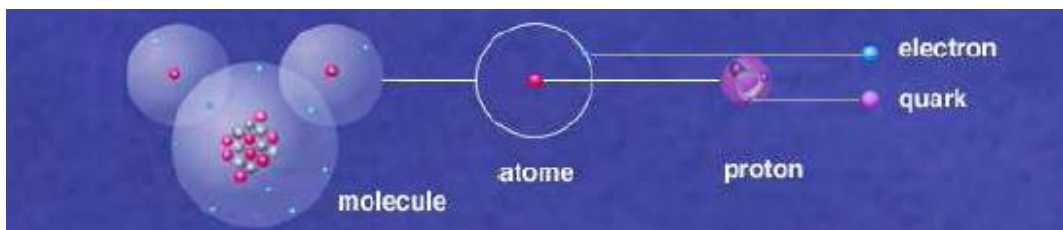


Chapter Four

An hour after her arrival, WPC Thatcher was still waiting to see her first Professor. All the permanent members of staff here seemed to be Professors. She suspected the US meaning of the word – a tenured member of academic staff - was in usage rather than the British - a very senior academic. She could believe Montford would have chosen the more vainglorious system.

She had roamed to the common room area, behind the lecture theatre at the back of the building. There was a stunning view through large glass windows over the lawns down to a modest ornamental lake. Half the room was a seating area with the usual white boards, here covered in sketches of interlocking circles and cones. The rest of this room had a pool table and bar stools. The bar against one wall was fronted by imposing stainless steel machines for producing coffee and tea but she was surprised to see behind on the wall a small array of spirit bottles and below fridges with soft drinks and beer. Apparently alcohol was on the house.

The coffee appeared to be for general consumption so she poured herself a plastic cup full. On the wall was a poster detailing the world of particle physics and here she found familiar concepts from her undergraduate studies. There was a picture of an atom, like a mini-Solar System; negatively charged electrons orbiting as a result of their electric attraction to the positively charged protons clustered with neutrons in the nucleus of the atom. The protons and neutrons were then shown themselves to be made up of those mysterious particles called quarks. A proton was made from two up quarks and a down quark, a neutron from two downs and an up. Here the quarks were held together by the strong nuclear force. She had always thought they would have been better sticking to Greek names but it had been the 60s – what was Greek for up she wondered?



Here also was the ethereal neutrino, a particle which essentially does not interact, the exception being through the peculiar weak force. The weak force could change up quarks into downs and electrons into these neutrinos. This was radio-activity, a down quark becoming an up quark and spitting out an electron and a neutrino. The electron caused the damage if it hit you. She had never understood how a force could change a particle's type though.

Still all simple enough: two quarks, an electron and a neutrino, plus electric forces, strong and weak nuclear forces. All you need to build a world. What about gravity she

wondered? Searching deep into her past studies she recalled that gravity was too weak for the effects between individual particles to be observable. You need a whole planet's worth of atoms all pulling together to notice gravity. Still the poster ought to mention it surely?

The next panel on the display talked about anti-matter. When she was young she'd always assumed that anti-matter was made up for Dr Who. It had been a little bit surreal to discover the stuff was real. A precise copy of every particle but with the opposite charge, and it really did blow up if brought together with normal matter. It still seemed a little too like science fiction to be true. Her thoughts were interrupted by the arrival of Carl, striding in from the hall outside.

After leaving Amber's Carl had decided to struggle into work. He hoped he could distract himself from Andreas' fate with the daily shock of seeing the great work other people around the world had produced today. He'd decided he needed a drink on arrival though. He was surprised to see the WPC absorbed by one of the Phi's posters. On hearing him enter she turned and regarded him. He looked more upright and confident than he had the previous evening. This was his territory not hers.

"Good morning," she said. She was still half distracted by the poster so took the opportunity to quiz an expert, "Anti-matter just seems to give you twice as many particles as you need."

"Oh no, you have to have them." Carl eyed the coffee machine he'd been making for across the room, wondering if he could make it before explaining - probably not. "When you study how particles move you find they are as capable of travelling backwards in time as forwards. We used to think that travelling backwards in time was silly but it isn't. Imagine a negatively charged electron sat somewhere and you choose to move it forward in time. Now take an electron at the same place and move it backwards in time. You've just undone your first move, so no charge moved through time. Except if they are different particles two things moved. If you insist on thinking only about things going forwards in time you had an electron and something identical but with precisely the opposite charge moving so that no net charge moved." WPC Thatcher watched Carl set the coffee machine going. His explanation was not what she'd been expecting and if it wasn't for his serious demeanour she would have wondered if she were being teased.

"Isn't going backwards in time forbidden?"

"Some people think information shouldn't go backwards. Here though you can always just talk about anti-particles going forwards in time so there's never a contradiction. Actually I don't see why information shouldn't go back either. People get into trouble when they think about going back in time and killing their mother. That just couldn't happen because it doesn't make any sense. The Universe would only allow examples where the time traveller consistently fits with events so that at each place and time only one thing happens logically whoever's fate you follow." WPC Thatcher wondered why

the poster presented such bald facts when all this fascinating philosophy lurked behind them.

“There was a film, Twelve Monkeys, that was like that wasn’t there?” she pondered, “A man goes back in time to find out information about a plague in the past and is killed in front of himself.”

“Yes... that was a great film.” Carl turned back after struggling with the sugar sachet. He was brought up a little short by the realization that he was chatting with a policewoman. There must be a real person under that intimidating uniform. “Why is Terry Gilliam always struggling to find money for films? They should make him a UNESCO world heritage site or something and just let him get on with it!”

WPC Thatcher smiled at such an idealist thought and offered, “Overly pampered artists become self indulgent.” Their thoughts were suddenly interrupted by a surge of noise on the WPCs radio. She had to come down to the Cathedral Green and bring a physicist to decipher what they’d found. Carl was the only physicist to hand.

Police driving was a rather serene experience since the speed limits must be carefully obeyed and the traffic around was always immaculately behaved. As WPC Thatcher drove carefully down the hill towards the centre of town, therefore, she could ponder the brief description she had been given of the flat on the Green they were heading for. A chemical laboratory could not be more at odds with the Phi Institute. Modern particle physics experiments, she recalled from her studies, were no longer the preserve of local laboratories. Vast teams of hundreds or even thousands of international workers built these experiments in a few select sites world wide (carefully chosen to massage as many political egos as possible, presumably). You needed a significant fraction of the output of a whole power station to run the equipment needed to drive particles to the high energies where the forefront of the subject resided. So what had this Born been up to?

Carl was slumped in the passenger seat musing on recent events too. His job was all about quiet, stress free thought and innovation. He decided he’d better give up on any hope of making progress on physics. He’d just have to wait while events took their course. The WPC noticed his silence and wondered what he was thinking,

“Did you remember anything over night that you might want to add to your statement?” she queried. Carl jumped slightly,

“Oh, er, yes, there was a smell of chemicals near the body.”

“I noticed that too. We may be about to find out why.” She left that hanging. “How about any disputes Andreas was involved in – with colleagues perhaps?” Carl hadn’t even considered that his death might be the result of their work. Researchers in the field may

be passionate about their theories and hypotheses but there was no money to be made on a scale worth killing for. He gave a small chuckle,

“I don’t think mathematics and murder really mix.”

“Really? I thought academia was rife with brooding grudges, plagiarism and spite? You have to remember that people commit murder over matters the rest of us would consider trivial.” She was right on all accounts reflected Carl. There were very strongly held views and animosities throughout the field and the Phi was no different. He didn’t think he was ready to point a finger at any of the staff though – it seemed so implausible.

“You’re not the biggest fan of the Phi are you? Was that comment earlier about pampering and self indulgence really aimed at us?” he asked. WPC Thatcher did a quick review of her comments. After all she wasn’t supposed to be antagonising these people. Was she perhaps displaying a chip on her shoulder based on her past? She had better smooth things a little,

“No, I’m sorry, I didn’t mean to come across that way. I think what you do is amazing, in a sense. You spend your whole lives just thinking about the way the world is. I can’t really imagine what you actually do though, it’s so very alien. That’s even though I studied Physics for a few years,” Carl glanced across at her, so perhaps she had gained some Brownie points with that. “I guess I’d just had the promotion speech from your boss Mr Montford, it was a little self righteous.” Carl laughed openly at that,

“All is forgiven, I’ve sat through it myself. The quest to split infinitives and all that? Actually I think that while that might be why *we* study physics. I’m not sure it’s why society should fund us, at least any more than it does opera. I prefer to think of us as a living library. We know and use daily all these theories that drive science and engineering.”

“You have to understand that the Phi holds a very special place in academia. It’s sort of like winning the lottery to get a permanent job there. On the contrary, most particle physicists spend much of their time teaching physics to students. Their research is only one component of their job. The students they teach go off and do a vast array of things that are really important to the economy. Police work included apparently!”

“Yes, but you’re such smart people. Is particle physics really so important? Couldn’t you be doctors working in Africa for example?” Here was a doubt Carl had often had about his choice to pursue his interests. He tried out his response, carefully constructed over a number of years.

“You have to remember that you only know that doctors are needed in Africa because of science. Airplanes, mass media, instant communication is all a relatively recent creation based on scientific discovery. The medicine they need there is all modern science too. Maintaining and improving that scientific base is the crucial first step to helping the world as a whole. In any case, I don’t think that Africa lacks smart people. It lacks

money. Probably we're better off earning a salary in the West doing anything and then giving to charities. Imagine how different the world would be if we all gave even a fifth of our earnings away?" Carl paused, a little embarrassed, "Not that I do."

"No," ruefully smiled the WPC, "none of us do. How then do you justify spending billions of pounds on your accelerator experiments?"

"I don't think a billion pounds is as much as you think. Sky pay a billion pounds to show Premiership football for a few years. The movie Titanic grossed a billion. If you want to look for savings I should try the military – they easily spend billions a day world wide."

They had turned into a small cobbled street separated from the Cathedral Green by another towering, flint wall. The WPC brought her car to halt at the curb.

An hour later, Carl was sat at a desk in Andreas' apartment in a state of slightly dazed distress. He stared distractedly at an old, knotted, length of cobweb hanging from an eave and blowing in the breeze. Two police officers were slowly working through the rooms recording and collecting evidence. Their growing bags contained chemical samples from blackened test tubes, shavings carved off the nib of a feather quill from the floor, and a growing pile of assorted papers. That Andreas had created this caricature of an alchemical laboratory was almost beyond belief. Surely this was a betrayal of the scientific worldview they were part of, thought Carl? Alchemy was an old, tried and thoroughly failed attempt to explain the world. He reflected that he was experiencing a vast magnification of the emotions he'd once felt when an undergraduate friend had suddenly, in all seriousness, pulled out a Tarot deck at a party. At least she'd been studying arts, English to be precise (and Carl would hold it against the subject forever more!).

The police at the scene had investigated sufficiently to have thrown open the windows by the time Carl and WPC Thatcher had arrived and the atmosphere was now breathable. It had been decided that Carl would be confined to the desk and asked for a first opinion of the writings around the room. WPC Thatcher had then been dispatched back to the Institute to continue taking statements. He had overheard them say that she would pick up a computer expert from the police station to trawl through the hard-drive of Andreas' computer up at the Phi.

Carl supposed it was a good sign that they let him into the crime scene. Hopefully he was not a suspect in spite of finding the body. Perhaps they were allowing him to incriminate himself though? Still, they were going to discover he had little to contribute. What he had looked at so far was weird gibberish. There were some reprints of old books with names such as *Semita Recta* and *Novum Lumen Chymicum*. There were notes in Andreas' hand on the rough pads they used at the Phi. These scribbles seemed to be quotes and shorthand versions of paragraphs taken from old texts, although he couldn't find where

they'd been copied from. Flicking his eyes over them he noted words and phrases from "Zeus", to "sophistic transmutation" to "ferment until the rede". No, this was definitely not modern science.

There were also longer tracts on what appeared to be historic, aged paper although there was such a quantity of it that it must be more modern. Most of this seemed to be written in historic German with a quill. The initials I.N. occurred frequently but Carl's German was essentially none existent. Finally, most enigmatically, there was a small modern journal, again in Andreas' hand, full of paragraphs of apparently entirely random letters. Each paragraph was separated by a string of numbers.

An exclamation of discovery from one of the police officers in the next room distracted Carl and he peered round the door to see what was going on. The officer was kneeling by the cream painted fireplace an arm extended up the chimney flue. The other officer was moving over.

"Secret shelf into the back of the mantel," said the first officer concentrating on gently exploring with his fingers. "It seems pretty old... here we go... plastic bag of powder!"

"I'm buying the beers if it's smack, you if it's Charlie," proposed the second officer. The first withdrew his hand and displayed a small bag of white powder. "Oh bad luck you loose," grinned his partner. They suddenly became aware of Carl's horrified gaze and exchanged looks.

"You're supposed to be reading mate," instructed the officer with the drugs, "and you should bag this," he proposed to his partner.