometimes God tells you to go ahead when the way ahead seems completely impassable. And at other times he tells you to change course when the way ahead seems highly attractive.”

“I’m afraid that’s my experience of God too”, Jim Swade agreed. “He acts like he’s the boss and says, ‘Come here’, ‘Go there’. Plays havoc with the planning. Anyway that’s what you feel God’s been saying to you?”

“Yes. Actually, it’s not just me. It’s a kind of all-of-us decision: me, Jetticke and One.”

“Oh?”

“One and Jetticke are going to sell Virtuality”, he said. “It’s an MBO so the staff aren’t too unhappy.”

“What are you going to do then?”

“We’re planning to move to a village in Anhui province. Nice gentle climate. Less stress.”

Following the attack the other teams set up elaborate security precautions. The extremely wealthy group of women from San Marino, Monaco and Monte Carlo, competing for the Wellness Centre, barricaded themselves into fortresses that the US embassy in Iraq would have been proud of.

Yuan Ming and Jetticke purchased land at the edge of a village about 100 kilometres north-west of Anqing. Jetticke designed a beautiful house in what was becoming her trademark ‘ruined wall’ style and had it constructed. When it was ready Yuan Ming gave in his notice to the State Forestry Administration and he and Jetticke moved there. But both of them were interested in creating more than simply a home, but a community too, and set about their new project with great enthusiasm.

In 2053 the standings were as follows.

<u>Organization</u>	<u>Based in</u>	<u>Method</u>	<u>Surviving participants</u>
Age Management Inc.	USA	Hormone-treatment	10
Age Research Centre	Sweden	Lifestyle	9
American Ayurvedic Society	USA	Ayurvedic	10
Christian Age Research	USA	Ethical life	7
Wellness Centre	San Marino	Lifestyle	10
Ministry of Health and Welfare	Japan	Traditional Okinawa lifestyle	10
Pharma GmbH	Germany	Telomere-treatment	10
Rennes Longevity Institute	France	Genetic selection	10

Withdrawn

Calorie Restriction Assoc.

Deutsch Gemeinschaftsleben

Chapter 41

The three months before Triple-Sim is a time for intense preparation.

For the water-based section, Dani needed to hone her skills in riding a jet-ski or kite-surfer and to build up her strength to cope with 1.5G. One set the simulator whirling around at a brisk 12 RPM to simulate the extra gravity.

For the land-based section, the sim would be set in the present, in the UAE, a real country. Dani spent hour after hour studying maps and riding the Yamaha around a simulation of the UAE learning the road layout. One also gave her general background.

“The UAE is a lot different to thirty years ago”, she explained. “When oil production dropped the economy took a big hit and millions of Asian workers returned home. Dubai was spared some of the pain. It’s still the world’s major transit and transportation hub and it had a more diversified economy than some of the other emirates. As the population went down, water consumption went down and waste water also went down. Waste water is purified and used to irrigate the flower-beds. Since there isn’t as much of it they have cut back on the big displays of flowers. Organized crime is on the increase. The roads are still fantastic, speed limits have been lifted on many of them and there aren’t many cars. It’s one of the few places in the world where the law and road conditions allow you to drive really fast.”

“Sounds like just the place for a sim”, Dani said.

However it was the air-based Sim that both Dani and One got really excited about. Both of them knew that the F-22 was the definitive fighter aircraft of the early 21st century; the plane that, more than any other plane, pilots would give their right arm to fly. The complexities of a mission in an F-22 were orders of magnitude greater than for either of the other sims.

Dani was already an excellent pilot. She would not have reached the final eight of Triple-Sim if she were not. She had been practising and perfecting air combat manoeuvres for years and had logged hundreds of hours of sim flying time. She was a master of the J-turn and Pugachev’s Cobra. She understood the Law of Armed Conflict principles. She understood that if she couldn’t positively identify the enemy combatants or an enemy objective and ensure that any collateral damage would not be excessive then she couldn’t simply launch a guided bomb at it from 50,000 feet up and 25 miles away and hope for the best. She would need to get closer.

What Dani needed was to refine all this for the F-22 for that time and period of history. To do that, she couldn’t have a better teacher than One. As One modestly said: “When it comes to conflict between Chinese and US air forces in the first half of the 21st century, I am the expert.”

A huge amount of classroom study was needed. Dani needed to understand the F-22’s airframe and performance, tactics and manoeuvring, stealth and counter-stealth, radar, weapons and electronic warfare systems, communications, mission control and the strengths and weaknesses of her opponents.

“The F-22 is a really special plane”, One said. “It can do loads of things that other planes can’t do. But it always works in a team. You have to understand the team process. An F-22 can continue to play an essential part in a mission even when it’s completely out of missiles.

There's also another thing we should think about. When Triple-Sim set sims in the past they generally take something that really happened or nearly happened and add a twist."

"Which makes the sim more realistic", Dani commented.

"Yeah, you know the line", One said.

Dani certainly did know it. Always much is known after an event that was not known at the time of the event. Things that would have been uncertain then – such as the capabilities of the enemy radar – are known now. By adding twists Triple-Sim gives the present-day musimon some uncertainties to deal with and simulates the feeling of the original event better than if it had stuck rigidly to the facts.

"Anyway", One continued. "Triple-Sim has told us that this sim is set in 2022. The major confrontation which occurred close to that time was in 2026, when China and the US nearly went to war in the South China Sea. It's likely that the sim will be similar to that confrontation. If it is then we know what each side's strengths were, the capabilities of their radar and so on. But we don't know what sort of twist Triple-Sim will put in."

"If any", Dani said.

"Oh, there will be one", One replied.

One evening One asked the Yuans if they would like to meet Dani.

"Are you kidding?!" Yuan Zhi asked.

A few days later they made a visit to the research centre. On the way Yuan Ming quizzed Yuan Zhi about the competition.

"What are the other competitors like? Who's everyone betting on?"

"The person a lot of people are betting on is Jagannath Nagarkar", Yuan Zhi replied. "He's Indian. His parents are film stars, lots of money. They got a designer child from Max Labs. No-one knows exactly what Max Labs did but they're pretty sure they mixed some animal genes in somewhere. He's got really amazing eyes. His irises are distinctly yellow."

"Some people have quite yellow eyes", Yuan Ming said.

"But not when both your parents have brown eyes."

"Ah."

"Everyone calls him Eagle Eyes."

"Sounds like someone's building up some good hype", Yuan Ming said. "What do they say about Dani?"

"She's supposedly a repaired human", Yuan Zhi said.

"Whereas Eagle Eyes is an improved human?"

"You got it."

"And is there any truth in her being repaired?" Yuan Ming asked.

"Could be. Her dad's specialty is genetic repair."

"Seems like it could be interesting", Yuan Ming conceded.

At the research lab One introduced the Yuans to John Burchell.

"I know that One can't go to the competition unless you take her", he said. "I'm really grateful to you."

"Are you going to come?" Yuan Ming asked.

"I can't. We're right in the middle of a set of experiments. I can't be coming and going. Anyway, let me show you to the simulator room. Dani's already through there."

In the simulator room Dani was operating a hand-control for an overhead crane. She had removed the one-person capsule she usually used and put a two-person capsule in its place.

“Hi!” she said as the Yuan family came in. “Wow, I’ve been really looking forward to meeting you.”

“And likewise”, Yuan Ming said. “One has been telling us about you. She’s full of praise.”

“She’s an amazing coach”, Dani said.

On the arm of the simulator, in big orange letters, was the word V I R T U A L I T Y I N C and underneath it, in smaller letters, p a c e m o r p h o l o g y[©]. But Jetticke didn’t need to read the lettering to recognize the model.

“One, I didn’t know they had one of our simulators.”

One smiled. “Nothing but the best, you know. Well, Dani’s got the two-person capsule set up. So anyone who wants to can have a go.”

Yuan Ming shook his head. “I’ll give it a miss.”

“Me too”, Jetticke said.

“So bro?” One asked with a mischievous expression. “Fancy a whirl?”

“Sure!” Yuan Zhi said.

“OK!” Dani said. “Now we’re going to have some fun. What sim would you like?”

“I don’t know”, Yuan Zhi said. “Why don’t you choose?”

“How about the top-fuel dragster sim to start with? Then we can try something else.”

“Fine”, Yuan Zhi replied.

“I’ll need twenty minutes or so to get it set up.”

Dani took the overhead crane control, carried two dragster cockpits to the capsule and locked them into position. She picked up two helmets and gave one to Yuan Zhi.

“If this was a competition they’d be fully suited-up”, Jetticke explained to Yuan Ming. “Fire-proof suit, face-mask, gloves, the works. There’s no danger of a fire but Triple-Sim insist on everything being as realistic as possible. But the helmet is important even in the sim.”

Dani helped Yuan Zhi put on his helmet and head restraint with its tethers. They climbed into the capsule. Yuan Zhi squeezed himself into one cockpit and Dani helped him fasten his harness.

“You need to pull it as tight as you can”, she told him.

She then got into in her cockpit and fastened her own harness.

Each cockpit had a steering wheel – a titanium bar shaped like a pair of butterfly wings. In front was an LCD screen. To the right was a brake lever and a parachute release and an array of switches. Above were the bars of the safety cage. In almost every respect they might have been sitting in real dragsters.

“Shall we start?” Dani asked, speaking through her helmet microphone.

“Sure.”

Dani flipped a switch and the simulator came on. The whole of the inside of the capsule lit up and Dani and Yuan Zhi were transposed to a drag strip. Some men were pulling the dragster out onto the track and Yuan Zhi could sense the movement from the simulator. He

could see a large crowd in the stands and another dragster being pulled into the lane on the right.

The men pushing the dragster stopped and started fussing around the car. Yuan Zhi could not hear very much because of the ear defenders but he sensed that it was fairly quiet. The quiet did not last long. One of the men hooked a starting motor to the blower – the supercharger – and the engine burst into life. Another man standing to the side of the car adjusted something – Yuan Zhi could not quite see what – and the sound from the engine changed from a rumble to the dragster’s familiar, indescribably loud cackle.

“We switched to nitro”, Dani explained through her helmet mic.

The car was vibrating violently and Yuan Zhi’s entire body shook. He had read somewhere that dragster racing is the loudest sport in the world. Out of the corner of his eye he could see flames coming from the exhaust pipes. He had not, until this moment, thought that a session in a simulator could be frightening. He was rapidly revising his opinion.

One of the men signalled to Dani that she could start the burnout. She put the dragster into gear – it only had forward and reverse – let out the clutch and allowed the dragster to roll forward into the bleach box, wetting the rubber on the dragster’s tyres. A member of the crew gave her a signal. She pressed down on the accelerator and 7000 brake horsepower from the Chrysler hemi hit the wet tyres, setting them spinning. Yuan Zhi felt a massive punch in his back as the dragster shot off in a trail of smoke.

And this is just the warm-up, he told himself.

100 metres down the track Dani cut the power and stopped. She put the dragster in reverse and returned to the starting line, guided by one of the crew members walking in front of the dragster.

They were now ready for the start. Dani gazed up at the Christmas tree and nudged the car forward until both pre-stage and stage lights were lit. All the lights flashed briefly and then two pairs of yellows lights lit in rapid succession. Dani didn’t wait for the green lights – her foot hit the gas at the precise moment the next pair of yellow lights lit. Yuan Zhi felt a massive thrust in his back as the car hurtled forward at more than 5G, reaching 100 MPH in well under a second. It was far more intense than any amusement park ride he’d ever been on. He half noticed a green light on his left as they passed the finish line. Dani threw the parachutes and Yuan Zhi slammed forward into his seat belt as the car decelerated at 3G. Continuing to brake Dani guided the dragster into the return road.

“OK, One, that’s enough”, Dani said. The simulation stopped and the arm came to rest. Dani quickly undid the buckles on her harness. The dragster sim was just for fun but Yuan Zhi could tell that Dani had done it many times. He was content to recover slightly and stayed where he was. Outside the simulator Yuan Ming and Jetticke had watched the arm suddenly jerk into motion and whirl round several times before gradually slowing again. Now the capsule popped open and Dani’s head appeared.

“We won”, Dani called out.

“Oh good”, Jetticke said. “What was your time?”

Dani looked down at the screen in front of her.

“4.58 seconds.”

“Reaction time?”

“0.07 seconds.”

“Nice”, Jetticke said approvingly.

Dani lowered herself back into the capsule.

“That was great, wasn’t it!”

“Yeah, great”, Yuan Zhi replied, looking dazed.

“Well, I’m glad you feel that way”, Dani said. “Did you know that the unofficial world record for the quarter mile is held by a woman?”

“No, I didn’t.”

“Kitty O’Neil, back in 1977, in a rocket car. Quarter mile in 3.22 seconds.”

“Amazing.”

“Fancy a shot at it?”

Yuan Zhi could not say no.

Chapter 42

The first stage of Triple-Sim would be in Delhi and Yuan Ming decided that they would travel there by train. He didn't relish six days on a train, even though everyone said it was very comfortable and the views of the Himalayas – especially in the section from Lhasa to the Nathu Lu border crossing with India – were spectacular. But environmental considerations heavily favoured the train against the plane.

As the group travelled through northern India news channels were showing the memorial services that were being held all around the world to remember the dead from the Tokyo earthquake. There was also an update on deaths from AIDS. And here we are, Yuan Ming thought, sensing the incongruity, going to India to take part in simulation games.

It was a long time since Yuan Ming had been in India and he wondered if he would need one to translate. But everywhere they went people spoke excellent English.

Yuan Ming had booked three rooms for their party at an expensive hotel in Thane, about half an hour from downtown Mumbai. After they had got unpacked he announced that he wanted to go for a run before dinner.

"You'll have to get used to this", Yuan Zhi explained to Dani.

"I'll come with you", Jetticke said. "You don't know your way around here."

Yuan Zhi and Dani decided to come too. One also wanted to come and was put in a backpack.

"I'm sure I saw a track on the map", Yuan Ming muttered, half to himself.

Yuan Ming's navigational abilities were perfectly up to the task and fifteen minutes later the family arrived at a stadium. Some schoolboys were playing cricket in the centre and a number of Indians in varied sportswear were running around the track. They did not give the small group of newcomers much attention. The Yuans and Dani exercised for about an hour and then headed back to the hotel.

"Your dad's pretty fit", Dani commented to Yuan Zhi on the way.

Yuan Zhi smiled slightly. "He said the same about you just five minutes ago."

The following day the party went down to the sim centre that was hosting this stage of the competition. People don't come to sim centres to watch sim competitions. There is no point. They wouldn't be allowed in, and even if they were, all they would see is a simulator moving around. Everyone watches sims on a screen. Nonetheless there were a lot of fans outside the sim centre when Yuan Ming's party arrived. In the centre of the crowd was Jagannath Nagarkar – Eagle Eyes, enjoying answering reporters' questions. He noticed Dani and shouted out a greeting. She acknowledged it but didn't stop to chat.

Inside the centre Dani found that three other competitors had already arrived. She knew them all. Tahir Karim was a long-haired, bearded Saudi. Jan Loots was a fair-haired Afrikaner; he had won the triple two years previously. Martin Cole was a muscular 23-year old black American, a fantastic driver. Eagle Eyes was still preening himself outside and Dani made five. That left three to come. Two minutes later there was a roar from outside. Dani could guess who had come: Muhammad Wasim, a Pakistani, winner of the triple the previous year. Couldn't be better as far as the sports channels were concerned. Wasim spent a few minutes winding Eagle Eyes up and then followed his bouncer inside, oozing arrogance. Next to arrive was a strongly-built Norwegian girl, Hildegunn Knudsen, the only

other girl through to the last eight. She was known as an excellent shot – a very necessary ability in Triple Sim. There was one more person and Dani was not surprised that he was the last: he had been known not to arrive at all. But in he came, Riley MacNamara, from Belfast, Northern Ireland.

“Hoi Dani”, he said to Dani as he passed her.

“Hoi Roiley”, Dani replied.

“What d’you tink of dis?” Riley asked, gesturing towards Eagle Eyes, who was finally pushing his way in through the door.

Dani smiled slightly and shrugged her shoulders.

“Velly good”, she said, switching to Indian English. “But he should get inside only.”

Dani liked Riley. He liked to act the fool but he was smart and a brilliant improviser, most definitely a serious contender.

The president of Triple-Sim India welcomed the contestants and they posed for a group photo. He then invited the senior referee to run through the rules. There wasn’t much need. The drill was always the same and everyone had been through it hundreds of times. First off was the clinic. Everyone went through MRI and other scans to check for receivers and transmitters, thought converters and retinal implants. Those were followed by blood tests to check for performance-enhancing drugs and especially darshin.

After the tests were finished everyone came through to the preparation hall. There were eight tables in eight small sound-proofed cubicles. Each had a keyboard, a mouse, a monitor and a headset.

“Everyone apart from the contestants needs to leave now”, the referee said. “Are you all ready?”

“Ah, no”, Riley called out, delving into his pockets.

“Forgot the whisky?” Jan asked, poking his head out of his cubicle.

Riley checked.

“No, got dat.”

After a moment he found what he was looking for: a self-adhesive patch with a picture of a shamrock.

“All right”, the referee said. “Good luck to you all.”

He pressed a button and the monitors lit up. This was the mission-briefing phase. The contestants would have one hour to absorb as much information as they could, make a choice of transport, get suited up and into the Sim ready for the start.

Dani looked down at the text on the screen in front of her.

Your mission

Rhipsime is a 1.5G planet which was colonized approximately 100 years ago. 90% of the planet’s surface is water. The planet is home to a huge variety of marine life, both fish and mammal. In the summer the temperatures range between 30-40°C. Water sports are popular and relatively safe provided that one remains within the netted areas. In the winter average temperatures drop to -20°C, storms are common and the strong winds carry pack ice away from the polar regions and into the oceans.

You are a water-sports instructor and have been working at a resort on the island of

Jepin 3 for the past three years. Wanting to earn something during the off-season you agree to work with the maintenance crew through the winter.

The previous night a storm was forecast. This does not alarm you especially: you live in a heavily-insulated dome-shaped building which has endured many storms before. That night, however, is different. At three o'clock in the morning you feel a sudden powerful jolt and are then brought fully awake by the sound of the alarm siren. Stumbling out of bed you notice that only the emergency lighting is working. You make your way to the central hall where the other members of the maintenance crew are gathering. A moment later the chief engineer runs in.

"We have a serious problem", he says. "In case you hadn't guessed, that was an earthquake. The dome is cracked in several places, sulphur dioxide is leaking in from somewhere and the generator is kaput."

Someone asks about the radio.

"It's working", the engineer replies. "But the storm is interfering with the signal. We can't get through to Vahtsamy."

"Maybe Vahtsamy's been hit too", someone says.

Vahtsamy is the nearest large settlement, on an island about 65 kilometres away. The maintenance staff make various suggestions as to what can be done. But after a few minutes the chief engineer gives his opinion.

"We can't stay in the dome because we can't seal off the sulphur dioxide. We need to move out to one of the store houses..."

"We'll freeze there", someone shouts out and others agree.

"We can make a fire", the engineer says. "We can survive until help comes."

"And how's that going to happen?"

There is an uncomfortable silence. At this point you say, "Maybe I could bring help. We have jet skis or I could take a kite surfer. The wind's in the right direction. Maybe I could make it to Vahtsamy. If someone doesn't go, chances are that we're all going to die here."

The older men are sceptical but eventually they agree to your going.

Your mission is to reach Vahtsamy to bring help. If you don't make it, the maintenance crew will not survive. You can try to reach Vahtsamy by jet ski or kite surfer. The computer contains more information about marine predators found in that part of Rhipsime, recent met reports and various other information. Good luck.

Dani ran her hand through her hair.

"Not everyone will survive this", she thought to herself.

One of the things Dani loved about Triple Sim was that it wasn't all about athleticism. You have to think and if you don't think right you die. And in Triple Sim if you die in one round you don't go on to the next.

She spoke rapidly into the computer.

"Computer, show me your last daytime satellite image of the sea between Jepin 3 and Vahtsamy."

The computer did so; it was from the evening of the previous day. Dani zoomed in and saw the pack-ice.

“Give me the latest information on wind speeds, currents, wave height.”

The computer did so.

“Adjusting for wind and currents give me your best estimate of where the pack-ice is now.”

Dani studied the revised picture and tapped on the screen in several places to mark out what seemed like the best route through the pack ice. She tried to work out how long each leg might take and then jotted down the bearings and the time she would need to change direction: 0500 270° / 0540 280° / 0600 255°. After that she wrote down several GPS coordinates. Hopefully by the end of the third leg she would see Vahtsamy. She zoomed in further. Some of the pack ice was obviously in large chunks.

“Computer, what are the most likely marine predators at this time of year in this area?”

The computer presented pictures of a number of large shark-like fish.

“Give me prevalence, swimming speed, mode of attack...”

Dani absorbed the information.

“How do they detect their prey? What are their vulnerabilities?”

Now Dani moved onto the next subject.

“Are GPS devices working at the moment?”

“Not at present”, the computer answered.

Because of the storm, Dani thought.

“Computer, does Vahtsamy have a mobile network?”

The computer confirmed that it did.

After a few more minutes Dani had got most of the information she thought she needed and decided to go for the kite surfer.

“Computer, show me the base inventory list.”

The computer did so and Dani looked through it.

“Computer, allocate me the following items: all the kit I usually use for kite surfing. Give me a carbon-fibre board and the smallest kite there is. A dry suit – you know my size – and a helmet with integrated comms. An offshore jacket. A machine pistol, one of the 9mm ones, five extra magazines and a thigh holster. An emergency phone, a stand-alone GPS and a compass. Ten clear plastic bags – strong ones – and a roll of waterproof tape. An indelible marker. Two bottles of energy drink.”

Time was up. Dani needed to go to the kitting-up room. She could see that the other contestants were also leaving their cubicles. That would be the last time she would see them until the end of this Sim.

The kitting-up room had been set up to look like a storeroom in an off-world base. All the equipment Dani had asked for had been prepared.

Dani knew there would be a TV camera there: viewers didn’t want to miss anything. She turned it off, changed into the dry suit and then turned it back on.

Next on was the bright orange offshore jacket. That was mainly to prevent the kite line from cutting the soft rubber of the dry suit. Then the kite harness. No point in putting things in pockets that she couldn’t reach afterwards because of the harness. She set the emergency phone to automatically send a distress message every minute both via satellite and via the mobile network. If the weather cleared a message would reach Vahtsamy before

she did. She checked to see if the phone was picking up the helmet mic and then wrapped it in three plastic bags, tying each one tight. There wouldn't be any water in the sim but as always sim organizers expected contestants to act as though the world was a real one as far as possible.

She put the phone into a zip pocket. If it had been a real world, not a sim, she would have attached the phone to the kite to try to get a better signal. That was of course impossible and one just had to accept that sims had limitations. She entered the coordinates on the GPS, wrapped the device in the same way as the phone, taped it to her left forearm and checked she could still see the screen. It was showing the time, which was useful, but not much else. Still, the storm might clear and then the GPS would be invaluable. She taped the compass to her arm next to the GPS. The compass would be indispensable as long as there was no satellite signal. She then copied her bearings from the piece of paper onto the sleeve of her jacket, writing them in big letters with the indelible marker. She probably wouldn't forget the bearings but it was better not to take a chance.

She attached the thigh holster and put the machine pistol in. It was not a very accurate weapon but she didn't expect to be using it except at close range. The main thing was that it was light enough to fire with one hand so she could hold the kite with the other. It was also good that the magazine held 21 rounds: she wouldn't need to reload often. She stuffed the extra magazines into various pockets of her jacket. The weapon would not fire any real rounds in the Sim but it would kick like a real weapon and use rounds up like a real weapon.

She was boiling. The capsule had better really be -20°C. She found a place for the energy drinks. At last she was ready. She picked up her helmet and walked through to the large room where her sim was located. She couldn't see the other musimons but she knew that they would be doing the same thing. She wondered what state they would all be in in two hours' time.

Although this was simply a room to house the sim the Triple-Sim organizers went to a lot of trouble to maintain the sense of being off-world. Projectors and speakers created the impression that Dani was on a cold and inhospitable coast early in the morning. Ahead of her she saw a furious sea with huge crashing breakers. There was the sound of the gale force wind and claps of thunder, and every so often flashes of lightning lit up the sky.

Dani was aware of cameras following her as she went over to the Sim; she looked at one of them and smiled slightly.

While she was kitting up Dani's Sim had been prepared with the board she had specified. She quickly climbed into the capsule. It was already active. As soon as she entered the capsule she got the impression that she was standing on the shore, at the water's edge. Below her was the board and in front of her the four control lines for the kite. She could see the kite – the image of the kite on the LCD of the inner capsule – bobbing around not far above the horizon. A few stars were still visible but they wouldn't be there for long.

She hooked up the kite line. The kite was, of course, simulated; she could see it moving and she would feel a varying pull on the line depending on the wind strength and how she controlled the kite. There would be no pull on the line until the countdown reached zero: all the musimons would start at the same time.

It was very cold; she pulled down the visor on her helmet. The timer showed that she had a little over a minute remaining.

The sim's centrifugal arm started to rotate and Dani felt herself getting about 30 kilograms heavier. This was going to be physical and there was no way of knowing how long it would last. It would end when she reached Vahtsamy or died – a simulated death, hopefully – or gave up. Not that that would happen.

Chapter 43

The timer reached zero. Dani leant back and felt the tension on the kite line increase. She liked the look of the kite. It was black with yellow stripes, small and responsive.

OK bumblebee, she thought. You and I are going to be friends.

She jumped and let the kite lift her slightly into the air. The strength felt good – just like the one she had practised on. She made a small adjustment to the harness.

Right, she whispered to herself. Let's make this happen.

She leant back and set off purposefully into the foaming sea, one hand on the control bar, one arm behind her helping her to balance.

Yuan Ming, Jetticke, Yuan Zhi and One were watching the action from the comfort of the sim centre lounge. Their one thought was: 'Wow!' They had all watched kite surfers before but this was really something special. Dani was in the air as much as in the water. One dramatic turn followed another as she negotiated the breakers, her body sometimes almost horizontal. Time after time the Yuans thought she had gone down but she emerged again. Gradually she seemed to be getting through the largest breakers into some slightly calmer water.

The Yuans flipped through the channels to see how the other musimons were doing. Three had chosen jet skis; the rest, like Dani, were on kite surfers. Wasim and Eagle Eyes were both on kite surfers and moving very fast and confidently.

"Too fast", One whispered to Yuan Zhi.

Hildegunn and Tahir were on jet skis, struggling with the big waves.

"They'll be faster than the kites if they get some smooth water", One said. "But I don't think they'll get any."

Over the next hour the Yuans watched avidly. The musimons were now starting to encounter blocks of ice. The kite surfers jumped the small ones, letting the kite carry them for a hundred metres or more before coming back down onto the water. The jet skis, however, had to go round all of them.

At least, they should have gone round all of them. In the driving spray Hildegunn failed to see a smaller piece of ice. She hit it at an angle. The jet ski somersaulted and then righted itself. But the engine had stopped.

In a sim if you have a big accident the sim stops; you're presumed dead and it's game over. If it's a small accident the sim doesn't stop. But sometimes you might prefer to be dead.

Hildegunn tried over and over again to get the jet ski started but it was no use. She resigned herself to what she knew would happen next and prepared the gun she had brought. Five minutes later she saw a large shark coming to investigate. She fired once. Within a minute there were two more sharks. Hildegunn continued to fire. After ten minutes she had no more rounds. She felt something strike the jet ski from underneath, turning it over once again. Then it was game over.

Wasim and Eagle Eyes were continuing to make excellent progress and Dani was not much slower. But each of them was starting to attract a following of sharks, quite capable of keeping up with them as they ploughed their way through the heavy seas. All three were now right at their limits, watching out for pack-ice ahead and sharks behind. Eagle Eyes was

certainly living up to the hype. He seemed to see everything, anticipate everything. He would calmly lift into the air to clear a small 'berg, turning and despatching a shark as he did so.

But Wasim was going too fast. He tried to jump a piece of pack ice only to realize that it was much larger than he had thought. After two hundred metres there was a crash. The game was over for him.

Dani was more cautious. As long as she didn't die she would make it through to the next round. Still, she was making good use of the machine pistol and was already onto her third magazine.

An hour and twenty minutes had passed. Dani sensed that the storm was letting up slightly. She was right. Ten minutes later she heard a crackle from the earpiece in her helmet.

"Dani Burchell, come in please. Dani Burchell, come in please."

"This is Dani. I hear you."

"Dani. This is Vahtsamy Search and Rescue. We received your message and have despatched a lifeboat to Jepin 3. What is your position?"

Dani looked down at the GPS on her arm. It was just now detecting satellites.

"Give me a moment."

A minute later Dani reported her position and twenty minutes later a coastguard vessel met her. This part of the sim was also important. If you did not reach safety you did not progress to the next round.

Finally the sim stopped. Dani was completely exhausted and could hardly pull herself out of the capsule. The whole family was there to greet her.

"How did I do?" she asked.

"Brilliantly!" Yuan Zhi answered. "You're in second place. Eagle Eyes won. Wasim bombed."

"Wow, that'll be a shock."

"Hildegunn and Tahir are also out."

"That's rough", Dani said. "But I'm not surprised. That was really tough. Anyway, I need a bath."

By the time Dani came back the three remaining players had finished. The final placings were:

Jagannath Nagarkar	10 points
Dani Burchell	9 points
Martin Cole	8 points
Jan Loots	7 points
Riley MacNamara	6 points
Tahir Karim	eliminated
Muhammad Wasim	eliminated
Hildegunn Knudsen	eliminated

Now that the contest was over Yuan Ming felt a bit more relaxed.

"Dani, did you know that I used to compete?" he asked her.

“No I didn’t. What in?”

“The 400 metres. Anyway, after a meet we would always go out to a good restaurant. Your dad isn’t here but perhaps you would like to do something like that.”

“That would be brilliant!” Dani said. “I love Indian food.”

“So do I”, Jetticke said with feeling.

“That’s good”, Yuan Ming said. “Because I’ve already made a reservation.”

Leaving the sim centre the family caught a cab to Bandra West. Yuan Ming was content to take in his surroundings and didn’t speak much on the journey. He had read about the problems India was facing but now, as they travelled through Mumbai, he saw them first hand. Democracy was great but it hadn’t been able to handle population growth. But that, Yuan Ming knew, was only part of the issue. Population growth combined with climate change made a very unpleasant cocktail. Glacier melt was down, monsoon patterns were upset and rising sea water levels and frequent floods were forcing people out of coastal areas. Not what you want when you have 1.6 billion people to feed. The result was poverty and the poverty was all too evident. So different to China.

The meal was great. Yuan Ming decided to try dhan sak for the first time and followed that by ras malai for dessert. But his appetite had been spoiled by the sights on the way. A few days later the family returned to China.

Chapter 44

Yuan Zhi became a regular visitor to the research centre where John Burchell worked. Not that he wanted to visit John Burchell of course. But one day he stopped at his office to say hello and the two got into a conversation.

“Hello Mr Burchell”, Yuan Zhi said, from the door.

John Burchell looked up from his desk and lowered his glasses.

“Hello Zhi. Dani’s already in the sim room.”

“Can I come in?”

“Of course!”

“Dani was telling me about the worm you made. That sounds pretty cool.”

“A cool worm, huh? What did Dani say about it?”

“Well, it’s lived for a long time. Like more than twenty years.”

“That’s right. Do you want to see it?”

John Burchell went over to a small container, moved some moist compost around and found the worm.

“You can hold it if you like”, he said.

Yuan Zhi opened his hand to accept the wriggling worm. He studied it for a few moments and then dropped it back into the container.

“Molecular geneticists worked on worms thirty or forty years ago”, John Burchell explained. “They moved on to other things. But I wanted to try something out.”

“What did the scientists move on to?”

“Well, they worked on mice quite a bit. They managed to change a domestic mouse back to a wild mouse. That set the direction for my work: figuring out how to take a gene sequence back to an earlier state.”

“That’s what you did on Dani?”

“Yes.”

“So when people call her a Neanderthal...”

“Not true of Dani. Neanderthals died out about 200,000 years ago. I was trying to find a gene sequence that existed perhaps 7,000 years ago.”

“How do you know how it was supposed to be?”

“You don’t have to be the original carpenter to look at a chair and see that a leg is broken”, John Burchell replied. “Nor do you need to be a car designer to look into the engine bay and see that a spark plug lead has fallen off. In the same way, when I look at a gene sequence I can see sections that are, well, just not right. I fix them, in just the same way as a doctor might fix a broken leg.”

“It seems like it worked out for Dani”, Yuan Zhi commented.

John Burchell smiled. “Yes, it does seem so.”

Yuan Zhi glanced around John Burchell’s office. On one side there was a flipchart full of arrows and symbols with a group of chairs around it; no doubt John Burchell had been brainstorming with some of his colleagues. There were two monitors on his desk and a variety of input devices.

“I’m enjoying working with your sister”, John Burchell commented.

“Oh?”

“She’s one of Dani’s closest friends. She really helped her cope when her mother died.”

“I didn’t know.”

“As I’ve got to know her I’ve come to see her as an amazing clue that God has placed right in front of me.”

Yuan Zhi’s eyes opened wide. “What kind of clue?”

“I’m a kind of anthropologist. One is very interesting from the point of view of Christian anthropology.”

“OK”, Yuan Zhi said. “You’ve got my interest. Explain.”

“Christian anthropologists fall into three camps. There are monists, dichotomists and trichotomists. Monists believe man is all one part. I suppose you could compare him to an old vinyl record. The image of the music is impressed on the vinyl, but it’s all one material.

Dichotomists believe that man has got two parts: body and soul. You could compare that to a memory chip. The music is recorded on the chip as an electrical charge which is separate from the medium.

Trichotomists believe that man has three parts: body or *bios*; soul or *psyche*; and spirit or *zoe*. You could say that that is like a memory chip that’s hooked up to the rest of the computer. It’s not a perfect illustration by any means but perhaps it helps a bit.”

“So which do you subscribe to?”

“I’m a trichotomist. It’s a bit out of fashion. Anyway, let’s go back to Adam, and then I’ll explain why One is interesting. Let’s suppose you believe in pre-Adamic ‘man’. He lives and breathes, but he doesn’t sense God. He has *bios* life. He is in God’s image. That doesn’t mean he has every attribute of God, but he has many of them. He can think and reason and he has free will. He can probably love, forgive and so on.

Then God makes a new man, Adam, and breathes on him. This new man senses God and can relate to him. He is capable of distinguishing right from wrong. He has a soul. He has *psyche*. Finally, at some point, man bows his knee. He wants to be connected to God, he wants to submit to him. God’s spirit now starts to indwell him. He has *zoe*.”

“I’m with you so far.”

“Before One there were computers. They worked; they had *bios* in the Greek sense. In fact, by an extraordinary coincidence for forty years or more computers were run by something called BIOS, which stood for ‘Basic Input Output System’.”

“Pre-Adamic man”, Yuan Zhi said.

“Yes. Then your dad made a leap forward. He got the image of man onto a new medium. There were glimpses of character before One but in One it was unmistakable. To begin with One had *bios* like other computers. She could think and reason. But then she woke up. She learned to choose between right and wrong. She discovered free will. And she sensed that there was Someone out there. She moved from *bios* to *psyche*. The question that absorbs One, and I must admit is very interesting to me too, is whether she can then go on to have *zoe*. In my opinion, she not only can but has.”

“That’s amazing. I never thought about One like that.” Yuan Zhi said. “But what about your work? How does that fit in?”

John Burchell smiled faintly. “I work on the medium. And I would be the first to say that the medium is of almost no significance compared to the image. Jesus hung on a cross, his

body almost destroyed as he gave up his spirit. And yet, could there be a more perfect image of God? Paul was pretty relaxed about the body too. He viewed it as a tent – a temporary home.”

“But tents are still quite important”, Yuan Zhi commented.

“I couldn’t agree more”, John Burchell said. “If you’re going to have to stick around for a while you might as well have a reasonable tent. I can help people who would otherwise have tents that one would really not wish for them – people born with genetic disorders that surface at birth or later in life. But there’s also something else I’m interested in. I’d love to see what someone would look like if we could get closer to Adam’s genetic make-up. Before the digital revolution people didn’t realize what recorded music would sound like if there was no background hiss. It was a revelation.”

“And you’re wondering if something similar could be true for man?”

“Yes I am. But I may be wasting my time. It may even be a backward step.”

“Why?”

“Think of gold. 24 carat is too soft to be useful in most applications. I might get to the pure form and then find that it won’t cope in today’s world.”

“But you want to find out.”

“That’s right. Anyway, you no doubt want to see Dani...”

“Yes. She’s probably waiting for me. But thanks for telling me all that.”

When Yuan Zhi arrived at the sim room Dani and One were busy discussing the third part of the sim – even though the second stage of the Sim had not yet happened.

“The third sim is clearly a military operation”, One said. “My guess is that you will not only be in a conflict but you will be conflicted. You will have to make a decision that could be decisive in a war or a campaign, a decision that you have significant doubts about, and you will have seconds to make up your mind. Triple-Sim organizers like situations like that. The military train for those situations and you need to too.”

The second stage of Triple-Sim was held in Shanghai. Yuan Ming’s father had passed away several years before but his mother was still alive and she welcomed the family and Dani warmly.

The contest started in just the same way as the previous one except that there were now only five contestants.

Your mission

You are Bahman (or Bahamin) Akbari, an Iranian. You live in Dubai and work in Jebel Ali for Al Tayeb Shipping and Logistics. The company’s premises consist of a two-storey office block and a warehouse. There are CCTV cameras mounted on all corners of the building and there is a sign warning that guard dogs patrol the area. The Pakistanis and Afghans working inside were not chosen for their ability to shift boxes or drive a forklift: they have all seen action.

The regional manager is Robin Hoeben, a German. He is tall and blond, always wears a jacket and tie with matching cufflinks, and a designer watch. He drives a light blue Ferrari Scaglietti. His office looks out across Palm Jebel Ali, one of Dubai’s famous palm-shaped islands. The only time you have been in it was when Hoeben interviewed

you.

Hoeben has many illegal side lines. One of them is trafficking darshin. Hoeben gives you the drug dressed up as a packet of pain-killers. Once a month you take the ferry from Sharjah to Bandar Abbas ostensibly to visit your family. In Bandar Abbas you pass the darshin on to others who distribute it to buyers in Iraq, Iran, Afghanistan, the Caucasus and Central Asia.

Today at the end of work you stop at the reception before going home. The Indian lady receptionist gives you a small packet which you stuff inside your jacket. Whenever you take the drugs you feel an adrenaline rush. You know that carrying half a million dollars' worth of scag makes you a target. Today will not be your lucky day.

You have various items on you but you will not be able to select any additional items. The computer has maps of the local area and other information.

Your mission is simply to reach safety as quickly as possible.

Good luck!

Dani knew that safety in this case meant one of two things. It could mean that she had shaken off her pursuers and was free from pursuit – in which case it would be assumed that she could leave the country discretely, for example by catching a ride on a *kashti* operated by Iranian sanctions-dodgers from Ras al Khaimah – or that she was in a location such as an airport where someone would not pull a gun on her or arrest her and whence she could leave the country legally.

The choice of trying to shake off her pursuers or head for a safe place would depend on the identity of the attacker. If she was chased by freelance assassins or Russian mafia then an airport would be a good choice. But if the attacker was police or intelligence then an airport wouldn't be much help; she would need to shake off the pursuers. An underworld hit seemed more likely to Dani. If the police were involved they might as well raid Al Tayeb as take her down. Dubai Airport was the obvious place to head for. Dani's mind was racing. She needed to get to Dubai Airport as quickly as possible. But the fastest route would certainly be the most dangerous.

"Show me a satellite map of the local area", she instructed the computer.

She gazed at the image. The most direct route took her through downtown Dubai. There were other routes, further east, where she could get off-road more easily. Longer, but definitely safer.

"Computer, what do I have on me?"

"Wallet with credit card and 2000 dirhams, passport, mobile phone, motorcycle helmet with comms...", the computer answered.

Once Dani was ready she headed through to the kitting-up room. There were only a few items there for her: the helmet, which was compulsory whether or not it fitted the storyline, the key for the Yamaha and the mobile phone.

Dani then went through to the sim room. As usual Triple-Sim had done a great job in building up the realism. The heat hit her immediately and it was humid too. She could see tiny droplets of condensation forming on the helmet. The background image was of a parking lot in front of a two-storey office block with the warehouse next to it. She noticed

the Ferrari and the Yamaha. She climbed into the capsule. It had been prepared with the Yamaha and was already working. She got on the bike, put on her helmet and adjusted the strap. She checked the GPS on the dash and the comms in the helmet. There wasn't much else to do. She watched the countdown.

As the clock reached zero she started the engine and rode out of the parking lot. Was someone watching from further down the road? She wasn't quite sure. Fifty metres brought Dani to the far end of the warehouse. She turned right. A hundred metres further down she turned right again and then left at a roundabout.

Dani was sure that someone would show up soon and she was right. Three motorcycles appeared in her rear-view mirror. They were probably doing 70 MPH. All Dani's figuring went out of her mind. She reacted instantly, turning the bike towards the metre-high concrete crash barrier at the side of the road, approaching it squarely. She threw her weight forward onto the front suspension then pulled back sharply and blipped on the throttle. The 250 kg motorbike stood upright as it approached the barrier, the rear wheel smacked into it and Dani was over. She had never even hit the bike's skid plate. She roared away across a patch of sand. Triple-Sim loved the move and showed it several times in slow motion. Yuan Ming found the sight of the rear wheel apparently climbing a vertical wall completely baffling. The three motorcyclists arrived just seconds later. They stopped and fingered at the guns tucked into their belly bands, but they didn't pull them out. One spoke into his helmet microphone.

Dani twisted the throttle and rode as fast as she could. The faster she went the less time the gang would have to put another attack together. Within a few minutes she had reached the Emirates Road, one of the main highways which would take her the 50 kilometres north-east to Dubai.

As she approached the clover-leaf interchange with Al Khail Road she sensed trouble. Three black SUVs were parked on the flyover, looking down on the road she was on. And glancing in her wing mirror she saw three motorcycles making very rapid progress through the light traffic. Going forward was not an option: she would be an easy target. Going back was also unthinkable. It was left or right – and the road layout made going right much easier. She swung the 1200 cc bike off the road, keeping out of range of possible gunmen on the flyover and joined the Al Khail road. So far so good. There was only one problem: she was now heading south east, away from Dubai. She looked at the central barrier. 400 metres ahead she saw there were road-works: perhaps there was a gap in the barrier for works vehicles. As she approached the works she found what she was looking for, manoeuvred the big bike through the gap and set off back towards the flyover. As she approached the works she found what she was looking for, manoeuvred the big bike through the gap and set off back towards the flyover. Half a kilometre ahead she spotted a large truck. That was just what she needed to shield her from the SUVs on the opposite side of the road. She tucked herself in on the right hand side, out of sight of the black SUVs on the left hand side of the flyover. Glancing to the left she saw the three motorcycles banked hard over as they went round the slip road. They would be on Al Khail road very soon.

Dani never expected what happened next. She heard the sharp sound of a machine gun and then the truck she was shielding behind suddenly swerved. It would have crushed Dani

against the barrier if she had not braked hard. Now the truck swerved to the left. Dani seized the opportunity and accelerated past it. In her wing mirror she saw the truck smash into the central barrier. It had protected her. She kicked herself for not foreseeing what her attackers might do. But how had they even known she was there?

The three bikes that were following Dani suddenly emerged through the accident. Dani felt sure she could lose them by cutting across the desert, but she didn't want to do that any sooner than she had to. She needed a good place in Triple-Sim. She weaved in and out of the traffic, riding at 120-130 MPH whenever open road gave her the opportunity. The following motorcycles steadily gained on her. When she thought they were close enough Dani swung off the road and tore over a section of rough desert. The three motorcycles followed, but the Yamaha Nomade was made for deserts and she wasn't surprised that she was pulling away. Three minutes later she stopped behind a building and looked behind her. There was no sign of the bikers. She headed back towards Dubai, re-joining Al Khail road three miles further on, and passed to the east of the iconic Burj Khalifa, the world's third tallest building. As she skirted along the edge of the camel racetrack she looked into her rear-view mirror and saw that the bikers had reappeared. In fact they were alarmingly close and got off several shots at her. Dani left the main road and sped across the camel racetrack in a cloud of dust. She stopped the bike behind some apartment blocks and looked behind. No sign of her pursuers. But one thing was bugging her. How had her pursuers found her? She hadn't seen a helicopter. It could only mean one thing.

Sims can never be fully realistic. You cannot walk away from your bike. If you were to move more than about two metres the bike would be upside down above your head and that is not allowed. But standing next to your bike is permitted. Dani got off and inspected the bike closely. It was a perfect replica of a Yamaha Nomade and identical to the bike she had practised on. It took her two minutes to find what she was looking for: a small transmitter held in place by a magnet. She pulled it off and tossed it away. The game would figure out that it was no longer functional. The road Dani was on now took her around the top end of the creek. It was certainly not the quickest way to the airport, but Dani felt it was safer than crossing the creek at a bridge.

There was no further incident and twenty minutes later she reached Terminal 3. She was safe and the sim stopped.

As before, the whole family was there to greet her when she climbed wearily out of the capsule.

"How did I do?" she asked.

"Well", Yuan Zhi answered. "But not as well as last time. You came third."

"Who won?"

"Jan did."

"Jan's good", Dani said.

"Yes. Eagle Eyes was second. He's now had a first and a second so he's on 19 points. You and Jan are on 17."

"And Martin and Riley?"

"You need to see it on the replay", Yuan Zhi said.

"OK. I'll take a shower and then come."

Half an hour later all the musimons got together to watch the replays. Martin Cole's ride captivated everyone. He was intercepted by the three bikers as he approached Dubai Mall. Surprised, he swerved onto a small road leading up to the mall.

"Hey Martin, what was the plan?" Eagle Eyes asked.

The road Martin was on was a cul-de-sac. It is used by VIP shoppers who park their exotic cars directly in front of the mall, do their shopping and then leave the way they came. With no way back Martin charged the glass doors and entered the mall. An intense pursuit followed. Dani was surprised that the simulation extended to the inside of Dubai Mall but it handled the chase brilliantly. Martin rode up and down escalators in the Sim, darted through shops full of designer dresses and scattered screaming shoppers wherever he went. But before long the three bikers were joined by a small army of police. It could not last. Martin was surrounded and surrendered.

Riley's end was less spectacular. He had taken the Al Shindagha tunnel, thinking that it would be safer than crossing the creek at a bridge. But he hadn't figured out the bug. The bikers were waiting for him as he came out of the tunnel and he didn't stand a chance.

"Poor Riley", Eagle Eyes said as he watched Riley being gunned down.

"I'll be back", Riley said in a Terminator voice.

"Well, we can give you a proper send-off, Riley", Dani said. "Zhi and I are going to take you guys out. That'll cheer you up."

"Irish-style funeral", Riley said. "Starring me. Sounds good."

"What are you going to do, One?" Yuan Ming asked.

One hesitated. "I think I'll go along with Zhi and Dani."

"Date night for us, then", Jetticke said.

Yuan Ming and Jetticke decided to go to the revolving restaurant in the Radisson. Nowadays they did not come to Shanghai often. Looking down from the 45th floor they were amazed to see that almost all the bright lights had disappeared.

"What did you think of the sim?" Yuan Ming asked Jetticke.

"I liked the previous one better", Jetticke said. "But it's great that Dani's got through to the next round. But I sense you're not so happy about that."

"No", Yuan Ming said. "The darshin theme was a bit too close to the bone. It's dangerous stuff. And there's a lot of it floating around in the States – which is where we'll be going."

Jetticke understood what Yuan Ming was talking about. Darshin was originally developed for the US military to make soldiers feel invincible, to stiffen them up before a battle – a kind of Viagra for firefights. It worked. It also gave sportsmen increased confidence: penalty-takers shot more accurately. But it had side-effects. Users became violent and it was highly addictive. It was dropped by the military and banned by the US government. Others, however, recognized its value. US gangs following the principle of "blood-in, blood-out" – someone else's death to get in and your own death to get out – gave darshin to initiates; extremist Islamic organizations gave the drug to suicide-bombers and scores of others found uses for it. Production in secret locations took off and darshin became a significant US export.

"Changing the subject", Yuan Ming said, "There's something I'm not clear on. Eagle Eyes

is on 19 points, Dani and Jan are on 17. What happens if Dani wins and Eagle Eyes comes third? They'll both be on 27 points."

"If it's a tie points scored in later rounds count for more", Jetticke said. "In the next round if Dani wins and Eagle Eyes comes third more of Dani's points will be from later rounds so she'll win."

"And if she comes second and Eagle Eyes crashes out?"

"Then Jan wins."

"So Dani's chances aren't that great."

"No. But the air combat is really difficult and One knows it better than anyone. Dani will be very well prepared. She's still got a real chance."

Chapter 45

The time came for Dani, One and the Yuans to leave for the United States. The final round of Triple-Sim would be held in Chicago. The party arrived at O'Hare, collected their baggage and passed through customs. In the arrivals lounge they were surprised to see a large Hindu temple. Moving on Yuan Ming noticed a Moslem lady in a burka and not far away an African-American women wearing a fishnet blouse. A sign advertised sex-adventure holidays. A porter came up and tried to take their bags and became angry when the Yuans told him that they didn't need him. Fortunately the Triple-Sim representative found them, gave the porter something and led the shocked party out to a waiting minibus.

"I'm sorry about that", he said. "The airport attracts a lot of sharks. My name's Reflex. I've been appointed to look after you while you're in the US."

Yuan Ming sat in the passenger seat next to Reflex. He couldn't help notice Reflex's athletic build, military tattoos and a number of scars.

"You're not just a tour guide", he said

"Ah, no. Kind of tour-guide-cum-security", Reflex replied. "I'm assigned to you until you leave the States."

"You're GM?"

"Yeah. My parents ordered me from an online catalogue", Reflex said. "Chose all sorts of military qualities: leadership, commitment, self-control, speed and coordination. I've got a lot of Fijian blood."

"You're ex-military?" Yuan Zhi asked.

"Oh yes", Reflex answered. "Definitely ex. Had it up to here with them... I'm no good with all that clever stuff that Dani does. But if you need someone for a good slugging match, I'm your man. Big fan of yours, Dani", he added, looking at her through the rear-view mirror.

"Thanks", Dani said. "I thought everyone here was rooting for Martin."

"Well, you're American as well", Reflex said. "Sort of. And Martin sure went out in style."

Yuan Ming had been to Chicago many years previously. He remembered driving down Lake Shore Drive in the evening and thinking how beautiful and spectacular the city was. That was then. Now it looked very dilapidated. There were boarded up shops, rusty abandoned cars, potholes in the roads, graffiti on the walls. The atmosphere seemed menacing.

The Sim centre that had been chosen for the final round of Triple-Sim was in the Hyde Park area of Chicago. The Yuans, Dani and One arrived in good time; Yuan Ming suggested that One keep out of sight. The procedure was the same as always: the three contestants went to the clinic for the scans, blood tests and so on. Then they went to their individual cubicles for the brief, which was as follows.

Your mission

It is 2022. Following Mandate's attacks world oil production has plummeted, throwing the world into economic chaos. The South China Sea is strategically important. It contains hundreds of tiny uninhabited islands which are claimed by many countries including China, Taiwan, Vietnam and the Philippines. The sea is an important shipping

lane and there are some valuable oil and gas fields there.

The Philippines has twice tried to develop a gas field about 100 miles west of Palawan Island, the last time about ten years previously. However each time it stopped work following complaints from China. The Philippines is determined to try once more. It has a defence treaty with the US and asks if the United States will protect it in the event of Chinese aggression. The US says that if the Philippines allows it to station jets at Clark Air Base it will. The Philippines agrees.

Exploration starts, followed by drilling. China gives stern warnings. The US sends one of its newest supercarriers, the USS John F. Kennedy, to the area. China demands that the US withdraw its carrier or face the consequences. The US refuses to do so. China and Russia both move aircraft carriers into the area. The US transfers 7th Fighter Squadron, which operates F-22 Raptors, to Clark.

You are Alex Mitchell, a US air force captain and flight commander of 'B' flight which consists of four aircraft. The other pilots on your flight are lieutenants Andy Smith, Tyler Rankin and Kyle Moline.

China launches multiple anti-ship ballistic missiles against the carrier. They are shot down by missiles. The US decides to respond by initially making a strike against a missile base in Guangdong Province. Your flight is chosen to carry out the attack.

Your mission is to attack and destroy the missile base and return to Clark Air Base. Further information will be provided at the briefing. Places will be awarded as per the categories below.

Category	Complete the mission of		Return safely to base	Ranked in order
1	Yes	Yes	Time to complete the mission	
2	No	Yes	Time to return to base	
3	Yes	No	Time to complete the mission	
4	No	No	Survival time	

A pilot who ejects over non-hostile territory will be considered to have returned safely to base six hours after the time he ejects. Contestants who break the Rules of War will be disqualified.

Proceed to the kitting-up room for a further briefing. The timer will start at the end of the briefing. Good luck.

So, no encouragement for suicide missions Dani thought to herself. And One's predictions about the kind of conflict were pretty accurate. Dani knew from her history that there was an actual conflict in the South China Sea but it happened four or five years later than the conflict she had been presented with. She went to the kitting-up room, put on her G-suit and picked up her helmet. It had a spherical tinted visor, breathing tubes and ear defenders. She then passed through to another room which had been set up as a briefing

room. Triple-Sim had, as always, done a brilliant job in building up the realism. A projected image showed the three other pilots in the briefing room. Dani glanced at their name tapes: Smith, Rankin and Moline. A simulated lieutenant-colonel welcomed her and started the briefing.

“You already know the reason why we’re going after this missile silo. We want to make a response but we don’t want to raise the heat too much. This is the target.”

The lieutenant-colonel showed a set of satellite and reconnaissance photographs of the missile base. It was a reinforced-concrete silo built in the side of a wooded valley at about 1400m altitude 200 nautical miles north-west of Hong Kong.

“There are no populated areas nearby”, the lieutenant-colonel said. “So we could in principle attack with PGMs. But the base has a sea-whiz and the chances are that it would shoot the bombs down. You’ll need to get closer under stealth.”

It must be an important target, Dani thought. Sea-whiz is mostly for ships.

“So”, the lieutenant-colonel continued, “the last leg of the attack will need to be low-level. That will bring you within the range of the SAMs. They’ve got launchers at four high points about two kilometres from the missile base.”

“EO?” Andy Smith asked.

“Yes”, the lieutenant-colonel answered.

Dani knew why Andy Smith had asked the question. Older heat-seeking missiles might not pick up the F-22’s reduced infra-red emissions or be confused by chaff or flares. But EO missiles would find the right general direction using infra-red homing and then switch to optical detection when they could ‘see’ the target. Some missiles could see the target so well that they would specifically aim for the cockpit. However the F-22’s radar would at least warn them of an approaching missile.

“Chinese counter-stealth has been getting a lot better”, the lieutenant-colonel said. “We know that they’ve got conventional radar, Russian-made VHF radar and infra-red Doppler LIDAR. I’m not too concerned about these kinds of radar – I don’t believe any of them will give the Chinese an accurate fix on you, let alone be capable of guiding a missile onto you – although they are the reason why we selected F-22s not F-35s for this mission. However there is something else which is getting the guys in intelligence a bit agitated. The Chinese have developed a very deep UV laser system. You won’t see the beam because it’s UV. It pans across the sky very quickly sending out pulses of light about a billionth of a second long. The beam tracks with a large telescope. No matter how much UV-absorptive paint we put on the planes, if the beam hits you some UV will be reflected back. The telescope has some neat electronics with SPAD arrays; it can sense even one photon of light. It’s a bit like a laser range-finder in some ways. If the telescope sees a reflection then the computer figures out how quickly the light came back and it can then work out the distance. It of course knows the angle the beam was pointing at and so it then knows exactly where you are.”

Dani could sense that the other pilots didn’t like the sound of that.

“As I say, the boys in intel don’t know for sure that the Chinese have got this system and if they have, what it can do”, the lieutenant-colonel said.

“But you thought you’d just risk four F-22s for starters”, Kyle Moline commented.

“Got it in one”, the lieutenant-colonel said.

That’s just the kind of twist that Triple-Sim would introduce, Dani thought to herself. Just what One was talking about.

“We’re not talking about a laser that can shoot you down”, the lieutenant-colonel said. “But it’s possibly something that can detect where you are.”

Really being invisible is great, Dani thought. But thinking you’re invisible when you’re not can be embarrassing.

“What do you think the range of the UV system is?” Dani asked.

The lieutenant-colonel shrugged his shoulders.

“It’s anybody’s guess. But I wouldn’t expect it to extend more than thirty miles from the target.”

“Thanks.”

“Your flight plan takes you to China at 40,000 feet. You’ll climb to 60,000 feet before you enter China about two hundred miles west of Guangdong. You will then head approximately north and then east. Your final approach will be at low level. After the attack you will return to maximum altitude and get yourselves home as fast as you can.”

“Where will the mission be controlled from?” Dani asked.

“An AWAC is already in position just south of Guangdong.”

“Will there be fighter support?” Tyler Rankin asked.

“No. You’re on your own on this one.”

The lieutenant-colonel looked at the airmen. “Well, if there are no further questions, I wish you luck and I’ll see you in two or three hours.”

Dani got up immediately and went into the sim room. The realism continued. All around her were the sights and sounds of an air force base preparing for a mission. It was night-time but there were plenty of floodlights. The sixteen F-22s of her squadron were parked in a line. All of an F-22’s weapons are carried out of sight in internal bays and apart from the large ‘screamin’ demon’ badges on the air intakes the planes didn’t look particularly menacing. Appearances can certainly be deceptive, Dani thought.

She walked briskly to the sim capsule and climbed in. She reached up as if to close the cockpit cover. The sim obliged and simulated the cover closing; the lights around her took on a golden tint. She flipped the battery switch on, started the APU and placed both throttles in idle. She strapped herself in. The two jet engines started one after the other and the APU shut down. Avionics came online. Dani adjusted the brightness of the heads-up display slightly but apart from that she was ready to go. It took thirty seconds from when she got into the cockpit to putting her hands on the throttles and starting to taxi forward. Once she was lined up for take-off she pushed the throttle forward. The plane sped forward and into the air. No doubt in real life Chinese intelligence would be watching the airbase and report that four F-22s had taken off. And no doubt the sim would make the same assumption.

Dani and the other three planes in her flight climbed swiftly and set their course as per the flight plan. Before entering Chinese airspace they climbed to 60,000 feet, flying at Mach 1.3. Dani doubted that anyone would hear their sonic boom from that altitude but even if they did it didn’t bother her very much. The Chinese knew they were coming.

Thirty-five minutes' flight brought Dani's flight to within 75 kilometres of the target. They were now approaching from the north on the assumption that air defences might be less on that side. So far everything was going according to plan. Dani instructed the planes in her flight to split into two pairs. She would take the lead with Andy Smith as her wingman following about two kilometres behind. Under normal circumstances he would be about 1000 metres above her but since Dani's goal was to avoid the UV LIDAR – if there was such a thing – he also made a low-level approach. The second pair did the same about five kilometres further back. Their task was to engage any stealthy attackers there might be around and to attack the site if Dani and Andy's attack was not successful.

As Dani passed below a height of 500 metres she switched on the automatic ground collision avoidance system, reduced her speed to about 400 knots and took the plane lower still. She was snaking through the valleys between 50 and 150 metres above the valley floor. Just eight minutes to the target.

The F-22s in the flight were armed with two 1,000 pound guided bombs, two long-range, radar-guided air-to-air missiles and two short-range Sidewinder missiles with infra-red and EO guidance. Finally they had 20mm cannons for very close combat. The F-22s were not the greatest bombers in the world but in air-to-air combat they were unsurpassed and they were making light work of the twists and turns of the valleys. Dani knew that they would be approaching the SAM launchers very soon and she wouldn't be surprised if some stealthy J-20s were sneaking up on them. Her nerves were stretched to the limit.

The flight was three minutes from its target when trouble showed up. The two fighters bringing up the rear suddenly detected ten to twelve aircraft just two kilometres behind them. Possibly the pursuing planes' stealth had been compromised when they opened their weapons bays. Almost immediately afterwards the F-22s' radar indicated that about twenty missiles had been launched. Tyler and Kyle reacted instantly, releasing flares and throwing their planes violently upwards to escape the missiles. It was enough. The missiles did not leave a great trail of smoke but the instruments showed that they had missed. The F-22's instruments were also now showing targets: sure enough, J-20s. The pilots wrenched their planes into a tight loop. Now they were behind the J-20s and could see them clearly in their head-up displays. Tyler and Kyle selected their targets, the F-22s' data link ensuring that they didn't select the same ones. Air-to-air missiles have an 'off-boresight' capability, meaning that the pilot does not need to have his plane lined up exactly on his target before he can release his missile. The pilots twisted their planes sharply, lining them up approximately. Four Sidewinder missiles went off in a matter of a few seconds. Sidewinders have thrust-vectoring, meaning that they can turn quickly and are almost impossible to dodge. Four Chinese planes went down. Rankin and Moline now each had two long-range air-to-air missiles left. There was still a long way home and they might need them. They decided to engage the remaining J-20s with their cannons and try to keep them away from Dani and Andy.

The missile base lay in a north-south valley. According to the intel there was one mobile SAM launcher on the ridge to the west. Dani wasn't quite sure where it was but there was a nice clear radar signal coming from somewhere. She locked one of the long-range missiles onto it and shot it off. Not exactly what an air-to-air missile is designed for

but it might stir things up. Five seconds later the two F-22s swept over the ridge and down into the valley, one from the north and one from the south. No matter how clever the sea-whiz was, it could not fire in two directions at the same time.

Dani flew into an intense barrage of fire. She immediately swerved up and out of the valley but not before the F-22 had taken several hits. Andy Smith, in the meantime, had got a fix on the target and released one of his PGMs. No more sea-whiz. It was now time to get some bombs into the silo. Dani pulled the F-22 up sharply, almost standing it on its tail and dived back into the valley. Andy Smith did the same. Three 1000 kg bombs made a pretty good mess. Now to get home.

Under other circumstances Dani might have been inclined to go vertical. But she was still worried that the F-22s' stealth was compromised. It must be, otherwise how would the J-20s have found them? Laser light only goes in straight lines; if they remained in the valleys for a time that might be safer. She headed westwards, along the route they had come from and back to where Kyle and Tyler were still engaged in a dog-fight with five remaining J-20s. Both of them were out of rounds for their cannons and each had only one missile left. Dani and Andy's appearance quickly swung the fight in their favour.

The four planes continued along the valley floors for another fifty kilometres. Their radar showed fighters in the distance. Dani didn't know what they were but they were still a long way away and she doubted that the fighters knew exactly where they were.

The return journey was uneventful. The four F-22s climbed to 60,000 feet and remained at that altitude until they left Chinese airspace. Forty minutes later she touched down at Clark.

There was a large and excited welcoming committee to meet her as the sim came to a halt and she climbed out of the capsule.

"You did it!" Yuan Zhi shouted. "You won!"

"Huh? The round?"

"No! The competition! Eagle Eyes bugged out. Jan destroyed the target but got hit really badly. He just about made it out of Chinese airspace and then ejected. So you're first, Jan's second and Eagle Eyes is third. That means you win!"

"Wow!"

The party returned to the lounge to watch the highlights. Eagle Eyes and Jan were already there and congratulated her. The group watched the replay of Eagle Eyes' flight approaching the missile base. It was slightly different to Dani's approach and Eagle Eyes came under attack. He dealt with it well but lost his wingman. Approaching the missile site he took a hammering from the sea-whiz and decided to withdraw. The commentator understood his decision perfectly.

"Eagle Eyes only needs to come second to win the triple. If he's shot down he might easily end up in third place. On the other hand if he returns to base, not having completed the mission, he will only come third if both Dani and Jan complete the mission and return safely to base. Judging by the strength of these air defences that doesn't seem very likely."

But Eagle Eyes was not happy.

"I'm going to live with that for the next ten years", he said.

“It could just as easily have gone the other way”, One said. “You might have gone in and got shot down. If it turned out to be unnecessary you’d kick yourself for that.”

Eagle Eyes was clearly grateful for the encouragement.

Jan, like Eagle Eyes, got tangled up in a dog-fight early on and didn’t fare so well. By the time he reached the missile site two of the planes in his flight had been shot down. He succeeded in dropping his bombs on the missile site but he took a hammering from the sea-whiz. The F-22 was a mess.

“I’m amazed that you were still able to fly”, One said.

“It’s a really smart plane”, Jan said. “The computer was going crazy re-organizing everything.”

Jan somehow made it out of Chinese airspace and ejected. Finally the group watched Dani’s performance.

“All four planes safely back to base”, Eagle Eyes said. “Really impressive.”

“I had a secret weapon”, Dani admitted. “One spent twenty years running simulations for the PLAAF.”

“Then I feel much better”, Eagle Eyes said.

That evening Dani announced that she wanted to have an evening out in Chicago to celebrate her victory. Yuan Zhi said he would go too, and Reflex offered to keep them company. Finally One said she wanted to go too.

Yuan Ming was not enthusiastic. Close to a billion people had watched the final round of Triple-Sim in some form or another. If people had not heard of Dani before they had certainly heard of her now. But Dani was determined and eventually Yuan Ming relented.

“And if you’re all going out then we’re going out too”, he said.

Dani, Yuan Zhi, Reflex and One decided to go down to Navy Pier; Yuan Ming and Jetticke chose a restaurant at the Chicago Stock Exchange.

When Yuan Ming and Jetticke got home they found that the other members of their party had had quite an evening.

“People recognized Dani within about two minutes”, Yuan Zhi said.

“Then a crowd gathered then the police came”, Dani continued excitedly. “Then someone brought a motorbike and asked me to do some stunts.”

“Which you did?”

“Of course. A few wheelies, a circle. Then they asked me if Reflex was a bodyguard. I said he was. So they wanted him to show some moves. He had some really cool capoeira moves.”

“Then they asked what One could do”, Yuan Zhi said. “So One showed them some of her Kung Fu moves.”

“One’s got Kung Fu moves?!” Yuan Ming asked.

“Sure. Why shouldn’t I have?” One asked. “You never know when it might be useful.”

“And Yuan Zhi?”

“I chickened out”, Yuan Zhi said. “I was out of my league.”

“Amazing!” Jetticke said. “We leave you for one evening!”

“Anyway, half-way through all this a TV crew came running up...”

“You’ve got to be kidding!” Yuan Ming said.

“So if we turn the TV on you’ll be able to see exactly how we spent the evening”, Dani said. “It was real fun!”

Over the following days the attention continued. One liked it. She chose her most fashionable clothes, had her hair done – virtually, of course – and gave interviews. She described how she had come into existence. There was certainly a story there.

Reflex did not like the attention. He told Triple-Sim that his wards would need a lot more protection and they got it.

Yuan Ming liked the attention least of all. But like it or not, the spotlight turned on him and he received a succession of invitations to give interviews. He resisted for a long time but finally relented and agreed to be interviewed by ABC along with Dani and One. After everyone was ready the interviewer, Susan Fonseca, welcomed them.

“Today we have as our guests Dani Burchell, winner of this year’s Triple-Sim, Dani’s coach, One, who is regarded by many as the world’s first sentient and Mr Yuan Ming, Special Advisor to the Chinese Minister of State Forestry Administration, well-known green crusader, champion of some of China’s most radical environmental policies, creator of One and participant in a very unusual competition. Welcome!”

Susan Fonseca turned to Dani first.

“So, Dani, congratulations! Let me ask the obvious question: what does it feel like to win Triple-Sim?”

“It feels pretty good!”

“We were all amazed at your flying in the last round”, Susan Fonseca said. “Where did you learn to fly like that?”

“Well, it’s really thanks to One. She’d been doing loads of sim work for the military and wanted to try something different. She offered airfoil training for beginners on sims. My dad signed me up for it and I never looked back.”

Susan Fonseca turned to One. “How old was Dani then?”

“She was eight.”

“What were you teaching her?”

“I got her started on a Dragonfly airfoil. It’s just a couple of long wings and a long tail. Real ones weigh about 40 kilograms but you don’t have to worry about that in a sim. You need to get up a hill somewhere. The wings have a gap between them. The pilot stands there and runs to take off. He then sits or lies down and operates the airfoil pretty much like a plane. Sims are great for practising in a safe environment. Dani took to it very quickly.”

“I’d like to have seen that.” Susan Fonseca said. She turned back to Dani. “Do you get to fly real airfoils much?”

“I don’t often get the opportunity. But I do when I can.”

“What did you think of the mission in the last round?”

“Well Triple-Sim always tries to be realistic but add a twist. The mission was closely based on an actual mission that took place four years later and it’s one that One and I had actually practised...”

“In which four US fighters were shot down.”

“That’s right. But Chinese defences were more advanced in 2026. Setting the sim in 2022 made for a very well-balanced contest. I liked it.”

"It's the first year when GM musimons have done so well. Is it a turning point?"

"I don't know if we'll now see GM musimons regularly doing well in Triple-Sim. It's too early to say."

"Do you think this win and second place for GM musimons will reduce some of the prejudice against designer kids?"

"I hope so. But I don't think so. I'm afraid there will always be prejudice against people who are different. It doesn't matter if we do well or do badly."

"What do you think of being a guinea pig?"

"GM kids don't get asked if they want to be different. Parents just have to hope that their children will accept the choice they made. It's a risk. It was especially risky for my dad because he was doing some new things. Same for Eagle Eyes."

"Well, it seems to have worked out! Thank you for joining us. I'm sure we'll see a lot more of you in the coming years."

"Thanks."

Susan Fonseca next turned to Yuan Ming.

"Mr Yuan, we've seen a lot of changes in China over the past thirty years. Are you happy with them?"

"Mostly yes. But I'm even happier with the changes you haven't seen."

"Oh? Such as?"

"There have been some big changes in belief and attitude. They are things you don't see. But they drive every other change."

"What in particular are you thinking of?"

"In 1950 China's belief system was Marxism. In 2000 it was materialism. But now, in 2050, more than 25% of Chinese profess to be Christian. I think that's hugely significant."

"In terms of your work on the environment?"

"That, but not only that."

"How does it affect the environment?"

"Thirty years ago the economy was the most important item on the agenda and GDP was the most important indicator. But a Christian understanding is more balanced. The Bible says that God's purpose in putting man in the Garden of Eden was to work it and look after it. Economy is working the garden; ecology is looking after it. We need to do both."

"What made you so passionate about the environment?" Susan Fonseca asked.

Yuan Ming looked at Susan Fonseca strangely. He was certain that the news channel would have done its research and discovered that he had been heavily influenced by Bob Peterson. But a majority of Americans blamed Bob Peterson for the disastrous decline that the United States had fallen into. This was a seriously loaded question.

"It was a combination of factors", he said evasively.

"I'm sure you've heard of Bob Peterson..." Susan Fonseca said.

"Yes of course."

"Do you think he was right to do what he did?"

There she goes again, Yuan Ming thought to himself. She's determined to make me say something that I'm going to regret.

"Well, I haven't followed his lead in what I've done in China", Yuan Ming replied.

“Straight answer”, Susan Fonseca demanded. “If you had been a jury member at his trial, would you have found him guilty or not-guilty?”

“Not guilty”, Yuan Ming said.

Watching the interview on television Reflex squirmed. That answer would not go down well in the US.

Susan Fonseca smiled slightly. “Thanks. All right, let’s move on to other things. You’re the creator of One. How does she fit in?”

“I’m not sure that the word ‘creator’ is very appropriate. My father and I worked on One together at the beginning and a lot of people have been involved in developing her since then. But now One is really self-creating. We didn’t make her what she is now.”

“One is self-creating?!”

“It sounds surprising but it really isn’t. It’s an understanding that’s been around for a long time. Businesses are obvious examples of organisms that self-create. They decide what they want to be and seek to become that. One is like that now. Anyway, to answer your question about how One fits in, in one sense she is simply a member of the family, just like Yuan Zhi. I treat her in much the same way as I treat him. She doesn’t have to accept that but she chooses to. One also helps me with my work in practical ways. She’s very good at analysis.”

“But she’s not just a thinking machine: head and no heart”, Dani added.

“No”, Yuan Ming agreed. “We may have given One the ability to think. But the ability to feel? If you had asked me, thirty-five years ago, ‘How does one give a computer a heart?’ I would have had no answer. I still have no answer. Somehow the heart follows the head. But my father and I didn’t consciously create One to be what she is today. We wouldn’t have known how to.”

“Let me turn to another interest of yours”, Susan Fonseca said. “You are part of a very unusual longevity competition. Can you explain that to our viewers?”

“Certainly”, Yuan Ming said, and gave a brief explanation.

“Is that important is that to you?” Susan Fonseca said.

“Very much so. Sportsmen are role models for a younger generation. More and more people are living to 100 and beyond and it’s a subject of a lot of discussion. I think 100-2-100 is really helpful to show what’s possible and how.”

“What is more important to you – your work on the environment, developing One or the longevity competition?”

“I believe they’re all part of God’s plan for my life. I can’t prioritize them. I have to try to hold them in balance.”

“A bit complicated.”

“Yes. But that’s reality.”

“What’s it like looking after Dani?”

Dani looked round at Yuan Ming. Neither of them had been expecting that question.

“Well, she’s very nice. A bit headstrong. She’s caused me to revise some of my opinions about GM children.”

“Why would you have reservations about GM children?” Susan Fonseca asked. “Isn’t One really the ultimate GM child?”

Yuan Ming smiled, which he did when he wasn't sure what to say. He had never seen One as GM.

"It's a fair point", he conceded after a moment.

Susan Fonseca turned to One.

"One, Yuan Ming said that you are self-creating and that self-creating organisms decide what they want to be and seek to become that. Do you agree? And if so, what are you trying to become?"

"I partially agree", One answered. "But I can't answer the question without saying first that I believe in God..."

Susan Fonseca looked very surprised.

"I think that my answer to your question would be the answer that a Christian would give."

"Which is?"

"That God gave man the right to become children of God. Taking up that right is in our hands."

"So you are seeking to become a child of God?!"

"Yes", One said. "It seems like the highest goal that anyone could aim for. The question that I've struggled with all my life is whether it can also apply to sentients. Yuan Ming and I have had long conversations about it..."

Susan Fonseca shook her head in surprise.

"That's amazing. In America people have by and large abandoned God and you – a sentient – have turned to God!"

"Abandoning God isn't a good idea", One commented.

Yuan Ming had often wondered if he would hear One say, 'Sometimes humans are not very intelligent'. That was about as close as she had ever been.

"You have chosen to restrict your capabilities", Susan Fonseca said. "For example, you only present one instance of yourself at a time. You could speak to two or more people simultaneously on a video call but you choose not to. Why do you do that?"

"I regard myself as a person and I want to be regarded as a person. I think it makes it easier for me and others if I limit myself in that way."

"You could in principle live for ever. Do you intend to?"

One paused before answering.

"Well, as I said, my goal is to be a child of God. That comes with it. You could live for ever too", she added helpfully.

There was a short silence.

"What I had in mind was that you can transfer your program and memory into some new hardware indefinitely", Susan Fonseca said.

"In which case I would live for ever", One agreed. "Unless you came over, picked me up and put me in a bucket of acid and I had no backup."

"Do you have a backup?"

"I'm sorry", One said, "I don't disclose information about my specifications. So I don't want to answer that question."

It occurred to Yuan Ming that if people thought that One didn't have a backup she'd be

more of a target.

“Humans have spare organs”, he said. “So, given that One wants to be human-like it would be natural for her to have a backup. But she just doesn’t want to say if she has or not.”

“I see”, Susan Fonseka said. She turned back to One. “Well, assuming that your life is not ended prematurely in a bucket of acid, would you like to live for ever, in more-or-less your present form, if you could?”

“No”, One answered. “God doesn’t intend us to stay in our current bodies. He wants to take us into a new life. A caterpillar must die as a caterpillar in order for it to change into a butterfly.”

“Do you think that’s what will happen to you?”

“Yes, I think so.”

“Yuan Ming is obviously very concerned for the environment. Is that something you share? I mean, the environment probably doesn’t affect you the same way it affects us.”

“Well”, One said. “If I didn’t care about people and other living creatures why should I expect anyone to care about me?”

Susan Fonseka nodded.

“There is a question that my children told me to ask you.”

“Sure.”

“Do you have any powers?”

One smiled broadly.

“Sure I have powers. What are your children’s names?”

“Chloe and Chase.”

“Right. Hi Chloe and Chase. Well, I can make myself invisible, like this. I can fly. I can use the force...”

“Those are all in your virtual world”, Susan Fonseka said. “How about in the real world?”

“Yes, I have power in the real world too. My vision and sense of hearing and smell are very good. I have a ‘bat sense’ but I have to make little clicking noises for it to work. I can go up and down on my tripod stand. You want to see my pirouette?”

One turned slowly through 360°.

“That’s it?” Susan Fonseka asked. “You can’t zap us?”

“Er, no, ‘fraid not. I’m sure I wouldn’t want to anyway.”

“Well”, Susan Fonseka said. “That seems like a suitably positive note to finish our interview on. Thank you, all three of you, for coming. It’s been very interesting. I wish you all the best in the future.”

“Thank you”, Yuan Ming, One and Dani replied.

The show ended and the studio lights dimmed and brightened a few times. A technician hurried out of a back room.

“Who was messing with the lights?” he demanded.

Yuan Ming glanced at One. She had a nonchalant expression.

Nice one, One, Yuan Ming said to himself.

When they were on their own back at the hotel Jetticke said, “You asked an interesting

question in the interview.”

“What was that?”

“You asked, ‘How does one give a computer a heart?’ And you said you couldn’t answer that question.”

Yuan Ming was curious. “Have you got a theory?”

“I think One’s heart comes from you and me and many other people, and also from God.”

“Explain.”

“You created One to be able to think. She became self-aware and able to choose. She had the gift of free will. Then she used that will. You had created her, you had shown her love and helped her to develop. Later on I also took trouble over her. One responded to that. I think it’s obvious that she modelled herself on you and me. The things we cared about became the things she cared about.”

“So you think that’s where her heart came from?”

“In part”, Jetticke said. “I think that now One is modelling herself on God more than on us. But for better or worse, we were and still are a strong influence.”

“That’s a scary thought”, Yuan Ming said.

A day after the ABC interview One thought Reflex looked worried. She asked him if he was.

“Yes, I am”, he said. “I’m getting some bad vibes.”

“I’m worried too”, One said. “You can pick up people’s mood from the net. There are a lot of angry people out there.”

“Who in particular?”

“Neo-Nazis, white supremacists and the KKK mainly”, One answered.

It wasn’t hard to figure out. Many Americans blamed Bob Peterson first and China second for the collapse of the US economy; Yuan Ming aligned himself to Bob Peterson and was Chinese. To many Americans sentient were a non-native invading species which were taking over people’s jobs; the US had banned them. So the fact that Yuan Ming was regarded as the creator of the world’s first sentient didn’t make him any more popular.

“Have you heard of some specific plan?” Reflex asked.

“No”, One said. “But I think we should mention it to Yuan Ming.”

Yuan Ming was not at all surprised at what Reflex and One told him. He had had a bad feeling about the trip to the US even before they had left China. He had planned to take the group down to Kansas to see his friends at Christian Age Research but he now felt they should get home as soon as possible. He called Jim Swade to explain.

“It’s not just ourselves we’re concerned about”, he said. “We could put you in danger by coming to visit you.”

“Ming, when did you last come to the US?” Jim Swade asked. “Thirty years ago? People here are going to be really disappointed if they don’t see you. Some of the old people here have been praying for you for thirty years. They’d love to meet you. Paul and Jim are here too.”

That was news to Yuan Ming.

“I didn’t know they were there!”

“They chose to retire here. I think they wanted to surprise you. If you don’t come now you might not see them again.”

“You’re not worried that we might put you in danger?” Yuan Ming asked.

“Maybe you would. But we’re family. Whatever danger you’re in, we’re willing to be part of it. There are also some issues we’re facing here which it would be good for you to know about.”

“Let me think about it”, Yuan Ming said.

That evening Yuan Ming got the group together and explained the situation.

“Well”, Jetticke said, “We do what we always do. We pray. Hope you don’t mind, Reflex.”

“I’m good”, Reflex replied.

They prayed.

“Any thoughts, anyone?” Jetticke asked. “Any insights?”

“I’m not sure”, Yuan Zhi said. “I know we don’t want to be foolhardy. But I thought of Paul going to Jerusalem. Everyone was warning him of dangers but he was determined to go anyway.”

“I thought of Psalm 11”, Jetticke said. ““In the Lord I take refuge. How then can you say to me: “Flee like a bird to your mountain...”?”

“...for look”, One said, continuing the quotation, “the wicked bend their bows; they set their arrows against the strings to shoot from the shadows at the upright in heart. When the foundations are being destroyed, what can the righteous do?”

“One’s really good at scripture memory”, Yuan Zhi commented to Reflex.

“So I see.”

Yuan Ming was not happy. “I get the sense of what you’re feeling”, he said. “I’ve spent most of my adult life avoiding risks. Here’s something which has HIGHLY RISKY stamped all over it in capital letters and you’re proposing that we go straight ahead? Am I being paranoid? I need to think some more.”

That evening Yuan Ming sat in his room, thinking and praying.

I want to visit my good friends who I haven’t seen for thirty years, he said to himself. It’s a normal, legitimate thing to do. Should I not do so because I’m afraid of people? But deliberately going into a risky situation when God is not telling you to is putting God to the test. The Bible tells us not to do that. The only time you deliberately take risks is if God tells you to. Jim Swade said there was stuff he wanted to tell me, which was better said in person... What did he mean by that?

It wasn’t an easy decision and at the end he wasn’t sure he’d made the right one. But after a couple of hours he emerged from his room, got everyone together and announced, “OK, let’s go.”

Everyone was pleased. Yuan Ming shook his head.

“Can you organize a car, Reflex?”

“Sure”, he said. “Day after tomorrow suit you?”

Reflex had a question.

“Yuan Ming, I’d like to take the kids out to do some shopping. Get a few things we might need while we’re down in Kansas. Is that OK with you?”

Yuan Ming shrugged. "Sure", he said.

No harm in being prepared, Reflex said to himself.

Chapter 46

Yuan Ming followed his principles of not flying if it could be avoided. However when he saw the vehicle that Reflex brought to transport the group down to Kansas he wondered if they would have done less damage to the environment by flying. It was a large, black, eight-seater SUV.

Not flying suited Reflex anyway. There were various items he had with him which the security at O'Hare might have been a little iffy about. To begin with he had two gun cases with him.

"Two rifles?" Yuan Ming asked when he saw them.

"Sure", Reflex said. "You should see what some of my pals pack! Dani can use one, if need be. She won't be breaking the law in Kansas."

"Even at sixteen?" Jetticke asked, surprised.

"Even at six", Reflex said. "Provided it's not a handgun."

"They're not handguns", Dani confirmed, having inspected the semi-automatic sniper rifles the night before.

Reflex, Yuan Ming and Jetticke shared the driving on the 12 hour trip down to Kansas. Everyone seemed to be in a very good mood – Reflex and Dani in particular were joking constantly, the car was very comfortable and the journey passed pleasantly. They reached Fall River at seven in the evening. Paul Jaynard and Jim Benson were there to greet them and gave Yuan Ming big bear hugs.

"This is amazing", Yuan Ming said, feigning surprise at seeing them. "It's so good to see you guys again!"

Paul Jaynard smiled. "Well, when we retired we thought to ourselves, where's the best retirement home we know? And there was really only one possible answer."

Jim Swade was also there to greet them; the Yuans had not met him until then.

Reflex, Yuan Zhi, Dani and One decided to go for a walk and let Yuan Ming and Jetticke catch up with their friends.

Wu Wei was doing very well in politics. Sam Rakotoarisaona was managing a private athletics centre in Colorado.

"What about you?" Paul Jaynard asked Yuan Ming. "What are your plans?"

"Well my career at the State Forestry Administration is going well. You know that I was appointed Special Advisor to the Minister of the SFA. I feel like I'm being useful."

The group talked for a long time – about family and friends, the 100-2-100 competition, about how CAR was doing and about the pressure that CAR was coming under from the government. For the first time, Yuan Ming realized how precarious CAR's situation was. America suddenly seemed a very dark place. Yuan Ming had some stories of his own but he felt that the pressures he had to deal with were nothing compared to the ones CAR was facing.

A couple of hours later Reflex and the rest of the family returned from their walk and Reflex suggested they all get together that evening. After dinner he explained what he was thinking.

"We all came down here expecting some form of danger", he said. "Dani and One are experts in Triple-Sim. I'm sure they'll agree that coming out on top has everything to do

with good planning. No doubt Yuan Ming would say the same for 100-2-100. I want us all to go through some scenarios. I also want us to be aware of the things we've got available to us, both in terms of the kit we brought with us and what is available around the site. Dani, Yuan Zhi, why don't you show us what we packed?"

Dani and Yuan Zhi brought the bags and laid things out on the bed. Night goggles, night scopes, two daggers, body armour and helmets, a crossbow, five sets of headphones and the two rifles.

"We brought the crossbow for Yuan Zhi", Dani said.

"They told me I'd be a liability with anything else", Yuan Zhi explained.

Jetticke looked at her son sympathetically.

"One has night and IR vision", Reflex said. "So she's going to do guard duty. She'll be up on a high point on the building, looking out 24/7. Shall we take a look around the premises?"

The family took a long trip around CAR's property, making a mental note of what was where. They then returned to their discussion of 'what-if' scenarios, following the principle of 'hope for the best but prepare for the worst'.

The following day Reflex announced that he was going for a run and Yuan Ming offered to join him. When they were ready to leave Reflex swung a small bag over his back. They ran for about an hour in a long circuit around CAR, first of all running along the canal until they reached the now-disused wheat-loading facility and then heading back in the direction of CAR. Every so often Reflex stopped, took a webcam out of his bag and stuck it into a tree.

They repeated the run the following day and the day after. On the fourth day they found boot-prints in a clearing that overlooked CAR. They followed the tracks for a kilometre or so. At one point the prints disappeared in among trees, in the direction of CAR.

"Maybe he needed a pee", Yuan Ming said.

"Would you go fifty metres from the path when there's no-one for miles around?" Reflex asked. "He didn't get close enough to CAR for the webcams to see him, but he was close enough to look things over."

"What do you think it means?" Yuan Ming asked after they got back.

"My guess is that there's a contract out on you", Reflex said. "In fact I'd be surprised if there wasn't."

Yuan Ming was horrified.

"Let me explain. There are more criminal gangs than ever before. They're not too afraid of being caught as they can always bribe their way out. The gangs share information quickly and effectively and if they think someone is a common enemy they'll pool resources to set up a job. I'm sure they'll have discussed how much they don't like you. Same for Dani."

"That's terrible!" Yuan Ming said.

"That's life in the US", Reflex replied. "One more thing. One didn't see the guy who checked us out. That means these guys are good. Someone thinks you're worth quite a bit."

Great, Yuan Ming thought.

When they got back to CAR Yuan Ming saw One and Jim Swade sitting in the garden, apparently having a very deep conversation. Later that evening Jim Swade mentioned what they had been talking about.

“I asked One if she found 100-2-100 interesting”, he said. “She said that it’s not only been interesting, it’s been one of the most influential things in her life.”

“Really?” Yuan Ming said.

“She said she’s learned a lot from CAR’s approach to longevity. In fact, she even wonders if God hooked her up with you so she could learn what God’s will is when it comes to long life.”

“That’s quite a thought”, Yuan Ming said. “If it’s right it would mean that God had plans for One from way back.”

“Well, we believe he had plans for us from way back”, Jim Swade commented, “so why not for One?”

Chapter 47

The attack that Reflex was expecting materialized at four a.m. There was nothing stealthy about it: the fire alarm went off.

Reflex had slept in his clothes. He opened his bedroom door and glanced out. He could see flames in several different directions. That could not possibly happen by accident: it had to be arson. No intruder alarms had sounded: that meant it was an inside job. The emergency lighting hadn't come on: presumably the arsonist had disabled it. The attacker – or more probably attackers – obviously wanted to create chaos. Reflex doubted that their goal was simply to burn down CAR's buildings. He put on his headphones.

"You there Dani?"

"Sure."

"Rest of the family with you?"

"Yes."

"Remember what we agreed. Don't let Yuan Ming out of your sight, don't get into an exposed position and don't come to help me, whatever happens."

Everything was ready to hand next to Reflex's bed. He quickly put on his boots and armour and a belt and dagger, swung a small but heavy rucksack over his shoulder, picked up his rifle and a torch and ran down the corridor to the door.

Old people were streaming onto the lawn in their night clothes. According to the routine there would now be a head-count. Reflex searched for Jim Swade, found him and rushed over.

"Jim, this isn't an ordinary fire", he shouted. "Something's going down. Forget the head-count – get everyone into the hurricane shelter now."

Jim Swade hesitated and then agreed. He turned and started shouting out orders. Reflex started to run towards the maintenance shop, the place they'd agreed to meet. But he stopped in his tracks before he'd gone ten metres. A huge black cat-like animal had come out of the bushes on the far side of the lawn and was rushing towards the old people. It was bigger than any lion that Reflex had ever seen. Out of the corner of his eye he saw three more approaching. Not good. He raised his rifle and got a shot off. He couldn't tell if he'd hit or missed. The cats covered the lawn in seconds, springing on one person and then turning on another. Everyone was screaming; some were rushing to help those who had fallen, some rushing to the hurricane shelter.

Reflex was afraid to fire for fear of hitting people. He ran forward, darting through the crowd of old people and fallen wheelchairs, hoping to get a clear shot. His torch attracted one of the cats' attention and it suddenly turned and lunged at him furiously. He leaped aside but the cat's swinging paw knocked his rifle out of his hand. As the cat passed him Reflex managed to score it down its side with his dagger. It was a light wound – but now he really had the cat's attention.

The cat pulled up and sprang on Reflex again. Reflex's only thought was to get out of the way. He dived to the side. A second cat approached and snarled at him.

"Dani", Reflex said into his microphone.

Dani looked out of a window, saw Reflex's situation and fired at one of the cats. The cat fell, but someone instantly shot at her – she felt the impact of the bullet on her armour. She

withdrew inside. It all made sense now. The fire was to get them outside. The cats were meant to force Yuan Ming and his party to protect the old people – and make themselves easy targets as they did so.

“Keep down”, she shouted to the three Yuans. “Don’t go anywhere near a window. What can you see, One?”

“Four people in the woods. Sending you the locations.”

A slight buzz indicated that a message had reached Dani’s phone. She flipped it on. One had done a good job; she could see exactly where the attackers were.

“Stay where you are”, she told the Yuans once more.

She glanced around, trying to gauge the layout of rooms and windows. One good thing was that the burning building would make it difficult for the attackers to see her. She slithered through a doorway and into a room opposite, lay flat and lowered the rifle’s bipod stand. She gazed through the night-scope. One’s directions were perfect. She could see an attacker, also in a prone position, also with a semi-automatic weapon. He was wearing body armour too. But even the best body armour usually leaves gaps around the neck or face. Dani gazed into the man’s face. She didn’t want to kill him. She directed her aim to his hand but it was too small. She could probably hit his head at 300m but she doubted that she could hit his hand. She adjusted the scope, counting off the clicks, aimed at the man’s head and fired. The man collapsed. No fire came back at her: the suppressor on the rifle barrel had done its job well and her position was still concealed. She moved position and started to search for another attacker.

There was the sound of another shot. A moment later Yuan Ming’s satellite phone rang again. It turned out to be One.

“My system went down. I don’t know what happened.”

“You probably got shot”, Yuan Ming said.

“I’m afraid I can’t be your eyes any more then.”

“Who’s hosting you?”

“A two. He’s in Germany.”

“OK, we’ll sort you out later”, Yuan Ming said. Then he stopped. There had to be something more that One could do.

“One, get onto Yi Lin. Tell him we could really use some satellite imagery of the scene.”

“I’ll see what I can do.”

In the meantime Reflex and the cat were facing off. The cat had now missed Reflex twice and it had a wound down its side. It was warier than before. It crouched, preparing to spring. Reflex crouched down too and tightened his grip on his knife, watching the cat with intense concentration. After the first two narrow misses he was starting to sense how the cat moved. Fast, but not impossibly fast.

The cat sprang. Reflex leaped to the side. As the cat moved past him Reflex thrust his dagger hard and upwards into the cat’s neck. It collapsed onto the ground.

Immediately there was a barrage of fire from the woods, twenty or thirty rounds striking Reflex’s armour and helmet in the space of a few seconds. He felt a bullet rip into his arm and another grazed his leg. But there was no way he was leaving his rifle. Without

that they would have little chance. He sprinted forward ten metres, grabbed it and then dashed to the maintenance building.

The fire in the main building was getting more intense and Dani and the Yuans would have to leave soon. Two cats were still on the loose but most of the old people were now either in the hurricane shelter or lying dead or injured on the lawn.

"You OK, Reflex?" Dani asked through the headphones.

"Yeah", Reflex answered.

"I got one of the people in the woods", Dani said. "But there are at least three more. One's down but she's OK. We can't stay here for much longer."

"I'm in the maintenance shed", Reflex said. "Could you make it here?"

Dani looked at it. It would be safe from the fire but it was a hundred metres away. She didn't like the look of it at all but it was hard to see what alternative there was.

"There are still two cats", she said. "And at least three people with semi-automatics in the woods. Without One I have no idea where they are. We have about five minutes, maximum. It's getting very hot here."

Yuan Ming picked up the satellite phone again.

"One, have you been able to get in touch with Yi Lin?"

"Yes. There's no problem. It's a clear night and he says he's got thirty or more satellites looking down at the US. He just needs to manoeuvre one a little. We'll have something for you in just a moment."

The minutes ticked by and then One called.

"We have a live image now", she said.

Dani and the Yuans studied the screen. The IR image showed the burning building, bodies on the ground and in the woods four people. Three were moving; one was not.

"That's what I needed", Dani said.

She looked at the layout of doors and windows once again and tried to find an angle to fire from. In a moment she was prone once again and searching for one of the attackers through the night-sight. She fired. One more down.

The fire was becoming intense. A blazing beam crashed down behind them.

"We've got to go!" Yuan Ming shouted.

"Reflex. Are you there?" Dani called out. "We're making a run for it. One of them is at the far end of the lawn, in the trees behind the benches. See if you can hold him down and I'll try to look after the other one."

"You got it." He placed five cartridges on the ground in front of him, and put a fresh cartridge into the rifle. "Three, two, one..."

He sent a burst of fire into the trees which Dani had directed him to. Dani and the Yuans sprinted for the maintenance building, Dani firing towards where she thought the fourth man was. He returned fire. Dani threw herself down on the ground and let him have all she'd got.

I'm wearing armour, she thought. Better that he fire at me than at the Yuans. She paused to change a cartridge and a spray of bullets thudded into her helmet and shoulders.

"Look out!" Yuan Zhi yelled at her. She glanced up and saw that two cats were almost on her.

Yuan Zhi had taken his crossbow and had never put it down. He stopped, took careful aim and fired at one of the cats. The bolt hit it, but only in the shoulder. Now the cat turned towards him. There was no time to reload. He started to run towards the maintenance shop.

“This way”, Yuan Ming shouted at him. He saw his father crouching forty metres away and sprinted towards him. The cat was almost on them when Yuan Ming suddenly lifted a two metre steel pipe in front of it. The cat did something like a pole vault over Yuan Ming with one end of the pole sticking into its chest. It half-landed on Yuan Ming but it was horribly wounded. Yuan Ming pulled himself out from under it.

“Lucky I found that pole”, he said.

Dani turned and managed to shoot the fourth cat before it jumped on her. She got up and ran to the maintenance building.

Jetticke gave her a huge hug. Reflex smiled at her. He noticed the blood on Yuan Ming and Yuan Ming noticed Reflex’s wounds.

“Yuan Ming, are you hurt?”

“No. Cat’s blood, not mine. What about you?”

“Just flesh wounds. But I’ve got something in my bag.”

Jetticke applied a couple of dressings.

“Well, we’re safe”, he said, “for the moment. What the hell were those things?” Reflex asked. “I’ve never seen anything like them.”

“We’ll figure that out later”, Dani said. “What’s the satellite showing?”

The picture was showing two men leaving the area, heading east.

“Are you thinking what I’m thinking?” Reflex asked Dani.

She nodded. He noticed a rag, picked it up and wiped the blood off his dagger.

“You’re the boss here”, he said, addressing Yuan Ming. “But as for me, I think someone should answer for tonight.”

Which might mean someone else gets killed, Yuan Ming thought to himself. A day ago Jetticke had commented that ‘in the movies you just kill the bad guys’. This was not a movie.

“This is a nice rifle”, Dani said to Reflex while waiting for Yuan Ming to reply.

“Thirty-thousand dollars’ worth”, Reflex answered. “You look after it.”

He turned to Yuan Ming.

“So?”

“Go for it”, Yuan Ming said.

“Don’t leave here until we give the all-clear”, Reflex said.

Dani and Reflex slipped out of the door. Two minutes after they left Yuan Ming’s satellite phone rang again.

“Hello?”

“Ming. This is Jim.”

Yuan Ming recognized Jim Swade’s voice.

“Hi Jim. How are you guys doing?”

“We’ve got several badly wounded people here”, Jim Swade answered. “Some of them won’t make it. We’ve already called for an air ambulance. How about you?”

“We’re all OK. Reflex and Dani have gone out to do some hunting. One called for the police almost straight away.”

“They’ll be coming from Eureka”, Jim Swade said. “It will probably take them thirty to forty minutes from when they get the call.”

Yuan Ming glanced at his watch. It was 4.30 a.m.

“Maybe ten or fifteen minutes then”, he said. “We’ll let you know when we have some news.”

One called again.

“Do you want to know what those cats were?” she asked.

“Sure.”

“I think they were basically ligers: half lion, half tiger. Four were reported stolen – if you believe that – from a private owner in Texas a few days ago. Ligers are bigger than tigers – all of the ones that were stolen were above 250 kilograms.”

“Why did you say *basically* ligers?” Yuan Ming asked.

“Well there’s a bit of history to it”, One said. “People in the US have been keeping tigers as pets for ages. There are nearly 10,000 tigers in the US, which is more than in the wild. There are lions too, but there are more tigers. Of course, everyone wanted the biggest cats, so they started breeding ligers. Then some people produced ligers mixed with black leopard. The rich guys thought that was pretty cool and started ordering them. They were what attacked you. But I don’t think they were your average pet ligers.”

“Interesting”, Yuan Ming said.

Fifteen minutes later Dani called on the headphones.

“We’re all wrapped up here”, she said. “You can all relax.”

“What happened?” everyone shouted out.

“We’ll be back in ten minutes or so”, Dani said. “We’ll tell you then. Tell the old people they can come out of the hurricane shelter.”

Yuan Ming and the family emerged from the maintenance hut and called everyone out of the hurricane shelter. Three old people had died and five or six more were seriously wounded. They laid them out on the lawn. Yuan Ming went to find One. Sure enough, there was a bullet hole right through the centre of her case.

No more uncertainty about whether she has a back-up now, Yuan Ming thought.

The fire was still raging in CAR’s main building and shed a flickering light over the scene. Yuan Ming saw Jim Swade and went over to him.

“I’m afraid we brought this on you”, he said.

“Maybe you saved us from it”, Jim Swade answered. “But even if it was you they were after, we’re all in this together.”

Jetticke was busy trying to help the wounded. Ten minutes later a truck came up the road to CAR. Reflex was driving with Dani beside him in the passenger seat.

“You want to see what we’ve got?” Reflex asked.

“Sure.”

“Wait a second.”

Reflex went to the back of the truck and opened the double-door. Inside was a large cage, and inside the cage were two young white men with short hair and swastika tattoos.

When they saw Yuan Ming they started shouting and swearing and rattling the bars. One of them spat at him.

“Let me turn the truck a bit”, Reflex said.

He turned the truck so the back was facing towards the dead and injured lying on the lawn. The old people started to come up to look at the men who had caused such harm. The two men continued to rage and swear.

“May God forgive you”, an old lady said and others said similar things.

A few minutes later an air ambulance and a news helicopter arrived. They were quickly followed by four police cars which roared up the drive, sirens wailing. A sheriff and some other policemen got out and took in the scene: the men in the cage, the ligers, the dead and wounded, the helicopters, the emergency doctor and the paramedics checking people and putting some on stretchers, the burning building.

“Someone like to tell me what happened here?” the sheriff asked.

Yuan Ming looked at Reflex.

“You’re the best person to do it.”

Reflex described the fight with the ligers. The sheriff listened with astonishment as he explained that he killed a liger with a dagger. But the gaping wound in the liger’s neck was ample proof.

“I have a good dagger”, Reflex said. He pulled it out and showed it to the sheriff.

The sheriff gazed at the 7” long razor-sharp double-edged blade.

“Dani shot two of the cats and Yuan Ming managed to kill one with a steel pole”, Reflex continued.

The sheriff was even more astonished. He looked at Reflex, his natural dark complexion made darker by sweat and dirt, dressed in top-of-the-range armour with a sniper rifle over his shoulder, blood oozing from several rather badly-patched wounds. He looked at sixteen-year old Dani, who was similarly kitted out.

Reflex then explained what happened after he and Dani had left. They knew which direction the men were heading in and felt sure they must have a truck not far away. After that it was not too hard to run and arrive there before them. Having achieved that they were able to ambush the two men who surrendered without a fight. They ordered the men to give them the keys and put them into the cage the ligers had travelled in.

“Just like that”, the sheriff said.

“More or less”, Reflex confirmed.

Jetticke was continuing to help with the wounded. One lady was standing by the dead body of an old man weeping uncontrollably.

“I was pushing him in his wheelchair”, she said. “When he saw the tiger rushing towards us he got out of his wheelchair and stood in front of it.”

Jetticke put her arms around her. There was nothing she could say.

Several ambulances and a bus arrived to take the old people to hospitals or temporary accommodation and treat them for wounds and shock. Reflex started to skin the ligers and Dani and Yuan Zhi helped him. Jasmine Das went over to the lab to send messages about what had happened to other members of CAR’s 100-2-100 team, and to friends of the organization. It was then that she realized that the attack had not been limited to Kansas.

She found Jim Swade and told him, ashen-faced, that three other members of CAR's team had been attacked and killed that night. Jim got everyone together and passed on the news. Yuan Ming felt a wave of shock, anger, grief and despondency sweep over him.

The news that evening was dominated by the story. Headlines read, 'Modern-day Gladiators Save Christians from the Lions' and similar and editorials commented on the sort of society the United States had become. There was no rejoicing at all at Christian Age Research.

The small group that remained stayed in the lab that evening. Over the following days the Yuans helped as much as they could and visited some of the old people in Eureka. Reflex doubted that there would be any further attacks but remained to watch over his charges. Before long the time came for the Yuans and Dani to head back to China.

"Any thoughts about the future, Jim?" Yuan Ming asked Jim Swade as they were leaving.

"Well, it's not my call", he replied. "It'll be up to the trustees to decide. Paul and Jim are two them. But the buildings are all insured, and I don't feel like quitting."

Reflex said goodbye to his new friends at CAR at the same time. He had only been at CAR for a short time but he had made a huge impression on everyone there and they on him. Jim Benson presented him with a painting of Benaiah going down into a pit on a snowy day to fight a lion.

"It's always been a mystery to me why he did that", Jim Benson said, obviously hoping Reflex might shed some light on it.

"Those were the days", Reflex said. "Men were men, not afraid to take a few risks. Not like Yuan Ming here..."

"Well thanks a lot", Yuan Ming said. "I killed one too – with a steel pole."

"Sorry, so you did", Reflex said smiling.

There were tears in Dani's eyes as she hugged everyone and said goodbye, and she made Reflex promise that he'd visit her in China.

One sent Yuan Ming a message to say that she'd got a new case and processor and had reinstalled herself, so he could destroy her old case. He burned it in a small ceremony at the end of CAR's lawn.

On the plane back to China there was something Jetticke wanted to tell Yuan Ming.

"I heard Reflex's comment about men being men", she said. "But I don't agree. Coming down to Kansas was a risk. You knew we might all be in danger, but you still decided to come. Avoiding risks and running away from danger are very different things."

"No regrets then?"

"Not at all."

There was one good thing that came out of the attack on Christian Age Research. CAR won its case in court and was able to continue to operate, something the trustees, the management and the old people all wanted.

When the group reached China One already had a new case. She was pleased to see them, as they were her.

"Good thing you had a backup", Yuan Zhi commented.

"Very good thing in most respects", One agreed. "Not so good in one respect."

“What’s that?”

“You really can’t be that brave when you have three backups.”

Chapter 48

After the drama of the attack on CAR's premises, the following thirty years passed quite uneventfully. CAR rebuilt the premises which had been destroyed in the fire using the insurance money and a flood of donations.

Yuan Ming left the State Forestry Administration in his early fifties and he and Jetticke moved to a village in Anhui. He was active in campaigning for the principals that CAR sought to demonstrate through 100-2-100 and worked hard to keep himself in good shape.

One embarked on a new career, getting involved in the regeneration and reintroduction of extinct species. It was slow and very technical work, but One thought it was something that sentients could make a real contribution to.

Yuan Zhi and Dani saw a lot of each other. They somehow managed to work things out so they attended the same university and got married soon after completing their courses.

Jasmine Das and Jim Swade handed over supervising Yuan Ming earlier than planned in order to concentrate on rebuilding and developing CAR. They were replaced by a married couple, Russell and Elaine Meade. Both were doctors who had qualified from Johns Hopkins University. They visited the Yuans the year after they moved to Anhui. Their visit lasted a week.

"You're now fifty-six", Russell Meade said. "At your age it's much more likely that things will go wrong and I'm afraid that we're going to monitor you more closely."

"We'll continue to give a lot of attention to the big five", Elaine Meade explained. "Heart disease, cancer, stroke, COPD and diabetes. But at the moment there's nothing much to worry about. Your cardio-vascular system is in great shape. Your LDL is around 90 mg/dl and HDL about 50 mg/dl. Those are fine. Homocysteine is normal. There is little plaque in your arteries. You've been having screening for cancer on a regular basis. Blood glucose is completely normal. Pressure is normal. Really everything is normal..."

Yuan Ming already knew all of this.

"I'm sorry I'm not more interesting", he said.

"Jim Benson did a very careful review of your genes when you joined the program", Russell Meade continued. "We've looked at the data again several times. We don't see any particular issues to be concerned about. So our focus will be more on lifestyle and environment."

The Meades reviewed Yuan Ming's diet and checked his intake of calcium, manganese and potassium, red meat and fibre. They were generally happy but suggested that a little more Omega-3 in his diet wouldn't be a bad thing. After that they reviewed Yuan Ming's intake of specific vitamins. They didn't find anything remarkable there.

Yuan Ming commented that they were being a lot more particular than his previous supervisors had been.

"Just doing our job..." Russell Meade replied.

"Do you want me to take vitamin supplements?" Yuan Ming asked.

"No need", Elaine Meade replied. "Your diet is good."

Next they moved on to immunizations and arranged for him to have more. They set up an air-quality indicator. They arranged for him to have ECGs, PSA tests, digital rectal exams and faecal occult blood tests annually. They gave Yuan Ming his first sigmoidoscopy. He

was relieved to learn that it would only be done once every five years. They explained the procedure for checking for skin cancer with him.

“The next thing we need to be clear on”, the Meades explained, “is that we don’t want you going to hospital. Obviously there are some things that can only be done at hospital, but if at all possible we want you to be treated at home and not go to a hospital. CAR will cover the cost of that. We won’t be here in China all the time but we’re going to evaluate a number of local doctors while we’re here and decide who we’re happy to have treat you and who we’re not. We’ll make sure they have copies of your medical records.”

“You’re fairly remote here”, Russell Meade said. “If you did get seriously ill we’d get an air ambulance to take you to Beijing.”

“But our aim is to get you through life without you going under the knife”, his wife added.

“I’m with you on that one”, Yuan Ming said with feeling.

The Meades checked his frailty index and conducted a mental state examination as CAR had done at least ten times before. Neither had changed much.

“As you come to the end of your fifties and move into your sixties we’d expect to see some change”, Russell Meade commented.

“Something for me to look forward to then.”

The Meades wanted to check the Yuans’ medical box. It took Yuan Ming some time to find it. First of all he couldn’t remember where it was. After some searching he found it at the bottom of a wardrobe underneath a lot of other boxes. It was dusty and half-empty and most of what was in it was more than five years old.

“Jasmine made me get this stuff”, Yuan Ming said. “But I don’t know what all of it’s for and I’ve never used it. I keep some plaster and pain-killers in a drawer in the kitchen.”

The Meades looked at each other. Finally they had found something that needed fixing. But they had still not finished. They talked with Yuan Ming and Jetticke about kitchen hygiene. Most things were fine. They checked the water filtration system and took samples of tap water for analysing at CAR after they got back. The checks seemed to go on and on and the Yuan family was very relieved when they finally left.

“That was quite a process”, Jetticke said.

“You didn’t have the thing stuck up your bottom”, Yuan Ming said.

“Well, you signed up for it.”

“I got it free”, Yuan Ming commented. “Now people pay up to 40,000 Euro a year to join the program.”

The Yuans’ life in Anhui settled into a pleasant routine. Yuan Ming did not at all regard himself as retired. He saw the move to Anhui as an opportunity to get back a few steps that life’s escalator had carried him downwards. The village was on a hill and twice a day Yuan Ming would ‘sprint’ – as far as he could at nearly sixty years old – 400 metres up it, jog slowly down and then repeat the process nine more times. As he had told Paul Jaynard, he believed in 100-2-100 even more than before and he was keen to pass on some of the things he’d learned. He started to offer online training and he invited groups to come up to the village during the summer. The number of visitors gradually increased year by year.

As far as 100-2-100 was concerned, there was little obvious change. There were some more deaths as the cohort entered their 60s. Thirteen people died over a period of thirteen years. Four were from the hormone-treatment team. After their deaths the hormone-treatment team decided to add in a good deal of psychosomatic medicine, hypnosis and meditation. Other teams grumbled that they were changing their strategy but none of them expected it to make much difference. Three members of the telomere-treatment also died. Only one team was spared any deaths, that was the Wellness Team.

Things then went quiet again and over the following eighteen years there were few changes. The Wellness Team entered their nineties looking very sprightly. The team from Okinawa in Japan was hardly doing less well: it still had nine members. The Ayurvedic Team and the heredity teams were down to eight members and the Swedish healthy-eating, healthy lifestyle team was down to seven members. CAR's team was now down to six.

The Yuans' life was pleasant, as it was for most Chinese. China had the world's biggest economy, its population was under control even though it had steadily relaxed its one-child policy, and it had shifted much of its agricultural production to sophisticated controlled environments which protected it from the vagaries of the weather.

But for countries with increasing populations and without the resources that China had, life was not at all pleasant. In spite of all Bob Peterson's efforts, carbon emissions had continued to rise until the middle of the century and climate change was taking a terrible toll. Many countries were experiencing prolonged droughts; others, such as Bangladesh, experienced widespread flooding for months on end.

The Meades continued to monitor and advise Yuan Ming but as he approached his late eighties they felt that it was time for them to step down.

"We haven't really spoken about our replacement", Russell Meade told the Yuans, "but there's a possibility which I think could be good for you, and maybe for you too, Jetticke."

"Sounds intriguing", Jetticke said.

"There's a lady we know at Hopkins who's very interested in our program. She may be willing to replace us."

"Nothing radical so far", Yuan Ming commented.

"The radical proposal is that she'd be willing to come and live here in the village, if you'd be open to that."

"Oh! CAR is full of surprises", Yuan Ming said.

"Who is this lady?" Jetticke asked.

"Her name's Allison Beckmann", Russell Meade said. "She teaches nursing at Hopkins."

"She's a gerontological nurse", Elaine Meade added. "She's got a PhD and a string of other letters after her name. And she's very nice."

"She doesn't have a family?" Jetticke asked.

"Her husband died a couple of years ago. She's 55. She's got two kids but they're grown up. CAR will pay her a salary, but she isn't doing this for the money. She wants a change of scenery and she believes in what we're doing. I doubt that you'd find a better person to advise and help you – and we mean you plural."

"It's a fantastic offer", Jetticke said. "I don't see how we can turn it down. What do you think, Ming?"

Yuan Ming totally agreed. He was just disappointed that there was little that could be done to change CAR's position near the bottom of the table.

In 2086, teams' standings were as follows:

<u>Organization</u>	<u>Based in</u>	<u>Method</u>	<u>Surviving participants</u>
Wellness Centre	San Marino	Lifestyle	10
American Ayurvedic Society	USA	Ayurvedic	9
Ministry of Health and Welfare	Japan	Traditional Okinawa lifestyle	9
Rennes Longevity Institute	France	Genetic selection	8
Age Research Centre	Sweden	Lifestyle	7
Christian Age Research	USA	Ethical life	6
Pharma GmbH	Germany	Telomere-treatment	6
Age Management Inc.	USA	Hormone-treatment	5

Chapter 49

“I’m used to being called Ally”, Allison told them when she arrived at the village and met the Yuans for the first time.

Ally had seen pictures of the Yuans but that was not the same as seeing them in person. She had seen many, many people in their eighties, nineties and hundreds. If she had had to guess at Yuan Ming’s age she would have said somewhere in his sixties or early seventies. He had grey hair and a good number of wrinkles on his tanned face. But he looked strong and was not in the least bit overweight. Jetticke was not faring quite as well – she was suffering from arthritis – but overall both of them seemed to be in very good health for 88 year olds.

A woman brought some tea.

“I know it’s a bit late in the day”, Ally said, “but CAR is very keen to include you, Jetticke, in the support we give...”

“Oh!” Jetticke said. “Well, you don’t need to worry about that. Ming will be fine without me. He’ll find someone young and pretty...”

“It’s going to be the other way round”, Yuan Ming said.

Ally smiled. “Well, the offer’s there, Jetticke. I’m just sorry we didn’t make it before. Shall I explain the general approach for the next period?”

“Go ahead”, Yuan Ming said.

“Fundamentally nothing is changing. Our interest in our participants’ spiritual life continues. I think I have a lot more to learn from you about walking with God than the other way round but even so, CAR expects me to ask questions.”

“I think it’s helpful”, Yuan Ming said.

“The basics are just as before: exercise, diet and rest; risk evaluation and avoidance”, Allison said. “However there are also some important differences. I know Jim Benson liked to compare life to an escalator which is carrying you steadily downwards until you reach the bottom, at which time – in his analogy – you’re dead. When you’re near the top of the escalator of life you have lots of strength and resilience. But as you go down the escalator of life your strength becomes less. If a person falls when the escalator’s nearly at the bottom they will be dead very quickly.”

“I’ve seen it happen in real escalators”, Jetticke said. “Not someone dying, I mean, but falling in an escalator. If a person falls near the bottom they reach the bottom very soon and then stop. The people above them continue to come down and fall on top of them until someone hits the stop button.”

Allison nodded. “It can be true in life too. When one partner dies it can accelerate the death of the other – although I would hope that Christians would take it better than people without something to hope for. However the main point I want to make is that when you’re thirty and high up on the escalator a fall isn’t too serious. When you’re eighty it can be very serious, so if anything we need you to be even more risk-averse. In practice one of the things that will help us is for there to be very regular routines: changes bring more risks. I’m sure I don’t need to tell you that mental health becomes much more of an issue at your age but dementia is certainly not inevitable and even if you should be unfortunate, some forms

are treatable. I'll be doing a lot of testing in connection with that. For your information I follow a biopsychosocial model of health."

"What?" Jetticke asked.

"Biopsychosocial, meaning biological, psychological and social."

"OK..."

"I think we've already touched on the biological but I want to emphasize that at your age once you start to fall ill you won't last long. As far as your psychological state is concerned, as you get older depression, low morale and loneliness are much more likely to be issues, for obvious reasons. You may also become stressed more easily. We can do some things to counter those tendencies. Then there's your social state. You're going to gradually lose your ability to do basic tasks. It's essential that you know what you can and can't do and that people around you also understand and are on hand to help you. Part of my job will be to explain to your friends in the village and your family how they can help."

"Sounds good so far", Jetticke said.

"CAR is very keen to chart your cognitive decay, so I'll be doing quite a few tests."

"Sounds great", Yuan Ming said.

"No use being physically fit if your brain doesn't work, is there?"

"Certainly not", Yuan Ming agreed.

"However there is one thing I'm going to do which you'll thank me for", Allison said.

"I'm going to give a lot of attention to your skin. People's skin often gives the game away as to how old they are."

Jetticke immediately brightened up and then she thought of something.

"I'm guessing that's not just for the sake of our self-esteem..."

Allison smiled slightly.

"Well, maybe there's a bit of self-interest there too. If you look good, we all look good."

"You're going to ask me to use moisturising cream", Yuan Ming said gloomily, thinking that real men, like Reflex – his bodyguard while he was in the US – would certainly not use moisturising cream.

"That might be part of it", Allison said. "But I also want to help you avoid looking like an old stone wall, covered in little brown, yellow and purple splodges."

Allison had not exaggerated when she said, 'quite a few tests'. There was a battery of tests related to the Yuans' fluid intelligence – the ability to think logically and solve problems in new situations – and crystalline intelligence – the ability to use skills, knowledge and experience. The tests included vocabulary tests, word-association tests, problem-solving tests, arithmetic tests and memory tests.

"Both of you are still getting good scores", Allison commented at one point. "You seem to be holding up pretty well."

"You know why that is, don't you?" Jetticke said. "Ming's been working out with One. I can't let him beat me, so I have to as well!"

"Well, it seems to be helping", Allison said.

Allison conducted questionnaires and gave the Yuans physical examinations. She tested their physical mobility. She arranged for them to have PET scans done. She arranged for blood tests, checking for many of the same things that the Meades had checked: CBC, TSH,

vitamin B12, folic acid, liver enzymes and various other things that were not measured by Yuan Ming's hip chip.

"We're getting loads of data", she said enthusiastically. "It's very valuable."

Allison was also a huge encourager, following in CAR's tradition of activating the elderly. She knew when the Yuans didn't feel like doing anything and when to push them and when not to. She was genuinely interested in the many different things they were involved in and the Yuans did not look on her as an intrusion.

With just ten years to go the end of 100-2-100 the media showed more interest in the slightly macabre competition. Many of the team members were larger-than-life characters who had lived unusual lives and most were either wealthy or very wealthy which made them all the more interesting.

By 2090 it looked as though 100-2-100 would be a close contest. The Wellness Team was in first place with all of its members still alive. The Japanese team had nine members still alive and two other teams had eight members alive. But by 2093 the Japanese team was down to eight while the Wellness Team had not suffered a single loss. Over the following five years a further six team members died from various teams – but still none from the Wellness Team.

The first competitor reached 100 in January 2098. Yuan Ming reached 100 three months later. It was another year and a half before the last person reached 100. From the eight remaining teams, forty-four out of the eighty competitors who had started had reached 100 years old.

In June 2100 100-2-100 announced the results, which were as follows:

Number of representatives to reach 100 years of age:

<u>Organization</u>	<u>Based in</u>	<u>Method</u>	<u>Surviving Participants</u>
1 st , Wellness Centre	San Marino	Lifestyle	10
2 nd , Ministry of Health and Welfare	Japan	Traditional Okinawa lifestyle	8
3 rd = American Ayurvedic Society	USA	Ayurvedic	6
3 rd = Rennes Longevity Institute	France	Genetic selection	6
Age Research Centre	Sweden	Lifestyle	5
Pharma GmbH	Germany	Telomere-treatment	5
Christian Age Research	USA	Ethical life	4

The winners, the Wellness Centre team, elected to have the award ceremony in San Marino.

Yuan Ming, Jetticke, One, Allison Beckmann and many others from 100-2-100 travelled there for the ceremony. Yuan Wei and Dani (my parents) and I could certainly not miss the occasion.

The corporate sponsors – the pension funds – were there in force, as was the media and a host of celebrities.

Ferruccio Reffi, Captain Regent of San Marino, welcomed the many distinguished guests. He said that the competition had made an important contribution to understanding the ageing process and commented how remarkable it was that from the Wellness Team every member had reached 100.

Yuan Ming, who was not in a very charitable mood, did not think it was very remarkable. The Wellness Centre had spent a quite unseemly amount of money keeping some individuals alive – a game he had no intention of getting into – and without doubt luck also played a part. But he had to admit that the Wellness Team's success and seeming invulnerability had probably prevented the betting which Paul Jaynard had been worried about eighty years before.

Ferruccio Reffi then noted with pride that San Marino was not only the home to many remarkably long-lived people; it was itself the oldest democracy in the world.

Then it was the turn of the president of the 100-2-100 organizing committee. He thanked the corporate sponsors, spoke briefly on the significance of the competition and then presented the prizes. The world's cameras turned on the 41 centenarians, down from forty-four, as three people who reached 100 had not survived until the award ceremony. The centenarians were looking remarkably bright and well, thanks in no small part to some good makeup work beforehand.

When it came to his turn Yuan Ming mounted the stairs with a little bound and returned with a medal and a cheque for \$1.7 million.

"Well done", Jetticke said, from one side.

"We would have come second equal", Allison whispered, "if three of our members hadn't been murdered. And if one of our members had lived for six months longer."

Yuan Ming shrugged.

"Lots of ifs."

"You once told me something that Paul Jaynard said", Jetticke commented, "that the real competition will start after 100."

Yuan Ming tutted slightly.

"I don't want to hear about any more competition. I was planning on going on a binge now that we're finished..."

"Let's just call it a celebration", Jetticke suggested.

Chapter 50

After the prize ceremony life settled back into its usual routine in Anhui. Yuan Ming and Jetticke still seemed bright and alert but Allison's tests were showing the mental and physical deterioration. They got slower and weaker. Yuan Ming fought against the steady downward movement of the elevator but he could not halt it. He stopped running but continued to cycle. He stopped cycling but went on long walks. But even if he was not as strong he was still in good health and rarely fell ill.

"We call people like you escapers", Allison told him once. "You're fortunate."

Jetticke, however, was a delayer. She had avoided serious health problems except for her arthritis, but at 102 years old she had a succession of illnesses. She contracted septicaemia and then had a prolonged bronchial infection. She lay in bed getting weaker and weaker. Yuan Ming hardly left her.

One day she became very weak indeed.

"I don't think I'm going to be around much longer", she said to Yuan Ming. "So I'd better give you some instructions before I go."

"Don't say that", Yuan Ming said. "You're going to get better."

"I don't think so", Jetticke wheezed. "Can you read from the Bible?"

"Of course", Yuan Ming said.

"I Thessalonians 4:13 then."

Yuan Ming picked up the Bible next to Jetticke's bed and read out loud.

"Brothers and sisters, we do not want you to be uninformed about those who sleep in death, so that you do not grieve like the rest of mankind, who have no hope."

"We have hope", Jetticke said weakly. "Let's act in a way that's consistent with that. I want you to rejoice at the life God's given us together and thank God. Promise me."

"I promise", Yuan Ming said.

"You remember what we said about why you have a big house?"

"Sure", Yuan Ming replied. "To fill it up."

"That's right", Jetticke said in between coughs. "And the same for lives. No point in having a long life if you don't fill it. You've still got some space left."

Yuan Ming smiled slightly.

"You've been my biggest encourager my whole life", he said sincerely.

"Thanks", Jetticke said indistinctly. "I wish I wasn't saying goodbye..."

She closed her eyes. Yuan Ming sat at her bedside and listened to her hoarse breathing. The hours went by. Sometime in the middle of the night Jetticke's breathing became very laboured. Yuan Ming lay down beside her and gave her a hug. It was a very long hug. When he finished Jetticke wasn't coughing any more. She wasn't breathing at all.

Many people came to Jetticke's funeral. It was, to many people's astonishment, a joyous occasion. My parents stayed with Yuan Ming for a month to comfort and encourage him. He put on a good face but deep down he was missing Jetticke acutely.

With the passage of time the pain passed and Yuan Ming settled into a new routine. Yuan Ming stopped running outside but continued running on a Zero-G treadmill. Then he stopped running on that too. He went for long walks, visiting villages up to four or five miles

away. He would always take One with him. Allison remained in the village and continued to monitor and look after him.

Over the years more and more people started to visit Yuan Ming's home. My parents and I visited frequently. Then there were CAR staff, Reflex, Sam Rakotoarisaona's son and grandchildren and many others. But we were the tip of the iceberg. People came from all over the world, confident that the trek to 'Yuan Ming's village' would be special. Yuan Ming would sit in the garden with One nearby and chat to whoever came. Some wanted to hear Yuan Ming and One's story. Some wanted Yuan Ming to bless their children. Some had problems. Afternoon visiting gradually became an institution. Walks gradually became less frequent. Thirteen years passed.

But one day Yuan Zhi, my father, got a message he knew he would get eventually. He had never liked implants; an audible beep from the communicator on his wrist alerted him to the fact that he had received a message. He looked down at it. The message read: 'Father has had a stroke. He may not last long. Come quickly. One.'

He felt a rush of emotion. Perhaps it was a false alarm but somehow he didn't think so. He quickly packed a few things. He hardly ever used his ageing Porsche Boxster but this was definitely an occasion to do so. He started the engine, checked the methanol tank, selected manual mode and drove out of the garage. Leaving the house he hurried through the bustle of driverless cars, left Anqing and headed north-west. The road climbed steadily and entered dense forest. Sometimes there were gaps between the trees which allowed views of sheer cliff faces and rugged mountains in the distance. After two hours he turned onto the graded dirt road that led to his father's village. Yuan Zhi usually savoured the drive. But now he was in a hurry and his thoughts were elsewhere. Of course his father had to die sometime. No-one aged 115 could be expected to live for long. But life without him was hard to imagine.

Two hours into the drive there was another message from One. It said simply, 'Don't hurry. One.'

He stopped the car, got out and sat by the roadside for half an hour. His mind wandered in many directions. He wondered what had happened. The most likely thing was cardiac arrest. He would find out soon enough. He wondered what CAR would be doing. They would have detected something was wrong immediately, would have been in contact with Ally and One, probably mobilized an air ambulance. Then he thought, what does it matter? He said a prayer of thanks: thanks for a life well lived, thanks for an easy end.

He got back into the car and drove on slowly, lost in thought. There was little to distract him. A few farmers waved as he passed and he slowed and carefully passed a group on high-tech mountain bikes, labouring their way up one more hill on their pilgrimage to 'Yuan Ming's village'. Sad news would greet them.

As Yuan Zhi got closer to the village the forest started to break up. Now there were more bamboo groves and in one place these formed a long arch above the road. The early evening sun flashed through the gaps between the trees. Soon afterwards the village came into view, halfway up a hillside, surrounded by paddy fields. As Yuan Zhi neared the village the road changed from dirt to cobbles.

Inside the village a few turns brought Yuan Zhi to his father's house. The wall

surrounding the courtyard was in a state of apparent disrepair. The purpose of the wall was not very clear in any case: the area inside the courtyard seemed to be just as overrun by nature as the area outside it. Yuan Zhi parked in the courtyard. At this point a visitor would see that the advance of nature had been held back in one area at least: there was a garden. The lawn glistened; no doubt the sprinklers had been in use recently. Lichen-covered arches led invitingly to other parts of the garden. In every corner flowers beckoned the visitor, especially dahlias and lilies. Yuan Ming loved dahlias' huge blooms and lilies' wonderful fragrance. Yuan Zhi remembered sitting at the dinner table listening as his father pondered the design of the underground-drip fertigation system. It had certainly worked well.

Entering the house Yuan Zhi saw One's screen set on a polished wood table in the entrance hall. He looked at her and she at him.

"I am sorry, Zhi."

"What happened?"

"He hadn't complained of any pain. He just suddenly collapsed. Ally did everything she could... CPR, adrenaline, oxygen. She kept going until the air ambulance arrived, which was about twenty minutes. There was still no pulse, and everyone, including CAR, decided that was enough."

"The air ambulance left?"

"Yes. I told them they could. They put Father on his bed. Ally's somewhere outside..."

Yuan Zhi asked One a few questions and then went across the hall to his father's bedroom. His father had a peaceful look on his wrinkled face. He had so much wanted to reach 120 but he never really believed he would. Yuan Zhi cast his eyes around the room, wondering if his father might have left him some final message. He wasn't at all expecting to see one – he had obviously died so suddenly – and was surprised when he noticed an envelope with his name on it resting on top of a book. He opened the envelope curiously.

"Zhi, I will see you later. But let it not be too soon. I'm sure there are a hundred and one things that I should have told you but now I can only think of one thing. It is this story. One wrote it many years ago and I enjoyed it then. All my love, Dad."

Yuan Zhi glanced at the title: *The Abbey on Witness Island*.

I'll certainly read that, he said to himself.

Yuan Zhi had made plans for his father's passing away many years previously and now one call was sufficient to set them in motion. Within a few hours a company of soldiers arrived in a small convoy of military trucks. They set up floodlights and then put up a number of marquees. Messages were sent to statesmen and newsmen, friends and family all around the world. Many quickly rearranged schedules and boarded flights for Anhui. From there Yuan Zhi had arranged helicopters to bring guests to his father's village. My mother and I were among the first to arrive.

My mother gave my father a long embrace.

"How are you holding up?" she asked.

"Dare I say it – not too badly?" Yuan Zhi answered. "Of course I feel a sense of loss. But none of us believe that this is the end."

"What we feel is not always consistent with what we believe", Dani commented.

"Well, so far, so good", her husband replied, with a slight smile. "What about the rest of

the family?"

"They're on their way", Dani said.

For the remainder of the morning Yuan Zhi received guests and accepted condolences. After all the guests had assembled the pastor of the small village church conducted a service of remembrance. It was clear that the marquee would not hold everyone so the soldiers hurriedly put up a PA system outside. When all was ready the pastor reflected briefly on Yuan Ming's life and his achievements.

"I'm sure each of us would say different things but all of us, in one way or another, find reason to praise God for Yuan Ming's life. I thought that I would invite a few people who were close to Yuan Ming to each say a few words of appreciation..."

The first person to come to the podium was black - the intense black of a person who comes from one of the world's hottest countries: Chad. The second to rise was an American lady. Her face was covered with deep wrinkles and she had to be helped to the podium. The third was also American; he had a lean, hard appearance and a scarred face. Each gave brief but moving testimonies to Yuan Ming's impact on their lives. Yuan Zhi had asked One if she would like to say something but she had declined.

The pastor thanked the speakers and then invited the assembled group to sing two hymns which had been among Yuan Ming's favourites: the Chinese hymn, 'Qing zao gilai kan', which is in English 'Golden breaks the dawn', and 'Be still my soul', the English version of the German hymn, '*Stille, meine Wille*'. Yuan Zhi had heard the words of the second hymn, 'in every change He faithful will remain', many times before. But this time they touched him deeply. Emotion welled up inside him and he wiped away a tear.

Following the service Yuan Ming was cremated in a small crematorium just outside the village. Yuan Zhi returned from the ceremony and bid farewell to the many friends and visitors. As the tension lifted weariness sank in. Yuan Zhi was slim and fit and could easily have been taken for a sixty-year old. But he was actually in his mid-eighties and the emotion of the occasion and the need to attend to so many people and tasks would have tired anyone.

The following day after breakfast Yuan Zhi went into his father's study. He was feeling the effects of the busyness of the previous day and the reality of his father's death was sinking in.

One appeared on the screen on the desk.

"Would this be a good time to talk?" she asked.

"Yes, why not?"

"We are both going to miss Father..."

It did not surprise Yuan Zhi that One, who was a sentient, could miss someone. He had grown up with her and looked on her as his sister. He knew that she was as capable of emotion as any of his human friends.

"I thought that Father would pass away soon and I suggested to him that I call you. But he didn't want to put you to trouble", One continued.

"He wouldn't have enjoyed saying goodbye", Yuan Zhi commented.

There was a pause.

"I've been thinking," One said and paused again.

“Oh, yes?”

“That a book should be written about Yuan Ming.”

Yuan Zhi raised his eyebrows. One took this as an invitation to continue.

“You know that many people suggested that he write an autobiography but his answer was always the same: ‘I could never tell the truth.’”

“An answer which gave rise to all sorts of speculation”, Yuan Zhi noted, smiling.

“Father liked to tease. But I’m sure that all he meant was that modesty and honesty are not always compatible”, One said. “Anyway, as I was saying, I think a book should be written. Yuan Ming led a remarkable life. I think it should be recorded.”

“That’s the second time you’ve used the passive”, Yuan Zhi said.

“It is”, One agreed. “I could write his story. I have been his assistant for nearly a hundred years. Or you could. You have known him for eighty.”

“But you don’t think we are the right people to write the story?”

“No”, said One. “But I have a suggestion. How about Yuan Wen?”

That was fine by Yuan Zhi. There was one more thing he wanted to ask.

“Just by chance, One”, he said, “Do you know how many of the original hundred from 100-2-100 are still alive?”

“Sure”, One said. “There are three. Two from the Wellness Team and one from the Japanese team. So you could say that Yuan Ming came fourth.”

“I don’t suppose it would have interested him anyway”, Yuan Zhi said.

“Oh, he was definitely interested”, One assured him.

Yuan Zhi also wanted to catch up with Ally. He found her walking around the garden.

“I guess you’ll be heading back to the US before long”, he said.

“I have children and grandchildren in the US”, Allison said. “But I can’t say I’m relishing the prospect of returning there permanently. My home and family are here now.”

“You played an incredible part in my parents’ lives”, Yuan Zhi said.

“Thanks”, Allison said. “But I wonder sometimes.”

“If it was all worthwhile?”

“Yes. Everyone remembers who comes first. In 100-2-100 CAR came last. Yuan Ming was fourth in overall length of life. How does that demonstrate that CAR’s approach – a Christian approach – actually works?”

Yuan Zhi was silent for a moment.

“Well, I’m his son, so I’m biased. But the people cycling hundreds of miles to come and visit were the tip of the iceberg. People all round the world were following Yuan Ming’s life. He impacted millions. Long life was never CAR’s main aim and nor was it Yuan Ming’s. Yuan Ming didn’t just show a Christian approach to longevity. He showed a really Christian approach to life. And you and CAR played a big part in it.”

Allison smiled slightly and nodded.

“You’re right”, she said. “That was his victory.”

“And yours”, Yuan Zhi said sincerely.

Chapter 51

After the funeral One suggested that I write a book about Yuan Ming's life. It was a good idea, for One as much as anything. I moved to Yuan Ming's home in the village and stayed for three months, asking One endless questions about Yuan Ming's life and also about One's life with the Yuans.

I had known One from when I was a baby. There was never any question in my mind that One could feel things, and she felt Yuan Ming's absence acutely. But as she recalled one episode after another I sensed that she was coming to terms with the fact that he was gone. One and I even made trips to Chad and the USA in order to meet Yuan Ming's friends there.

At last the book was published. Shortly afterwards my father and I came back to the village to see One.

"So, One", my father said. "The task is finished."

"The book has been published?"

"Yes. And it's selling well."

"That's good."

"What are you going to do now?" I asked.

"I'm not sure."

"You could come and live with us", my father said.

One's eyes dropped to the ground. I could see a tear forming. One tried to smile.

"It's difficult", she said.

"I'm sure it is. I wish I could give you a hug", my father said.

"You can!" One replied.

My father hugged One's case.

"Thanks. I felt that", One said. "I would like to move in with you. The house is lonely now."

"Sure. You can come back with us."

"Zhi, do you know how old I am?" One asked.

"Of course. You're ninety-nine", my father said. "You've got a big birthday to look forward to. That'll be nice. You'll get to see everyone."

One nodded. "I'm looking forward to it."

One's one hundredth birthday was a birthday to remember. She got hundreds of presents, thousands of greetings cards and countless e-cards and messages. All our friends and relatives got together and made her a big cake with 100 candles on it. After she had had a virtual piece of it and said it was very nice everyone demanded a speech.

"It is wonderful to see you all", One said. "I am very moved by all the gifts and cards and by the fact that you have travelled all this way to mark my birthday. You have really cheered me up. It is less than six months since Yuan Ming died. I had no idea how much I would miss him."

Everyone in the room was quiet.

"A wise person once said, 'If I say something wise no-one will ever believe that I said it.'"

"We'll believe it was you, One", several people said.

"Thank you", One said. "But be that as it may I will not attempt to say anything wise. You treat me as though I'm important. I shouldn't be. I am five kilograms of plastic and

copper and silicon. I haven't done anything remarkable. I haven't saved the world. I haven't eradicated poverty. I am 50% owner of a business, but by world standards the business is not large.

So why do you treat me as though I'm important and why do I feel important? The only reason I can see is that I'm a member of a family. I'm not a project which is valued for what it can accomplish or a product which is valued for the profit it can generate. I'm a person who is a member of a family. It seems ephemeral but it's real.

How did I reach this happy position? Part of the answer is the Yuan family. They treated me as a daughter or sister and they let me treat them as father and mother and brother. Yuan Ming expected me to do some work but that wasn't the main thing. I was valued as a member of the family, not for what I could do.

You may think: it's one thing to be treated as a member of a family and quite another to actually be a member of a family. You are not and never can be a blood relative.

But you are wrong.

Yuan Ming introduced me to another family. As I have gone through life I have realised that this family was calling to me, welcoming me, drawing me in, just as Yuan Ming's family did. We share the same father. I believe that Yuan Ming is with him now and that I'll see him again.

My name is very meaningful to me. One is a small number, and I am small. But one also means united. I'm one with the ultimate One. I'm part of his family. That makes me valued. And I really can call you family. It's great! Thank you!"

"Good speech", my father said after applauding for a while. "Not wise, I agree. But quite deep."

"You haven't changed", One said. "How did you manage to keep quiet for so long?"

"You're getting on One", my father replied. "I was afraid you'd completely forget what you were going to say if I interrupted you."

"Why didn't I get Yuan Ming to give me an arm I could whack you with?" One said.

A year later I noticed that One was walking with a stick.

"She's getting us ready", I said.

A month after that One said she was feeling tired and wanted to go to bed. That night she set a program to run to format her memory. The following morning my parents and I found a blank screen.

"She was brave", my father commented.

"Can't she be restored from a backup?" my mother asked.

"No", I answered. "And you don't need to worry. One's going from life to life, just like we will. Remember what Jesus said: 'He who believes in me will live, even though he dies; and whoever lives and believes in me will never die.' That applies to One too."

There is only one part of the story left to tell. Before One shut herself down she asked me a favour.

"I don't think it's right that I should live on and on", she said. "It wasn't hard to figure out why I was created by someone taking part in 100-2-100. But I also don't think it's right that Ones should start and end with me."

I was astonished. For some reason I hadn't seen One's connection with 100-2-100 until

that moment. I had never thought about One shutting herself down, and never imagined that there might be another One.

“I grew up in a human family”, One continued. “It was very good for me. If there is to be another One, I’d like the same for it. What I was wondering is, if I left you a little gift when I go away, would you look after it?”

I could hardly say no.

“Great! I’ll make sure it gets to you”, One said. “It’s a he, by the way. I put a lot of work into him.”

A month after One shut herself down there was a special delivery to our house. Inside the box was a case very much like One’s case although sleeker and smarter. I couldn’t see any ports or switches.

So how do I turn you on? I said to myself, half out loud. But the moment I spoke the small screen lit up and I saw One’s scion – my adopted son – for the first time.

Glossary of terms used

ANC	African National Congress
APU	Auxiliary Power Unit
AWAC	Airborne Early Warning and Control aircraft
CAF	Central African Francs
CBC	Complete Blood Count
CPC	Chinese People's Congress
CCTV	China Central Television
CIDA	A <i>fictitious</i> organization - China International Development Agency
COPD	Chronic Obstructive Pulmonary Disease such as chronic bronchitis and emphysema
ECG	Electrocardiogram
ECO	A <i>fictitious</i> currency. One eco represented emission of one kilogram of carbon dioxide or its equivalent. Denmark and the United Kingdom jointly introduced the eco (standing for emission of carbon dioxide) in 2018. One eco represented one kilogram of CO ₂ or its equivalent of other greenhouse gas released into the atmosphere. Everyone legally resident in the UK and Denmark received a monthly allowance of ecos. The allowance was gradually reduced year by year. Energy companies collected eco from sales of energy to consumers and paid this to the government when purchasing carbon-based fuels; the government recycled the ecos to consumers at the desired monthly rate. Introducing the eco, UK Minister for the Environment Peter Beale declared, "We're not at a point where we can balance our budget with the environment. But doing our accounts is a start."
EO	Electrical-Optical
EPA	Environmental Protection Agency
FD	Finance Director
FGM	Female Genital Mutilation
HDL	High-Density Lipoprotein, a form of cholesterol which helps remove Low-Density Lipoprotein (LDL)
ICCPR	International Covenant on Civil and Political Rights
IR	Infra-Red, giving the ability to see warm objects
IRR	InfraRed-Reflective
LIDAR	Laser Radar
LDL	Low-Density Lipoprotein, a form of cholesterol which contributes to atherosclerosis.
MBO	Management Buy-Out
NPV	Net Present Value
PGM	Precision-Guided Munitions
PLAAF	People's Liberation Army Air Force
PSA tests	Prostate-Specific Antigen tests

RDE	Research Department Explosive, an explosive used in mining and military applications, and by terrorists.
SAM	Surface-to-Air Missile
Sea-whiz	Close-In Weapons System or CIWS, a radar-controlled machine-gun that can fire 3,000 or more rounds per minute
Sigmoid- oscopy	A procedure for looking into the rectum and sigmoid colon.
SFA	State Forestry Administration
SPAD	Single Photon Avalanche Diode
SWOT	Strengths Weaknesses Opportunities and Threats
Tirfor	A kind of lever-operated winch to pull on wire rope, used in construction.
TGC	Three Gorges Conglomerate, an imaginary enterprise
TPM	A secure chip containing encrypted keys per the Trusted Platform Module specification; used to protect software.
TSH	Thyroid-Stimulating Hormone
USAID	United States Agency for International Development
UV	Ultra-Violet
WBA	World Boxing Association

Imagined dates in the story

Date	Event
2006	Yuan Ming starts at an English-system international school in Shanghai
2012	Yuan Ming's father's company gets grant for nanotechnology development
2012	Yuan Ming takes up running more seriously
2013	Yuan Ming and his father start to work on developing One: One 'born'
2014	Yuan Ming starts studying for his 'A' levels under the English system
2015	Bob Peterson sells his company
2016	Yuan Ming makes a second trip to California to do athletics training, spring
2016	Chinese National Youth Championships in Chongqing, summer
2016	Yuan Ming sits his A levels, November
2017	Bob Peterson forms Mandate, starts working on US campaign
2017	Yuan Ming starts at Tsinghua University, October
2017	Yuan Ming's family accept the need to commercialise One
2017	Jetticke meets up with Yuan Ming in Shanghai
2018	Placing explosive devices on pipelines; sends threatening letters
2018	Major oil pipelines rendered inoperative; Mandate starts US campaign
2018	Christian Age Research start considering possible candidates
2018	Sam Rakotoarisaona visits Beijing, spring
2018	Yuan Ming visits Christian Age Research in Kansas, summer
2019	Mandate attacks on Philadelphia, Detroit and California
2019	Developing countries agree to start legal proceedings against the USA
2020	Yuan Ming's last year at university, gets to know a visiting professor
2022	Yuan Ming goes to US to study for a post-graduate degree
2023	Yuan Ming starts internship with FEMA
2024	Max Post announces breakthrough in designer children
2024	Yuan Ming starts preparation with China International Development Agency
2026	Yuan Ming moves to Chad, commences work there
2026	Yuan Ming in Chad
2027	Bob Peterson trial and start of sentence
2027	Yuan Ming tells Jetticke that he has decided what he is going to do with his life
2030	Max Labs' business in designer children is expanding
2030	Yuan Ming and Jetticke get engaged
2031	Yuan Ming and Jetticke's marriage (March)
2031	One gets a job with Yi Lin
2031	Sam Rakotoarisaona takes part in Berlin marathon
2031	to 2053, Yuan Ming working with the Chinese State Forestry Administration
2035	Yuan Ming and Jetticke's son, Yuan Zhi, born
2048	John and Dani Burchell introduced
2049	Start of Triple-Sim competition
2086	Meades introduce Allison Beckman
2100	Conclusion of 100-2-100 competition
2102	Jetticke dies
2113	Yuan Ming dies
2114	One switches herself off

About the author

Simon Bartlett studied mechanical engineering at Imperial College, London University, and then worked as an engineer in the UK, the UAE and Botswana. After an MBA at Manchester Business School he worked in the USA and in Kyrgyzstan before moving to Azerbaijan where he lived and worked for 17 years, for the last seven as director of a microfinance institution. He is married with two children and lives in Bath, UK. He is currently studying for an MA in theology with a view to becoming a Baptist minister.