Science is thrilling – except in our schools

Johann Hari · *The Independent*, 3 July 2008

In a moment, I am going to say some words, and I want to know if you begin to drift into a coma. The periodic table. Bunsen burner. Photosynthesis. Eyelids heavy yet? Teat pipette. Petri dishes of mould. Magnezzzzzzzium.

Wake up! It is exactly 150 years since a British scientist published perhaps the greatest insight of any human so far: you, me and everyone we know are sophisticated apes, thrown up by millennia of blind evolution. Armed only with his grey matter, Darwin forced us to rethink everything we thought we knew. It is still thrilling, and strange, and stunning. Yet today, potential little Darwins and Hawkings and Dawkinses across Britain – and most of the rich world – are being bored out of science.

In British universities, more than 31 per cent of all places in chemistry and 40 per cent of all places in physics have been dumped in just a decade. The pool of science teachers is drying up: every year, we lose 26 per cent more physics teachers than we recruit. And it gets worse. The way science is served up – icy and lifeless – by the teachers who remain suffocates all interest in the subject. Ofsted recently warned: "Science is a fascinating subject, yet many pupils are becoming bored and demotivated because of the way it is taught."

I know: it happened to me. At primary school I found science – exploring how things work and mix and grow – fascinating. But at secondary school, I banged my head into a subject dominated by the rote-memorising of decontextualised information. I could have been reciting the winners of the Eurovision Song Contest for all I knew. I began to associate this choking boredom with all science. It was only much later, taking some papers in experimental psychology at university, that I discovered science can be an adrenaline-surging attempt to answer the great questions: How did we get here? Why is the world the way it is? Where are we going?

You can glimpse how badly science is taught if we look at two of the throbbing scientific questions of this decade – and compare them in your mind to what you learned at school.

Human beings have always wanted to discover what happened at the start of the universe. In a few weeks, we will know. Deep beneath the suburbs of Switzerland, an international band of scientists has constructed a Big Bang machine. It is called the Large Hadron Collider, and inside its reinforced walls they are going to recreate the forces that erupted 14 billion years ago, a fraction of a second after the Big Bang. It will blast open everything we think about physics.

By going back to when there were only a few simple forces in the universe, the Hadron scientists believe they will be able to separate out the basic building blocks of existence – and find out what it is made of. They have no idea what will be there. Some think they will discover new dimensions. Others believe they will unlock vast carbon-free sources of energy. Some even think the world will end. We will only know when the universe's baby pictures come through this summer. Now, isn't that more exciting than a teat pipette?

If how the universe began doesn't stir your interest, how about cracking open your own head to see how it works? Every day, neuroscientists are revealing who you are and how you function. They have shown that if I electrically stimulated a few millimetres of grey flesh in your mind-meat, I could make you experience love, forget your wife, or think you were talking to God.

But it gets weirder. In the West, we all believe there is one coherent person dominating our brains, directing us as we wander through life. There is You, whole and complete. But we are wrong. The different parts of our brains are locked in a constant electrical war. None of them is in charge. As the neurosphysician Paul Broks puts it: "We are all divided and discontinuous. The mental processes underlying our sense of self – feelings, thoughts, memories – are scattered through different zones of the brain. There is no special point of

convergence. No cockpit of the soul. No soul-pilot."

This is why we feel inner conflict all the time. Your amygdyla tells you to run away from the exam; your frontal lobes tell you to stay or you won't get into university. Decode this brain-science and you decode yourself. Now, isn't that more exciting than a petri dish of mould?

So why is there such a swollen gap between this – the thrilling science you can find in any bookshop – and the sludge you were force-fed at school?

There are a range of explanations coursing through this Education-Boredom Collider. Today, our schools focus exclusively on one part of science – which happens to be the dullest. Professor Brian Greene of Columbia University says: "We continually fail to reveal the rich vistas opened up by science, and instead focus on the need to gain competency with science's underlying technical details. It squanders the opportunity to make students sit up in their chairs and say, 'Wow – that's science?'" The internal mechanics matter – but they are only part of the story. It's as if art classes consisted solely of learning how to perform individual little brushstrokes, without ever stopping to look at a painting by Caravaggio.

But we also have a schools system scarred by the need for instantly measurable results – when inspiration can't be measured by SATs. A friend of mine who teaches physics explains, "It's impossible to be inspiring when you are always teaching from a checklist." This is a reason why the best science teachers are dropping out: half of all teachers qualifying in science quit within five years. A study by Sheffield Hallam University found the main reason was "frustration over lack of professional autonomy and ability to be creative in work". When the best teachers go, the kids lose interest.

This is a disaster for our economy. Science jobs are due to grow by 20 per cent in the next decade, and to fill this we have been relying on importing Chinese and Indian scientists. But as their countries develop, they will find jobs at home, and we will be left with a science-vacuum.

But that's not all. Having a scientifically illiterate population is dangerous in a democracy, because it can't assess risks properly. Measles has now become endemic and deadly again because so few of us were able to see the anti-MMR hysteria for the unscientific sham it was. We weren't taught to ask: was it published in peer-reviewed journals? Where are the control groups? Worse still, a majority are still falling for the oil industry claims that there is a serious scientific dispute about whether global warming is caused by man. This is a brake on the life-saving action we need to take today.

And it is, finally, an aesthetic disaster. The great questions of life are being answered all around us – in glorious Technicolor – and most of us can't follow it, even as awed spectators. Now could you pass the periodic table and the Bunsen burner please?