THE ISOTOPE MAN

THE LIFE AND WORK OF THE

CLIMATE SCIENTIST

NICK SHACKLETON

By Richard Corfield

Chapter 1. The Fenland Tardis

Cambridge is a strange University town. The college's enclose serene, lawned quadrangles from whose surrounding cloisters the bells still mournfully toll, calling Dons and students to meals or matins as they have done since time immemorial.

Many of the colleges are built of stone that has been transported from the same quarries that Oxford used to build its colleges. This reflects two things – first that Cambridge was founded by Dons from Oxford who wanted things as much as possible like the town that they had

left, and the second is that Cambridgeshire has no native stone of its own - a fact that shall attain significance as our tale unfolds.

But Cambridge is not just about its colleges, it is world-renowned for the quality of its science. Here Isaac Newton laid the foundations of orbital mechanics, here Rutherford performed the research that led to atomic physics, here the structure of DNA was discovered and here is where the importance of the greenhouse effect in influencing climate change was confirmed.

In the 1980s Cambridge's science areas – where research and teaching occurs into what Cambridge still pleases to call 'the Natural Sciences' – have been shoe-horned into a city already bursting at the seams. Development has already started on Greenfield sites to the west of the city because Cambridge is hyper-compressed, its ancient buildings sitting cheek-by-jowl with more modern blocks. It is an architect's bad-acid trip. Yet there is something almost glorious at the indifference with which the University has been thrown together – as though any thought of the harmony of form has been summarily sacrificed on the altar of scientific function.

All of which brings us to the New Museums site, on the right as you head down Downing Street (no, not that Downing Street) towards the Fitzwilliam Museum and King's Parade. Hidden in a corner of the New Museum's site - almost underneath the massive concrete pillars supporting the Department of Materials Science - is a small Brownstone

building so nondescript that it is almost eclipsed by the glittering 1960's monstrosities around it.

Opposite the brownstone, even more bizarrely, is a dilapidated (to put it charitably) hut that must have been considered temporary when it is constructed at least forty years before. It is full of rusting bikes and old gas cylinders. It was part of the original Cavendish Laboratory and is none other that the suite of rooms where Watson and Crick discovered the structure of DNA and built their first model of it.

But to return to the nondescript building. A sign on the door proclaims 'Exam Schools', another reads 'University of Cambridge Audio Visual Aids Unit' and in small letters beneath that is a sign saying 'Sub Department of Quaternary Research - Godwin Laboratory'.

Enter the unprepossessing door with its sagging wire mail-cage and you find yourself in a grey painted hallway lined with coat-hangers. At the far end of the hallway is a door saying 'Exam Schools' and beyond is another large, grey painted room where generations of candidates have sweated their way through questions in the Sub-Fusc which - in the 1980's – was still a formal requirement for sitting exams within the University of Cambridge.

But straight ahead is another set of doors. Pass through them and you have a choice – to your left another sign directs you to the 'AVA Unit'. Stairs lead up and into comforting dimness.

But in front of you… Well, this is a different story. A set of four heavy doors arranged as an airlock. There is a red light above the doors and a prominent sign:

WARNING!

You are now entering a Low Radiation Area

Crikey! You've wandered onto the set of a Michael Crichton movie. Low radiation? Low compared to what? Low compared to a dental X-Ray? Low compared to the forests around Chernobyl?

Low compared to the interior of the reactor vessel at Three Mile Island?

This, you think, cannot be good.

But, screw your courage to the sticking point and ignore the fact that your family-allowance is trying to crawl back into your abdomen. Step though the first set of double doors and you are in the shadowy confines of the airlock. Underfoot is a mat that feels tacky. It is there to remove as much of the outside world as possible from your shoes - or sandals, should you favour them - before you enter the inner sanctums of this, the Godwin Lab.

Through the armoured glass portholes in the inner set of airlock doors a long, harshly lit corridor with rooms opening off to right and left stretches to a neon-lit vanishing point. The corridor ends in a series of cabinets that even at this distance you can see are full of white

powder. The Godwin Lab looks like a cross between a submarine and a crack dealer's warehouse.

Opening the inner door the first thing that hits you is the noise. A ceaseless susurration that beats remorselessly against your ears like a billion sleepers in the world's biggest dormitory.

Step in, look left. An ordinary tea-room; large white table, a dozen chairs arranged about it. A fridge, kettle, coffee maker. Old pictures torn from calendars blue-tacked to the glossy white walls. Scenes of pastoral harmony, English meadow-scapes, the Rocky Mountains, Alaskan glaciers, the Namibian desert. All unutterably normal, except, no windows. Nothing to alleviate the merciless glare of the omnipresent, overhead fluorescent lighting.

Back in the corridor, look right and suddenly you're onboard Dr Who's Tardis, circa 1965. An incomprehensible tangle of glass-and-metal pipe work. Spirals of glass, U-bends of glass, H. R. Giger-ish spaghetti-junctions of glass, yellow-stoppered vials of glass arranged on waist high benches that line the sides and dominate the middle of the room.

Stainless steel beakers weep listless vapour that pools strangely on the benches before dropping vertically to the blue linoleum floor. A room beyond, same deal, another nightmare tangle of bent glass. What is this place? And where is William Hartnell?

Then, the next set of facing doors down the corridor: to the left a workshop with a hulking silver cylinder in it which weeps its own menacing miasma of white vapour, opposite this another room full of glass and steel. Further on and you are in the middle of the ten-roomed block. To the left, an office space, benches and desks, mercifully unthreatening.

To your right double doors open onto a darkened room in the centre of which hulks something that looks superficially like a furnace. It is only when you get closer that you realise that it is a carefully arranged pile of lead bricks; it must weigh several tons, and even as you realise that the floor must have been reinforced to support it, all of a sudden you find yourself remembering two things: the reactor pile on the Chicago Tennis Court where Enrico Fermi and friends loosed the world's first nuclear chain reaction, and the radiation warning sign on the outer door to this place. Amazingly, you don't want to be in that room anymore.

The next set of doors; to the left, a room full of desks with benches on which are arrayed binocular microscopes. Opposite is a cluttered, unremarkable office with a single desk.

And then at the end of the corridor on the left, the source of the strange noise – and you realise that you are at the heart of whatever enterprise goes on in this bizarre place. The room here is actually the last two rooms joined together. Yet the sense of space is offset by the beasts that hulk within. Two large silver, cream and green boxes with

tubes of glass and metal, thick braids of heavily insulated wire sprouting from them and atop each a heavy block of metal that it takes you a couple of seconds to recognise as the largest magnets that you have ever seen. The two machines hiss and clank to themselves and pumps start up and shut down. Small tubes of stainless steel suddenly start trailing more of those uncanny wisps of visible vapour and within seconds they are covered in frost. This is the inner sanctum, an alchemist's abode of unspecified purpose. It is simultaneously exhilarating, bewildering and frightening.

These last two rooms on the left hand side of the Godwin lab are the heart of the enterprise and the machines housed therein are the Mass Spectrometers - machines that weigh atoms. Opposite the twin-roomed end lab is another office where a small group of desks are used for visiting academics but it is the penultimate door on the right that is this place's nerve centre. The entrance is completely blocked by a massive bookcase. You cannot see inside from the corridor and to gain entrance you have to turn sharp right and then left. Cold white light spills round the edges of the book case like backlighting from an episode of the X-Files.

The occupant is clearly someone who values his privacy.

But summon your nerve and step inside. A room with a desk, a microscope and wall lined with a series of huge blue volumes that are so heavy that the inch-thick shelves they stand on sag under their

combined weight. And opposite these a bench covered in a snow drift – a stratigraphy - of computer printout.

This is the lair of the Godwin Lab's most famous alumnus: Dr Nick Shackleton as he is then.

Stardate: October 1986.

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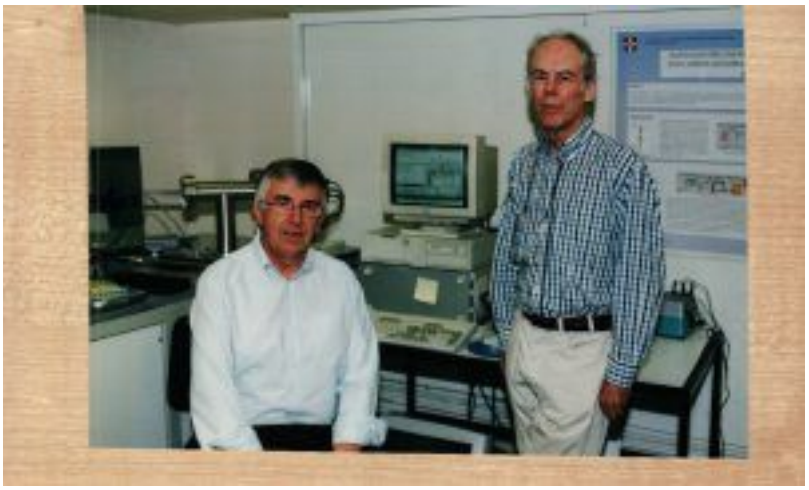
I had been sitting in my lab - the one with the desks and the microscopes just up from the first mass spec lab – and decided to go and see what is happening with 'the machines' - for that is how we routinely referred to the mass specs. I wandered past them, listening to them hissing and clicking to themselves as the samples were eaten by the orthophosphoric acid and turned into clean, dry, carbon dioxide gas in preparation for their long, one-way race down the flight tube. At the far end, after they have been subjected to four thousand volts of accelerating voltage and magnetic fields strong enough to stop the Incredible Hulk's pacemaker, they will collide with the ion detectors. Their minute subatomic signatures will there be captured by amplifiers that would make Pink Floyd weep tears of envy as their signal is multiplied a trillion fold.



I nod affably to Mike Hall - Nick's Vicar on Earth – who is tending one of the machines and wander into the end lab - the one where the walls are lined with countless thousands of tiny bottles filled with white powder; the foraminifera that we use to reconstruct the history of the oceans. Working quietly at the computer there is a visitor to lab – Shackleton has frequent visitors - this one by the slightly Italianate name Nick Pisias. Pisias is an expert with the Cambridge mainframe that hulks in a separate building in the computing centre on the other side of the DNA bike sheds.

Pisias is an enigma. Strangely ageless yet already a full professor at Oregon State University. He has a floppy halo of jet back hair and is stocky – just as you might imagine a Sicilian Mafia Boss to be. If they make a movie about him I would not be surprised to see him played by James Caan. The other thing that makes Nick Pisias notable is his seemingless insatiable appetite for industrial quantities of black coffee. How he sleeps at night is a mystery to me. He must be permanently wired.

But there is no denying his talent.

Pisias is a member of the new breed of geologists that my PhD advisor – Nick Shackleton – has pioneered. But whereas Shackleton had forged his new earth science out of a melding of geology and physics, Pisias had forged his out of a melding of geology and mathematics.

Over the preceding many months Shackleton has picked many thousands of tiny, single-celled organisms from the washed core samples that line the walls of the lab and Mike Hall had run them through his machines generating precise measurements of the weight of the creature's component atoms. The amount of data generated is enormous – the largest of its type ever assembled at that time - and Pisias, the maths wizard, has come to crunch the numbers and try and reduce it into some kind of statistical sense.

The data that Pisias is analysing are proxy measurements of temperature and carbon dioxide in the atmosphere of the equatorial Pacific (from a core named V19-30) spanning the last 150,000 years of Earth history. In other words they encompasses the whole of the last glacial and interglacial cycle and a bit more besides. It is this existence of a continuous section of the two vital proxies for the greenhouse effect – a section with no breaks as far as anyone could see, and they have looked hard for them - that makes V19-30 special.

Pisias is not at his terminal. The green cursor blinking weakly against an incomprehensible background of figures and matrices looks like a pulse on a life support machine begging to be switched off.

At that moment, a whooshing noise; always the sign that Nick is exiting his office as the sliding door hisses backwards on its runner. A slap of sandal leather on the linoleum floor and the Boss is among us, wispy brown hair hanging around his jaw, spectacular sideburns like two vertical moustaches on either side of his thin, ascetic face and his baggy brown Afghan sweater swirling about his waist like the poncho in a Clint Eastwood movie.

His excited arrival in the lab – a kid on Christmas morning - is succeeded by the measured tread of the unemotional Pisias. Nick Shackleton looks at the data on the screen, nods to himself in silent confirmation and has a whispered word with Mike. Then, without a word to the rest of us, he is slinging his battered carpet bag over his shoulder and, like Elvis, is leaving the building. I watch as the two disappear down the corridor in the direction of the airlock. I cannot help but notice that Nick – my supervisor - is skipping.

I raise an enquiring eyebrow at Mike. “Off to The Vaults,” he says laconically, “for champagne. They’ve cracked it.”

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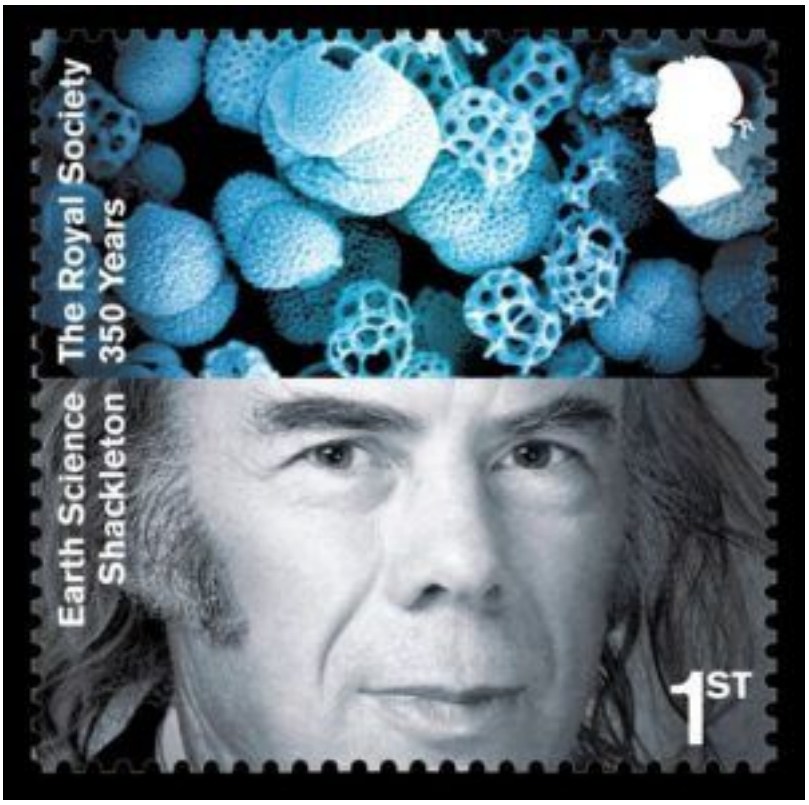
The Royal Society
350 Years
Earth Science
Shackleton
1ST