

## Chapter Nineteen

There was a brief pause while Morris Trant digested WPC Thatcher's accusation of withholding information. In the end he reposted with a show of humility,

"It's difficult to wilfully incriminate one's self," he ruefully admitted. The WPC had been charmed by Prof Trant's gentle but authoritative manner, as in her previous meetings with him, and she had felt a little guilty about challenging him. The job demanded it though, she reminded herself. He gave a brief explanation of his past interaction with Andreas that he had previously omitted,

"I'm probably old fashioned but I get rather frustrated with theorists who spend their time continually trying to guess the future. To justify their work they must come up with more and more radical extrapolations from what we know. It seems to me that a degree of sense is lost and the ideas become so implausible as to be ridiculous. They argue that they drive our experimental colleagues to search wider for new phenomena and I suppose that's true. Sometimes my conservative irritability overflows though." He seemed genuinely sad at his own failings.

"Well, anyway, Andreas presented a seminar on using gravity to explain aspects of the weak force. Now gravity is such a feeble force that it plays no role in particle physics. It is a force as a result of the energy two bodies have. To make the gravitational force between two electrons as powerful as their electric repulsion would require them to have an energy a million, million, million times higher than we have ever endowed one with. Gravity does not have anything to do with what we study. That doesn't stop my string theory colleagues studying theories of gravity of course. They hope to bend their theories so that they do become relevant to what we do – you'll have to speak to them if you want to know the details. This is just one of those implausible ideas it seems to me – an old man stuck in his ways perhaps. In that seminar all this boiled up and I let Andreas know what I think, then stalked out. Childish I fear. I apologised to him later." The WPC considered her point made, having forced him to own up to the incident. She had become interested in the wide variety of views within the field though,

"You expect the Higgs mechanism to generate the particle masses then?" Trant grimaced a little,

"I don't know, probably not. You see generating mass is not so hard. Do you know where the mass in your body comes from for example?" The WPC groped for an answer but Trant intervened apparently wishing to save her embarrassment,

"An indelicate question to ask a lady, I apologise. What I meant was that protons and neutrons are what give atoms mass." The WPC was keen to assert that she knew something of what they were talking about,

"Their mass comes from the quarks they're made of I presume."

“Ah, it’s not so simple. An up or a down quark is very light, little heavier than an electron. They gain extra mass from the strong nuclear force. The strong force is quite remarkable in that it becomes stronger as two quarks are separated. Compare that to an electric charge, which you could take to another galaxy and forget about!”

“So that’s why quarks are stuck in protons and neutrons?” questioned the WPC. “If you try to pull one out it just gets sucked back in?”

“Yes, precisely! That means that quarks are very strongly bound together or equivalently that you get a lot of energy out from pairing quarks together.” The WPC frowned at that so he added, “Think about what happens in a hot gas – as it cools electrons are attracted closer in to the nucleus of their atoms, where they want to be, and in doing so they emit energy as light or infra-red radiation. So binding things together gives you energy.” The WPC nodded unsure where they were heading.

“Now when you bind a quark and an anti-quark, because the strong nuclear force is so strong, the energy you get out is greater than the energy it cost you to make the quarks. So the Universe can create quark pairs like mad. It does! Remarkably the whole of space is very densely packed with quarks.”

“Why aren’t there an infinite number if they’re for free?” interrupted the WPC.

“Ah good question! The strong force becomes stronger if quarks are separated but weaker as they approach one another. If you create too many then they are all packed in so tight that there is no binding force and no energy back. So there’s a compromise.”

“How dense are they in space then?” This made Trant smile, pleased with what he was about to reveal,

“As dense as an atomic nucleus, my dear!” he waved his hand in front of him as if to emphasise the ridiculousness of his claim that this space was denser than lead. The WPC raised her eyebrows, she wasn’t going to walk into the trap of telling him this was impossible when he knew more. As she suspected he couldn’t resist explaining in any case,

“The protons in your body are heavy because they have to move through this super dense medium of quarks. They keep banging into them and that interaction generates the energy that makes the proton’s mass.” The WPC thought she saw the chance to wrap up the discussion,

“So you think these quarks in space are responsible for the W and Z masses then?”

“Alas, no, they are not dense enough to generate such big masses. The W mass is eighty times greater than a proton’s mass. But one can repeat the idea! There would be new, as yet undiscovered, quark-like particles with a new even stronger force.”

“Inventing a whole new sector sounds pretty ambitious too, doesn’t it?” Trant smiled accepting the point,

“A new sector but a repeat of already discovered physics. In a sense it is just the Higgs mechanism – the quark anti-quark pairs are the Higgs, but the Higgs is not fundamental since it is made of the sorts of particles we’re familiar with. The conservative solution!” Perhaps, thought the WPC.

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Rather comically, the dress code at the Phi Institute had turned to formal shirt, trousers and shoes for the afternoon. To a man the researchers had discarded their jackets and ties, although few of them looked comfortable even so. Carl had not made it back inside the building. He was tired, distracted and two pints the worse for wear. It was almost the end of the day anyway. Trying to work seemed a forlorn hope so instead he’d ambled off around the grounds.

Sasha was one unsolvable problem. He had pretty much given up hope by this stage. What was he going to say tomorrow? Georgina Montford must be back up the hill at her house by now. Tempting images of flesh and lingerie flitted through his mind. If Sasha was past history, why shouldn’t he take Georgina up on her offer? His pulse quickened at the daring thought and half tempted he took a few steps towards the path by the lake. Any hope of arguing to Sasha he had acted impulsively would be dead and buried, though. His self respect seemed to be against it too. He veered back along the lake side.

Another thought competing to rise to the surface of his consciousness was Cyril Hayhurst’s observation that if Andreas had a book by Newton it must still be in the flat on the Green. The idea was growing more plausible to Carl. Did he truly believe there was a real book and not just forgeries? Yes, or was he trying to write an apologist’s history for Andreas? He realized that he still had the key to the flat – the WPC must have forgotten to ask him for it back. To find something the police search team had missed would be exciting. He’d better wait until the evening so there wouldn’t be any police there. In fact perhaps he should quietly disappear right now before the WPC came looking for the key. He glanced around guiltily – there was no sign of her. Feeling a little like a naughty child he headed for the road home, his amble now increased to a purposeful walk.

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Only the faint acrid smell of chemicals remained in the flat to indicate its previous state. The police had cleared the rooms completely; presumably Andreas’ parents would be taking his possessions home with them. The rough plastered walls with their patchy off white coating and the bare, chipped, wooden floor boards made the place stark and slightly creepy. There was almost sufficient light from the illuminated cathedral across the Green but Carl flicked the light switch and the bare bulb in the middle of the ceiling sprang on, over bright. You needed to be able to see to search.

What though was there left for him to search? He had envisaged tapping on desk drawers looking for hidden compartments or feeling under the base of a wardrobe. If the fabled book was in any of those places though, it was now beyond Carl's reach. There was a set of cupboards under the sink in the kitchen and he ran his hand around inside, pulling on every edge or wood knot. There were holes round the piping into the skirting but poking his fingers in produced only dead spiders and greasy grime.

The chance of there being a second hidey hole up the chimney seemed low but he arched himself up into the dank space. The shelf the police had found was ideally sized to store a book but he'd know if there had been one there, having seen the police locate it. It seemed to have been plastered over and only recently broken into; the edges of the plaster around the niche were still sharp. He couldn't induce any other bricks to shift or hear any sound of further holes behind the plaster when he gently rapped.

Loose floor boards? He had brought a screw driver with him to try to pry up boards. This had seemed a likely possibility but as he worked across the floor his enthusiasm waned. They were all secured down by long, solid iron nails that the wood had swollen round and damp had half rusted. None of them shifted even a fraction of an inch. He sat on the floorboards under the light bulb and surveyed the flat disconsolately. It had probably been foolish to think the police would have overlooked something anyway.

One last surge of defiance rose within him. If he had a book and had to hide it here in these barren rooms, where would he put it? Above people's line of sight was a standard good trick. There was no loft hatch though and the curtain rails were thin reeds of wood. Presumably the loft was accessed from the main building below, or more likely had been done away with when this apartment had been built. So there would just be narrow spaces under the roof tiles above. Suddenly he remembered looking out of the window a previous time and the hatch-work of wooden struts supporting the eaves. You could certainly reach up and tuck a book away amongst those he thought excitedly.

He tried the window he had peered from before. The other in the main room had been hard to access behind a worktop and the glassware and chemicals it had supported before the room was cleared. He had to sit up on the window ledge and half lean out. Three stories down looked much further to fall from above than below but he could hang onto the window frame securely enough. Reaching up between the struts of the roofing there was indeed a decent hole protected by the slates. He reached his arm up through several different holes before his fingers bumped a soft package. Grasping it, he realized, with astonishment, that it was indeed a book covered in a thin, soft, leather covering. He drew it gently out from its hiding place and retreated back inside.

Carl sat cross legged on the floor and surveyed his find with a grin. The loose leather wrapping looked old and stained. There were white streaks that reminded Carl of the plaster around the fireplace niche. Could Andreas really have just found the thing hidden in the fireplace when looking for a place to stash his drugs? It didn't seem to have been good luck though, Carl reflected. Unwrapping the cloth revealed a thin, plain book

roughly the size of a normal pad. It had a brown leather binding. That library smell of old paper rose from the book.

The paper within was thin and coarse. It looked like there were roughly eighty pages. The content was hand written notes in black ink, each page showing a shadow of the words on its back. The title page read

*Isacus Newton*

*Trin: Coll Cambridge 4<sup>th</sup> March 1691*

Carl stared at the page for several moments astonished to be holding such a thing. The hand writing, Newton's hand writing, was fairly modern he observed. The capitals and the tails of letters were adorned with a slight heraldic flourish but it was very readable.

Gingerly turning the page revealed a mass of notes. There was a slight orange stain on the margin which looked chemical rather than mould. Carl realized this would be harder to decipher. There were words

*... gave a substance with a pit hemispherical and wrought with a net like hollow work...*

But also mixed in were an array of symbols. Male and female symbols he knew, but curly fours and calligraphic Rs in strings were a mystery. The bottom of the page had a section bracketed off by a strong pen stroke across the page and down its side

*A sea colour*

*Take privet berries when the sun entreth into Libra, about the 13<sup>th</sup> of September, dry them in the sunn; then bruise them and steppe them in Allum water, & strain them into an earthen porringer that is glazed.*

Maybe that was for an ink colour, wondered Carl? He flicked on through the pages of dense notes just enjoying the sense of discovery and the history that breathed out of the pages. After several minutes it dawned on him that perhaps he should be wearing gloves to avoid damaging the pages. Or had he read that gloves were even more damaging than fingers and were only used by librarians because of a sales scam? In any case, an historian would probably lynch him for what he was doing. Andreas must have been working through the text in detail though, doing far more harm as he repeated experiments. The tome seemed basically intact nevertheless. He remembered the tens of thousands of pounds, black market offer they had had for this book and decided to place it back in its cover.

What then should he do with it? The goal had been to find the book to uncover another clue as to Andreas' thinking. Should he give it to the police, or Andreas' family, or was it his since he'd found it? If it had been found in this flat maybe it belonged to the landlord? He sincerely hoped the absence of proof of its origins would preclude the latter. Well, he

wasn't going to leave it here so he'd better take it home with him to decide. He placed the book securely in his satchel with the screwdriver.

He climbed to his feet, switched off the main light and clattered down the narrow stairs onto the street below. He still couldn't believe this venture had turned out so perfectly. He turned the key in the lock. Suddenly a sense of déjà vu hit him - a shadow behind, a crunch of gravel under foot. In horror he realized he'd walked like some innocent lamb into the same trap as the previous night. This time a heavy bar smashed across the back of his head and as he lost consciousness with his only thought - I can't believe I gave him a practice run!