AFTERGLOW OF CREATION

From the fireball to the discovery of the axis of evil

Marcus Chown, Faber & Faber

- Foreword -

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It's the oldest fossil in creation

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It carries with it a 'baby photo' of the Universe

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It accounts for 99.9 % of all the light in the Universe

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It's in the air around you - even in the room where you are now

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Its discoverers mistook it for the 'glow' of pigeon droppings (yet still carried off the Nobel prize)

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Afterglow of Creation was first published in 1993. It tells the story of the left-over heat of the big bang. Remarkably, it is still all around us today. Turn on your TV and tune it between the stations. One per cent of the static on your screen is the afterglow of the big bang. Before being intercepted by your TV aerial, it had been travelling across space for 13.7 billion years, and the very last thing it touched was the fireball of the big bang.

Afterglow of Creation tells the story of the people involved in the discovery of the afterglow of the big bang - the biggest cosmological discovery of the past century - and of the imaging of the afterglow by NASA's Cosmic Background Explorer (COBE) satellite in 1992. The trigger for the book, in fact, was COBE's extraordinary "baby photo" of the Universe. Stephen Hawking called it "the discovery of the century, if not of all time". But it was when COBE scientist George Smoot referred to is as "like seeing the face of God" that all hell broke loose. The story was splashed over newspapers and TV screens across the world and Smoot reportedly received an advance for $2 million for a book which later became *Wrinkles in Time.*

That's where I came in. Working as science news editor at *New Scientist* in London, I followed the story. I also knew a bit about the big bang radiation from my university days. When a colleague at the magazine

said to me - Why don't you do a book about it? – I thought "Yeah, I could try that". So I put together a 2-page outline and sent it out. Publisher after publisher rejected it. Until finally it fell on the desk of Neil Belton at Jonathan Cape, who said: "Great, why don't you do it?" (for considerably less than $2 million, I should add).

That was when I got a tight knot in my stomach. I had never written a popular science book before. I had said 'I could' without knowing I could. I didn't even know half the story. I would have to go and talk to the people at NASA who worked on COBE and hope I would be able to get all I needed. Then I would have to sit down and write something coherent, comprehensible, chatty, engaging. Something longer than anything I had written before. Could I pull it off?

I met the deadline – just. And, when the book came out, lots of wonderful things happened. For instance, the magazine *Focus* bought 200,000 copies and cover-mounted them as a reader promotion. That probably made *Afterglow of Creation* the most-read (though not the *most-sold*) popular science book after Hawking's *A Brief History of Time*. In addition, the book was runner-up for the Rhône-Poulenc Science Book Prize.

The events of 1992 are a long time ago now. However, *Afterglow of Creation* remains the only account of the discovery of the afterglow of the big bang in the words of the discoverers. I talked to all of the players, some of whom are now dead, so the book is a unique text on a key chapter in the history of science.

But, more than this, the subject matter remains extremely topical. Not only is the afterglow of creation still yielding its secrets but two of COBE's scientists, John Mather and George Smoot, won the 2006 Nobel Prize. It was time to produce an updated edition, I thought. And, Faber & Faber, my current publisher, agreed. It is fitting that Neil Belton, who commissioned the book at Jonathan Cape and who is such a good editor I have become his stalker, is now head of non-fiction at Faber.

A tremendous amount has happened since the book's publication and I have added material on the two most important recent developments - the launch in 2001 of COBE's successor, NASA's "Wilkinson Microwave Anisotropy" (WMAP) probe, and the discovery of the biggest mass component of the Universe in 1998. This "dark energy" is invisible, fills all of space and its repulsive gravity is speeding up the expansion of the Universe. Nobody knows what it is.

WMAP has ushered in the age of precision cosmology, discovering among other things that that the Universe is precisely 13.7 billion years old and only 2 per cent of the Universe is visible (23 per cent is invisible "dark matter" and 73 per cent invisible "dark energy" and astronomers have seen only half the rest). In addition, and intriguingly, there are peculiar anomalies in the big bang afterglow, which could conceivably be evidence that our Universe once collided with another universe.

Afterglow of Creation is dedicated to my dad and, by a peculiar coincidence, I find myself writing the foreword to this updated edition on the 10th anniversary of his death. I'd been wondering for a while what to do today to mark the anniversary and what better way than to write about my dad.

It was my dad who bought me *Dr H. C. King's Book of Astronomy* for Christmas when I was eight. It was my dad who got me out of bed to see the Moon landings on TV. It was my dad who bought me a small telescope, which I poked out of the window of our upstairs flat in North London, squinting at the jittery images of the crescent of Venus and the rings of Saturn above the shimmering orange haze of the North Circular Road. Why did my dad buy me that book on astronomy, which sparked a life-long

passion for the stars? It's one of those questions I wish I had asked while I had the chance.

Another mystery is my dad's enormous - at times, almost ridiculous - faith in me. On one occasion, when I told him about a friend who had won a science book prize, his immediate response was: "*You* should have won that prize, Marc."

"But I didn't enter for it, dad."

"You're much better than him, Marc."

"But I didn't even write a book this year that was eligible."

"I'm telling you, Marc, they should have given *you* that prize."

"But, dad..."

In the end I gave up arguing. There was no dissuading from his view that I had been scandalously overlooked.

Whatever I did, it seemed, my dad assumed I would be brilliant at it. When I went to Caltech in Pasadena, my dad knew I would win the Nobel Prize for Physics and run the NASA space programme. When I abandoned research and returned to England to try and be a journalist, he assumed I would win the Pulitzer Prize. The thing I marvel at and, to this day, still have

trouble getting my head around, is that, for some reason, my dad believed I could do *anything*.

For most of my life, when my dad's faith was always there, like the air I breathed, I hardly noticed it. I didn't take it seriously enough to notice it. Now that he is gone - and isn't it always the way? - I notice it and wonder: Where in the world did his unshakeable belief come from? Since it was there from day one, when I was a blank slate, a mere pink blob, all I can think is that he must have seen in me something which was in himself.

Dad was born on Coldfall Estate, a sprawling council estate in Muswell Hill, a suburb on the northern outskirts of London. This in itself restricted the possibilities open to him. Those possibilities were further limited by the year of his birth: 1934. Although luckier than his contemporaries, born in Berlin and Stalingrad, he was still a victim of the Second World War, which broke out as he stepped over the threshold of Coldfall School for the first time.

The obvious way the war affected education was through the German air raids, which interrupted schooling. But a more subtle effect was that it took away all the young, vibrant teachers, conscripted to fight if they were men or sent off to work in factories or on the land if they were women. Their places were filled by impossibly ancient teachers, brought out of retirement

to meet the national emergency - teachers the children played up something rotten.

Things got better with the end of the war and the return of a younger generation. But there was no getting away from the fundamental limitations of Coldfall School, a one-size-fits-all establishment, which children attended continuously from 5 to 15. It was not a bad school but neither was it an aspirational school. For a girl, the pinnacle of expectation was a place at secretarial college; for a boy, a light engineering apprenticeship, with day-release to study for a vocational qualification at a technical college. On his 15th birthday, dad left for an apprenticeship at the Post Office.

I ought to know what he did there. But it's another one of the things I paid only passing attention to when ever he mentioned it, never once thinking that the day would come when I would be hungry for information about his life. I have a vague recollection that he serviced teleprinters. Certainly, it would explain why, on his 18th birthday, when the call-up for National Service came, he was assigned to the Royal Signals. And it is National Service that is the key, I think, to understanding my dad's extraordinary belief in me.

It was a profound, horizon-expanding experience, comparable in many way to university for me - though I was spared having to "wade through muck and bullets" (my dad's phrase, not mine). Throughout the war, it had been impossible even to visit the British seaside. Now dad was actually on a plane - a novel experience in 1952 - flying out across the blue Mediterranean to Cyprus. But it was not the foreign places he saw that had the most profound effect on him but the people he mixed with.

It is a truism of course that National Service was the great leveller, throwing together people from all backgrounds and all walks of life. But that isn't to downplay the effect it had. For the first time, dad met people who had actually been to university - something utterly unheard of for boys of his class and background. And what he learned, first on the gruelling 6-weeks' basic training course at Catterick in Yorkshire, then at a radio listening post at Episkopi, was that he was not stupid. Far from it. When it came to taking down morse, he was one of only a handful of operators able to record it at the very fastest rate.

Almost certainly, it reinforced something he already knew. As a boy, he had read voraciously - adventure classics like *Treasure Island*, *The 39 Steps* and *King Solomon's Mines*. Furthermore, he knew that his own father,

though merely a painter and decorator for Hornsey Council, was quick-witted. According to a family story, he had actually passed an entrance exam for a "minor public school", though, for obscure reasons, possibly to do with money, he'd never actually taken up his place. But for his own accident of birth - not to mention the years he spent in the trenches on the Western Front - his father would have done much more with his life.

For dad, I believe, National Service was a confidence booster. He discovered, or had confirmed, that he had a brain. Growing up in a working class family in the austere, post-war 1950s, he simply did not have the opportunity to do anything with it.

But his son and daughter might.

I came into the world during a heat wave in June 1959. For the first six months of my life, my parents lived in squalid conditions in one room in a terraced house in East Finchley. When the new MP for Finchley started regular "surgeries", my parents went along in the hope she might help them find somewhere better to live. She did. Three weeks later, they received a letter offering them a 2-bedroom flat on a relatively modern estate. "This is my first success as MP," read the letter. It was signed, Margaret Thatcher.

Luck, which had not been on my dad's side, was very much on mine. The Borough of Barnet, on the affluent northern outskirts of London, had good schools and my parents had an acute understanding of just what they had missed by leaving school at 15 in order to bring in money to their families. They encouraged me and my sister in all we did, took us to libraries, bought us books.

As I started school in the mid-sixties, unbeknown to me Britain's universities were undergoing an unprecedented expansion. Whereas previously only a fortunate few from ordinary backgrounds had won scholarships to universities, now it was possible for large numbers to go. As I progressed through the education system, doors continually opened up before me, which I stepped through without even noticing they were there.

I went to university - the first from my family - followed by my sister. I did well, graduated and went to do a PhD at Caltech, where I was taught by Nobel prizewinners like Richard Feynman who, while my dad had collected shrapnel from the doodlebugs raining down on London, had helped build the first atomic bomb in the desert of the New Mexico.

I see now, I think, why my dad had so much faith in me. He knew himself, knew what he could have done if he had been born at a different

place at a different time. And it was not just knowledge of himself, it was knowledge of his own father - my grandfather, who had survived the Somme, and Russia in 1919. My dad's potential was unrealised because of the accident of where and when he was born. I was able to realise my potential for exactly the same reason.

Afterglow of Creation was my first popular science book and I have written five more since in addition to other books, including children's fiction. I have been able to do what generations of my family before me were unable to do. I have had the opportunities my parents and grandparents never had. And for that I am extremely grateful.

My dad did not see a lot of the success I have had but, actually, it does not matter. He did not need to see it. He always *knew*. He had *faith*. "You wanna punch out a bestseller, Marc," I remember my dad saying to me over a mug of coffee at our kitchen table.

"But, dad..." I protested. At the time, I was struggling to finish a book, which was already several years behind its delivery date, so I was mildly infuriated.

"No, I'm telling you, Marc", my dad repeated as if he was imparting a piece of valuable advice, as if writing a book that sells a million copies

requires no more than putting your head down for an afternoon’s solid application, "you wanna punch out a bestseller."

My dad died 10 years ago but I still carry his faith in me around with me. And there have been times when I have felt he is still looking out for me. A few days before a book signing at London’s Science Museum, the phone rang and it was my then editor. The week before, knowing the book had been selling well, I'd said to her: "You do have enough books for the signing, don't you?"

"Yes, don't worry, we've got plenty in the warehouse."

I picked up the phone. "I'm really sorry", my editor said, "I've just checked and there aren't any books in the warehouse. We'll scrabble around the office and see what we can find."

"What! But can't you print some more?"

"Sorry, not until we get a big order."

"Well, when's that going to happen?" I asked, knowing as I put the phone down that it was never going to happen before the book signing.

"Fuck!" I thought. "Fuck. Fuck. Fuck!"

Later that afternoon, my editor rang again. "What?" I said, still annoyed.

"You'll never believe this. We haven't had any big orders for months and, out of the blue, we've just had two!"

I looked up at the clock. It was two years to the hour since my dad had died.

The book signing was a success. Afterwards, my wife, Karen and I, were driving back to Worcestershire, where we lived at the time. It was in the early hours of the morning and we were on a deserted road between Moreton-in-Marsh and Broadway. Suddenly, in front of us a fireball streaked down the sky and split into two. We looked at each other. "It's your dad," said Karen. "It's like Superman. He's saying: ‘Bye for now. Until you need me again!’"

Marcus Chown, Hyde Park, London, 2 May 2009.