

## Surprised by Science

### Colin Russell - Chemist and historian of science

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### Two discoveries

Life is full of surprises; things rarely turn out as one expects. My own commitment to science was like that. At school I actually enjoyed languages more than science for several years. Perhaps the fact that I started Latin as early as the age of nine had something to do with it. What I did not know then was that the way we were taught Latin had much in common with the methods of science. We mainly learned grammar, grinding out declensions and conjugations, and memorising rules such as gerundive attraction and the ablative absolute—all terribly mechanical by today's standards, yet fascinating in its own way and with a highly coherent internal logic.

Real science first came alive for me as a means to a very practical end. One winter several of us at school spent happy hours wiring up an old shed for electric lighting, about which I learned a great deal from the older boys. Electricity continued its fascination and I experimented with magnets, coils of wire and some ancient radio equipment off-loaded by a well-meaning family friend. The ultimate goal was to electrify my model railway...but that is another story. It was self-help of an almost Victorian kind—learning from experiments, gleaning here and there from boys' books and magazines, and making many mistakes on the way. In the austere years of wartime that was all one could do.

From physics I advanced to chemistry, via the simple route of making voltaic cells (in the vain hope of being able to dispense with costly dry batteries). Rashly, my parents allowed me to purchase considerable quantities of chemicals (including concentrated mineral acids) from the local pharmacy, and a new game had begun. Chemistry now had me in its thrall. I must have been about fourteen when, lured by advertisements in The Meccano Magazine, I made my first solo trip to North London, to a shop selling scientific glassware. Yet another family acquaintance off-loaded a box of miscellaneous chemicals, and I soon had an assortment of lethal substances that would make the hair of today's safety officer stand on end.

Shortly after this I concluded that the best use of chemistry would be in a medical career. Sadly, this was not to be, for in those early post-war years no sixth-form biology (then an essential prerequisite for medicine) was taught in my school. So chemistry, avidly pursued as a means to that end, now seemed like being an end in itself. After I entered the sixth form I discovered two new and enduring delights. One was mathematical analysis (above all in calculus and in algebraic functions). The other was organic chemistry. With a friend who had a copy of Cohen's Practical Organic Chemistry, and an indulgent mother, I resorted to experiments at his home. One day we conducted the full-scale preparation of acetyl chloride in the kitchen, filling the place with hydrogen chloride vapour. Fortunately, the lady of the house was out shopping at the time. Being now thoroughly 'hooked' on science, and disregarding the well-meant advice of my headmaster to read English, I left school for university with a chemistry degree as

my goal. But meanwhile something even more significant was happening.

It must have been during my later years at school that I made a discovery which seemed at the time quite independent of my interests in science. Somehow I began to realise that the Christian faith was true. I also saw that it was relevant to my condition, that it would make huge demands on me if I accepted it, and that unless I did so life would be immeasurably poorer. That is a very inadequate description of my 'discovery', for even then it was so much more than a set of rational deductions: not so much an intellectual conclusion as a personal encounter, an incredible meeting between a mere schoolboy and his Creator. This was not presumptuous arrogance. As I realised that Jesus loved me, and had died for me, there was no room for human boasting, but rather a dawning realisation of God's mercy and generosity that almost blew the mind. My conversion was not sudden, and certainly not dramatic. Gradually I recognised that Jesus was God, as he claimed to be, that I was trusting in him, and that I must therefore count myself as his disciple.

Exactly how this happened I am not sure to this day. I have had the privilege of parents and grandparents who were real Christians, with three of my great-grandfathers preachers of the gospel. To an outsider it might seem that I never stood a chance! Yet the very fact of piety at home worried and annoyed me; church-going was an unmitigated bore, and all legitimate (and not a few illegitimate) strategies were adopted to avoid religion wherever possible. For some years I was in an acute state of counter-reaction. However, as C.S. Lewis once remarked, a young agnostic cannot possibly be too careful, such is the patience, love and grace of God. Sure enough that grace eventually won me.

One day my parents heard of a group of boys meeting on Sunday afternoons on neutral territory (a local day school) and calling themselves a Crusader class. Despairing at my open rebellion against church and its organisations, they tentatively suggested that I might like to go. And so, reluctantly, I did—as a pillion passenger on a motor cycle driven at apparently breakneck speed by a young man who was one of the leaders—a young farmer later to become the Tory MP for Torridge and West Devon, Sir Peter Mills.

Here, at Epsom Crusader class, I met a lot of youngsters of my own age or above who spent an hour each week studying the Bible, singing somewhat militaristic choruses about the Christian faith to exciting and unchurchy tunes, and apparently enjoying themselves to the full. It was, I believe, through Crusaders that I entered into real faith in Jesus, and I can never be grateful enough for a movement that has led countless young men and women into the joys and challenges of Christian faith. They did so, not by manipulative or emotional exploitation, but by faithful teaching based on the Bible and by the consistent and attractive witness of lives embodying that teaching and reflecting the love of God himself.

In addition to my parents there were two people whose example was a powerful stimulus to my own faith. One, whom I encountered almost only in print, was Cecil J. Alien, Editor of a much-read monthly periodical now alas defunct: *The Crusaders' Magazine*. He happened to be also one of the most renowned railway writers of the day, and as I was an incurable railway enthusiast he already had my full attention. I had devoured his articles in secular magazines without any inkling that he was a Christian. (His autobiography, *Two Million Miles of Rail Travel*, 1965, ends with a clear Christian testimony.) He also happened to be a gifted musician and composer of some of the best tunes we used to sing.

If this were not bad enough for a young rebel, worse was to follow. Another of the Epsom leaders was a distinguished scientist and also a very good speaker at the class—Dr Jack Aitken, Reader and then Professor of Anatomy at University College, London. He had an open, honest approach to the Bible's message, and I could not help being impressed by his ability to hold to Christianity and science at one and the same time. At that point, since none of my immediate family were scientists, there was always the possibility that I could reject the faith on the grounds of science and would be in a superior position of authority if it came to an argument. Now, however, that prop was to be kicked away. This was not, of course, a logical verification of Christianity. Most of us, most of the time, come to the major decisions of life through a complex mixture of logical argument and intuitive deduction, with social pressures and the quirks of personal preference thrown in. This is not for one moment to deny the objective truth of

the Christian gospel; just to say that in my case I must honestly admit the importance of other factors, not least the compelling testimony of these two men. So far as I am aware neither of them ever had the slightest idea that this was so.

### **Science in close encounter**

I went up to read chemistry at University College, Hull. In the years after the war everything was extremely Spartan. Accommodation for male students was in a former army transit camp, consisting largely of Nissen huts, each undivided and heated by one central coke stove. In the ferocious winter of 1946-47, kettles left on the red-hot stove at night were filled with ice next morning, and once or twice we had to dig ourselves out of snowdrifts piled against the door. It was hard enough to study under those conditions, but the difficulties were exacerbated by chronic post-war shortages of food, fuel (anyone stealing coke was to be sent down immediately), teaching accommodation, chemicals and equipment. At that time, the university took external London degrees, and the hard-pressed staff had to teach without the foggiest idea of examination content and only the sketchiest of syllabuses to guide them, (Shortly afterwards Hull received its charter as a full university and those problems were at an end.) For the first year or two student morale plummeted and fall-out rates were high; only half of those who entered the Chemistry Department in my year made it to the end and graduated.

For many students university life was not the liberating experience that it ought to be, but quite the opposite. As a relatively new Christian, my faith might have disappeared without trace had it not been for one thing: joining a handful of other Christians who incorporated themselves into a small society called the Evangelical Union—now a nourishing body at Hull and known, like its counterparts elsewhere, as a Christian Union, associated with UCCF (or IVF in my student days). Here, at the traditional meeting for freshers, I listened to a sparkling address by a young research zoologist from Cambridge—Dr Oliver Barclay, then a Travelling Secretary for IVF, later General Secretary of UCCF, and now Editor of *Science and Christian Belief*. I was jerked to my senses realising that, whatever the circumstances, we were actually required to witness for Christ. A subsequent remark by the speaker to the effect that we are much too concerned with our own well-being, and not enough for the glory of God, gave a further well-aimed blow at my own rueful and lugubrious reflections. For some time that lesson had to be repeatedly relearned, but I had begun to experience the grace of God in wholly new and unexpected ways. Gradually the EU grew and prospered as other students found Christ through its witness. And all the time, almost in the shadows, was another figure whose incalculable influence on generations of students can never be known in this life.

He was George Steward, Professor of Mathematics at Hull from 1930 to 1961, and an indefatigable supporter of student Christian witness through good times and bad.<sup>1</sup> Not only did he keep the EU together during the dark days of the war, but afterwards he often attended its functions (sitting in the back row) and, if pressed to chair a big meeting, would invariably attest his belief that science and faith went together and that, in particular, Christianity had nothing to fear at the bar of reason, but everything to gain. Such a testimony by one of the most distinguished academics in the university made a profound impression on many budding scientists, myself included. It was not then a fashionable thing to say but it had the ring of truth and, if we were already Christians, gave an edge to our studies in science.

It would, however, be misleading to suggest that a Christian faith simply made science easy. On at least two occasions the opposite was true in my experience.

One laboratory technique that we had to acquire was that of gravimetric analysis (with, I fear, little help or instruction). This involves, among other things, the precipitation, collection, purification and weighing of often minute quantities of solid material, accurate to within a fraction of a milligram. As a student I was never very good at this, and did not perfect my technique until several years later. Since we often knew what the answer ought to be, many of us would 'adjust' our experimental figures to fit. I was no exception, until one evening in my Bible reading I encountered Proverbs 11:1, 'A false balance is an abomination to

the Lord!<sup>2</sup> Thereafter, my discipleship had to have a new dimension and I learned that, in science, as in everything else, integrity is essential. It was a long time afterwards that frauds and fakes.

The other occasion when Christian ethics impinged directly on my science was when it was suggested that I take a job in the newly formed Atomic Energy Authority. My judgement, which I now regard as immature, was that a Christian should have nothing to do with an enterprise connected, however distantly, with weapons of mass destruction. I could not then see that nuclear reactions are as much a part of God's creation as chemical change in general, and that it is what we do with them that is open to criticism. Nor did I realise the potential benefits of nuclear energy to present and future environment (nor, of course, the possibilities of a Chernobyl).

For various reasons I decided, on graduating, to become a chemistry teacher, so embarked upon a postgraduate Certificate in Education. The fact that I have never taught in a school from that day to this is just another of life's surprises. The PGCE course was not entirely wasted, however. It gave me time to catch up on general reading, to learn something of worldviews from Plato to Freud, and to write my long essay on a subject that by now was intruding a lot on my thoughts: the relationship between science and religion and, of course, its relevance to education. I never got the essay back, and have no idea what the authorities thought of it (if, indeed, it was ever marked). Nor did I bother to make a copy; if it still exists it must be buried deep in the Education Department's archives. Perhaps it is just as well.

When I left university I moved straight into higher education, and for the first half of my career taught chemistry at two colleges—at Kingston and Preston—both of which are now Polytechnics. I quite quickly specialised in organic chemistry and for ten years was in charge of that subject at Preston. It was here that I became immersed in research into heterocyclic compounds. Although the subject was new to me, to my surprise our work went well and I experienced the thrill of making and handling compound after compound that no human eye had ever seen before. I am convinced that without that kind of experience no historian, philosopher or sociologist of science can possibly empathise with the scientist and understand what really makes him or her tick. Eventually, a small research group was set up and several students obtained their doctorates in this area. My own responsibilities in the department increased, with new labs to be designed, new courses run, and plenty of other research projects in the air. My second-in-command was also a Christian, and in all this I think we were both aware of the good hand of God upon us, not because we were particularly special but because of his infinite goodness. This sense of being in the 'right place', or 'within God's will', is one of my abiding memories of those ten years of organic chemistry in Lancashire—that, and the delights of a lively and growing family.

I might have spent the rest of my life as an organic chemist had not another novel and unexpected opening arisen. For some years I had been developing an interest in history and philosophy of science, and had actually studied it part-time at University College, London, during my Kingston years. This arose from an awareness that the history of chemistry can help and enliven teaching of the science itself. I had also harboured the suspicion that the history of science bears quite strongly on certain aspects of the Christian faith (as in the evolution controversies). A new British institution called the Open University wanted someone to start the history of science and invited me to Join them. In all kinds of ways it was a considerable risk, but I decided to take the post, and now our department at the OU is one of the largest in the UK.

When I started in the history of science it was often sufficient to rely on printed sources; now, however, the subject has moved to higher levels of sophistication and, as in ordinary history, manuscript evidence is crucially important. Digging into such evidence I became more certain than ever before of the mythological character of one popular belief: the idea of a more or less permanent hostility between science and religion. As trumpeted by people like Bertrand Russell, Julian Huxley, J.B.S. Haldane and others, the notion had always seemed faintly ridiculous, partly because I knew so many scientists who held the Christian faith without, it seemed, any loss of integrity, and partly because the arguments of 'scientific materialism' appeared so pathetically thin. Of course, we often see what we want to see, but here my conclusions were shared by many who certainly did not start from my position. The more I read,

the more patently obvious it became that, far from being hostile to Christianity, science had owed it a great deal during the last 400 years. And many of the greatest figures in Western science had possessed not merely a conventional religious belief but a deeply-held biblical faith and personal commitment to Christ. Several graduate students of mine have multiplied illustrations of this trend.

Nor are the popular myths all about incompatibility or conflict. In my inaugural lecture at the Open University I decided to challenge the notorious thesis of Lynn White that Christian convictions about dominating the earth lie at the root of our ecologic crisis.<sup>3</sup> Such a thesis is, I believe, undermined by detailed examination of the historical evidence. Another popular error identifies opposition to the theory of evolution with religious orthodoxy; here I owe much to a colleague in my department—Dr J.R. Moore, whose important book *The Post-Darwinian Controversies* (1979) appeared shortly after he joined the OU. His researches have unequivocally slain that particular myth (to the discomfort, it must be said, of many of my 'creationist' friends). And so I could go on.

A study of the social history of Victorian science can help to explain how this conflict-myth has been so long-running. In Britain and America the scientific communities (or part of them) felt under siege for several reasons, and one defence mechanism was to perpetrate the illusion of endemic warfare between science and Christianity, with science the inevitable victor. As I got to grips with the social history of science that fact emerged with stark clarity. Another relation between science and faith, one of symbiosis, seems much more probable, and in the rise of science in the sixteenth and seventeenth centuries we have a host of examples. Although I had long been aware of the importance of Puritanism for English science, it came home to me with great force when I had the privilege of working, on two undergraduate courses, with such different leading scholars as Reiger Hooykaas and Christopher Hill.

Seeing science in its historical context has therefore not merely failed to undermine my faith but has given it strong support. Together with the love of my wife and family it has been one of the enriching elements in life, for which I can never be too grateful. A career in science should be as truly a 'Christian vocation' as any other. After taking services in church I have occasionally been asked why I was not a clergyman. My reply, to the effect that God had called me to be a scientist, always evinces surprise. I often wonder why.

## Notes

<sup>1</sup> George Coton Steward (1896-1989) was a founder member of the Research Scientists' Christian Fellowship in 1944. His obituary is in the *Bulletin of the University of Hull*, no 122 (9 February 1990): p 2, and in *Science and Christian Belief*, vol 2 (1990), p2.

<sup>2</sup> There are several other passages with a similar message (Prov16:11; 20:23; Ezek 45:10; Hos 12:7; Amos 8:5).

<sup>3</sup> Lynn White, 'The historical roots of our ecologic crisis'. *Science* (New York), 155: 1203-1207, 1967.