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Laboratory of the Cross

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I became a Christian in 1978 and started training as a physicist in 1981. So for most of my Christian journey, I have lived with the challenge of relating science and faith. This essay tells 'the story so far'.

Christian and scientific beginnings

When I was growing up in Hong Kong, neither of my parents were Christians. But they sent me to an Anglican secondary school, and before that, to its feeder primary school and kindergarten, because of their academic reputation. Christianity was a low key affair throughout. In secondary school, we all learnt the outline of the biblical narrative 'at face value', without ever discussing whether it was 'really so'. There were morning assemblies with hymns, prayers and short homilies with occasional Christian content. No one, staff or pupil, had to be a Christian. I certainly was not when I entered secondary school.

Here I began my formal education in science. We were taught a 'classical' curriculum. Physics was about mechanics, heat, light and electricity, chemistry dealt with reactions in test tubes, and biology was mostly focussed on 'higher' organisms (but without any evolution). Atoms and nuclei, the electron theory of bonding, and DNA only made brief appearances. There was little attempt at relating these sciences to each other. Such a curriculum would be considered very old fashioned nowadays. But it taught me that there was a perfectly valid macroscopic level of description of phenomena *without* resorting to microscopic explanations, and instilled an 'anti-reductionist streak' in my nascent philosophy of science, where each branch of science had its own autonomy, with its own concepts, forms of reasoning and experimental practice. Later in my research, I have worked successively at the boundary between physics and mineralogy, chemistry and biology. But I have never thought that these sciences could, or should, be 'reduced to physics'. Instead, I have learnt that I must steep myself in a branch of science *on its own terms* before I could hope to relate it to physics in non-superficial ways. The theology-science dialogue requires no less.

I was baptised and confirmed during my last year in Hong Kong. I think I started considering these matters because I wanted to study abroad. Since this meant either America or Britain, both apparently Christian countries, I seem to recall wondering whether I accepted Christianity for myself or not. I cannot remember precisely what form of conclusion I came to; but looking back, I think it was more that practical Christianity had become *meaningful* to me after prolonged exposure, rather than that I thought it was in some theoretical sense 'true'. And, somehow, I realised that if *this* stuff had become meaningful, it required an act of commitment.

In and out of creationism

I left Hong Kong for Rugby in 1979 to take my A-levels. There, I learnt much from the chemistry teacher who ran the Christian union, including a love for the Bible (and for thick-cut marmalade on toast!). Hiding in his large attic library for many happy hours, I acquired a taste for theology books. I also found a number of volumes advocating

creationism – my first encounter with literature that sought to relate science and faith. I do not know whether my friend the chemistry teacher was a creationist or not; but he certainly did not discourage me from exploring creationism. The upshot was that by the time I arrived in Cambridge two years later, I was a dyed-in-the-wool creationist.

I found a substantial minority of like-minded people in the Cambridge Inter-collegiate Christian Union (CICCU). It fascinates me that a majority of these were fellow scientists. Perhaps arts and humanities students simply had too much 'textual common sense' to do something as gross as taking Genesis 1 literally. Many, including the editor of this present volume, tried to dissuade me from creationism, to no avail. My total lack of exposure to evolutionary biology up to that point did not help. Before I explain how I got out of creationism, I should reflect on what attracted me to it in the first place.

In his first *Lecture on Physics*, the Nobel laureate Richard Feynman speculated about a world in which all but one piece of scientific knowledge had been wiped out. He asked, 'What item would be most helpful to the next generation starting from scratch?' His answer was, 'Matter is made up of atoms'. I agree. But history suggests that there is an equally important *meta*scientific principle that our hypothetical 'science-less' generation would need: the principle that they should be able to give mechanistic explanations of the universe *without* recourse to divine agency. It took humanity many millennia before the majority dared to believe that this was true. I will call this the 'Laplace principle', because Napoleon reputedly once asked Pierre Simon Laplace where God was to be found among his equations, getting the answer, 'Sire, I have no need of that hypothesis.' The historical context of this (possibly apocryphal) story is important. Just a generation before, the great Isaac Newton invoked occasional divine 'poking' to explain certain irregularities in planetary motion. Laplace, who was born and died a Catholic, showed that a thorough application of Newton's own laws sufficed, without appealing to a *deus ex machina*.

I think creationism was attractive to me because it evaded the Laplace principle, apparently offering a whole area of science where it was possible, perhaps even necessary, to invoke the 'God hypothesis'. It gave tangible security to a young Christian for whom the question of truth was just beginning to be felt. Applying Occam's razor in my first attempt to relate science and faith, I found in creationism an attractively simple hypothesis.

It was not science but philosophy that cured me of creationism during my PhD. When I started *doing* science for myself, it struck me that the creationist philosophy of science did *not* reflect how I actually made progress. A typical piece of creationist reasoning goes like this: here are some observations that conventional biology or geology cannot explain – and that would be true enough – *ergo*, these disciplines are wrong and need replacing by a creationist account. But finding observations that do not fit the current theoretical framework and trying to explain them *using the same framework* was the very stuff of everyday scientific research. Without such robustness, there will be no theoretical frameworks, and no science. Moreover, the creationist paradigm was unfruitful – it did not suggest a research programme; rather, it specialised in poking holes in an established framework. So I slowly jettisoned creationism during my PhD years. There is a moral here: we should teach scientists some philosophy!

I had nothing to replace creationism with, but simply stopped thinking about the subject. My research taught me that leaving difficult issues for a while could pay off. I did that with 'evolution and creation'. A few years later, I realised that the problem had vanished because my biblical hermeneutics had matured. Meanwhile, something else demanded attention.

Science: a Christian vocation?

Doing a PhD was a lonely struggle. I started to question why I as a Christian should be doing such work. But there was a deafening silence on this issue at CICCU meetings and the services at the church I attended. Instead, the powerful unspoken message was that I was a student first and foremost so that I could 'convert' other students. Moreover, full time Christian service, narrowly defined, was the top career choice afterwards – those in it were the only ones who ever got prayed for! So why was I slogging away at studying minerals at high temperatures?

Around this time, I started attending St. Barnabas church. The vicar, the Rev. Douglas Holt (now canon at Bristol Cathedral), became a life-long friend. He introduced me gently to philosophy, which (amongst other things) eventually weaned me off creationism. But he also helped me begin to articulate an adequate theology of vocation. I remember clearly that when I was introduced to Douglas, he did *not* ask me to lead a Bible study group, but enquired about my physics. Once I ascertained that this was more than politeness on his part, I was profoundly shocked. Here was a clergyman *really* interested in my work!

With Douglas' help, I realised that, wonderfully, the Christian gospel promised the redemption of *the whole of creation.* Out of many biblical passages on this subject, Revelation 21:24 became particularly important to me at that time. In his vision of the heavenly city, St. John saw that 'the kings of the earth will bring their glory into it.' Given clues from the rest of Scripture (especially Isaiah 60-66), I understood this as saying that *all* that was good and true and honourable in *this* creation would be redeemed and gathered into the new creation to add to its splendour. And, bravo, this included all that in my scientific research that fitted the bill! I began praying 'thy will be done *on earth* as it is in heaven' with new conviction.

Admittedly, this is only one component of a full theology of science as a Christian vocation. But it was an emotionally important starting point: I no longer felt a second-class citizen in God's kingdom. My story highlights an aspect of the pastoral task that churches in general rather neglect (so that I sometimes still feel a second-class citizen in church!), and which the burgeoning 'science and religion' literature barely touches upon. Now, living in Scotland, I find that a Eucharistic prayer-and-response often used by Scottish Episcopalians expresses well my sense of vocational 'at-home-ness' as a Christian. These lines are reproduced in the first two stanzas of a poem I wrote recently on science as a Christian vocation.

Benedictus

Blessed are you: Lord God of all creation:
Through your goodness
We have this Bread to offer.

Which earth has given and human hands have made.
It will become for us the bread of life.

Blessed be God for ever.

Blessed are you: Lord God of all creation:
Through your goodness
We have this Wine to offer.
Fruit of the vine and work of human hands.
It will become the cup of our salvation.

Blessed be God for ever.

Blessed are you: Lord God of all invention:
Through your goodness
We have this Cure to offer.
Fruit of the lab and work of evolution.
It will improve for us the Quality of Life.

Blessed be God for ever.

Blessed are you: Lord God of all intuition:
Through your goodness
We have this Proof to offer.
Fruit of the brain and work of abstraction.
It is the Self-understanding of your Universe.

Blessed be God for ever.

Laboratory of the Cross

The end of my PhD coincided with a painful and turbulent period in my personal relationships: God felt very distant, even absent all together. I thought and read a lot about 'the problem of suffering'. The book of Job became a firm favourite in the Bible. Many modern authors also helped. Paul Fiddes taught me about the 'creative suffering of God'. W. H. Vanstone helped me appreciate the 'stature of waiting' by highlighting Jesus' startling passivity once he was 'handed over' to his enemies. Dietrich Bonhoeffer's *Letters and Papers from Prison* gave me much insight into the 'hidden God', the *Deus absconditus*, that Isaiah spoke of: 'Truly, you are a God who hides himself, O God of Israel, the Saviour.' (45:15).

During this painful time, 'science and faith' was off my agenda. When this episode started to fade in the mid-1990s, I began reading the main-stream 'science and religion' literature. I was excited by what I found – if I had seen this stuff 15 years earlier, I might not have become a creationist! And yet, something troubled me. I felt that the books I was reading spoke of God in the context of science rather too easily. As a scientist, I worked completely according to the Laplace principle. Thus, day in and day out, my research mediated to me a palpable sense of God's *absence*, and I needed to know how to deal with that. The literature that I was reading offered little help in this matter, because it essentially bypassed it. I hesitated in raising the issue with my

Christian friends, especially the scientists, because it felt like 'letting the side down' – it was non-Christians who were meant to equate science with God's absence!

Today, when I do raise this point amongst Christians, the response I get is often some version of 'natural theology'. Some start from science: the Big Bang or some other discovery apparently provides fresh pointers to God. Others start from the Bible, often quoting Romans 1:20 – 'Ever since the creation of the world his eternal power and divine nature, invisible though they are, have been understood and seen through the things he has made. So they are without excuse.' But natural theology based on science has a short 'shelf life' – such discussion from barely one generation ago already reads dated nowadays, because science has moved on. On the other hand, the appeal to Romans ignores the context. In Paul's day, everyone saw signs of divine action everywhere; the issue was *what kind of god* was acting. In this context, Paul argued that idolatry was without excuse. That context no longer obtains today: a sense of divine absence is the prevalent mood. So, neither strategy helps. To make sense of my encounter with the *Deus absconditus* in my daily work, I had to look elsewhere.

Illumination came when I connected this issue with my earlier reading on 'God and suffering'. In both cases, the apparent *absence* of God was the issue. I already knew that the Cross made some sense of my painful relationships; now I realised that the same was true for 'science and faith'. In particular, if the man on the Cross was the only-begotten son of the creator and sustainer of the universe, then something like the Laplace principle is just what we expect. *This* God is unlikely to have made a world in which explicit reference to Godself is needed at every explanatory juncture. Instead, we may expect God's presence in the universe, in the person of the Spirit, to be about as obvious as God's presence in a dying rabbi hanging on a Roman gibbet.

When that dying man was taunted by the onlookers, 'If you are the King of Israel, come down from the cross!' (Mark 15:32), he had no answer. Indeed, his cry of dereliction only confirmed to these onlookers that he was *not* God's Son – 'My God, my God, why have you forsaken me?' (Mark 15:34) I began to hear a parallel between the 2000-year-old taunt thrown at Jesus and a taunt that I hear often today – 'If you are a scientist, why do you believe in God?' In other words, the Laplace principle works, so God is a delusion. I now realise that it is my Christian vocation as a scientist to inhabit prayerfully precisely this place of felt absence, 'drinking its cup fully' with Christian and non-Christian colleagues, and not be too quick in offering arguments for seeing God's footprints in the universe.

Of course, if *I* were God, I would have made the universe differently: everything would have to be explained always with reference to *me*. But Christians worship a different God, a God whose Son calls all to take up the Cross and follow where he went on the first Good Friday. Importantly, the new life to which we are called is 'hidden with Christ in God' (Colossians 3:3). Of course, such waiting and bearing is not in vain, because Christ has been raised from the dead on that first Easter Sunday. But, this side of heaven, we inhabit 'Saturday space'.

Dietrich Bonhoeffer understood these matters profoundly. Interestingly, in his *Letters and Papers from Prison*, he told us that he was reading 'with great interest Weizäcker's book about "the world view of physics" … [and] hope to learn a great deal from it' (letter 24/5/1944; Weisäcker was a distinguished nuclear physicist). Later, he spells out

the theological implication of what he had learnt (letter 16/7/1944), in language strikingly reminiscent of Laplace's supposed answer to Napoleon:

> God as a working hypothesis in morals, politics, or science has been surmounted and abolished … God would have us know that we must live as men [and women] who manage our lives without him. The God who is with us is the God who forsakes us (Mark 15.34). The God who lets us live in the world without the working hypothesis of God is the God before whom we stand continually. Before God and with God we live without God. God lets himself be pushed out of the world on to the cross. He is weak and powerless in the world, and that is precisely the way, the only way, in which he is with us and helps us. Matt. 8.17 makes it quite clear that Christ helps us, not by virtue of his omnipotence, but by virtue of his weakness and suffering.

The relevance to a scientist-believer working in the 'laboratory of the cross' is clear.

Science, faith and faiths

What I have said so far can be seen as an attempt to construct a 'theology of science' – making sense of the scientific enterprise in the light of Christian belief. Such 'god-talk' (theology!) is absolutely necessary for us 'scientists in pews': in order to pray and worship meaningfully, we have to know how our faith makes sense of our vocation and our daily experience. I have emphasized divine hiddenness, but have left out other themes. Thus, for example, I have found it fruitful to understand my own scientific vocation as 'giving voice to Creation', which is wordless on its own (cf. Psalm 19:3).[1] But this is not the place to construct a full theology of science.

Inevitably, 'god-talking' science starts from a position of faith – it is faith seeking understanding (to quote Anselm). But why should anyone be a Christian in the first place? This question is, of course, as old as Christianity. But nowadays, it is almost obscured by another, wider question: hasn't science made *any* sort of faith redundant? It is not just that the Laplace principle apparently renders 'god' unnecessary. It appears that scientific rationality has made *any* sort of belief irrational. All believing scientists have been confronted by this question multiple times from their colleagues. Richard Dawkins famously talks of 'a process of non-thinking called faith', which is 'evil precisely because it requires no justification, and brooks no argument'.

But this misunderstands the nature of faith. I often explain it to fellow scientists like this – faith is like the 'operating system' of a computer; it is needed before anything else can be done! We can choose between Windows and Mac OS (or whatever), but 'no operating system' is not an option. Similarly, humans must have *faith*, but we can choose between different *faiths*. The philosopher Mary Midgley puts it like this in her book *Science as Salvation*: '[Faith is] something that you must have before you can ask whether anything is true or not. It is basic trust. It is the acceptance of a map, a perspective, a set of standards and assumptions, an enclosing vision within which facts are placed.'

[1] Interestingly, Jesus repeatedly gave voice to the voiceless (the dumb and the marginalised).

Faith is needed to do science. Thomas Huxley understood this when he said (in *Darwin's Life and Letters, Volume 2*) that 'the one act of faith in the convert to science is the confession of the universality of order and of the absolute validity, in all time and under all circumstances, of the law of causation,' i.e., the Laplace principle holds true. Huxley explains: 'This confession is an act of faith, because, by the nature of the case, the truth of such propositions is not susceptible of proof.' In fact, the proof of the pudding is in the eating – science works!

This act of faith itself is inevitably situated in a wider faith context, whether acknowledged or not. Some believe that the success of the Laplace principle means that there is no god, and order and causality are just brute facts. Others believe that these reflect the character of a Creator God. The choice between these faith positions is not, or should not be, arbitrary. Defensibly, the Christian faith has greater explanatory power than scientism (Dawkin's faith) – for a start, it answers the question 'Whence order and causality?'.[2] Compared to other religious faiths, it also has a unique resource (the cross) for understanding the success of the Laplace principle. Moreover, I believe that Jesus is who he claimed to be because that makes best sense of a corpus of historical documents (the New Testament). And so on.

But arm-chair rationality can only go so far. In the end, one has to decide whether to accept the invitation to taste the pudding. As Philip said to Nathanael concerning Jesus, 'Come and see!' (John 1:46)

Concluding musings

When I first started to articulate my thoughts on science and God's hiddenness, I asked many friends whether they had come across similar ideas in their reading. The Rev. Canon Ian Paton, rector of Old St. Paul's, Edinburgh, pointed me to the poetry of R. S. Thomas. Thomas (1913-2000) was a rural parish priest in the Church of Wales. His poetry profoundly explores divine hiddenness. Fascinatingly, Thomas repeatedly mused on this theme in the context of science and technology. Here, for example, is his poem that inspired the title of this essay.

Emerging[3]

Not as in the old days I pray,
God. My life is not what it was.
Yours, too, accepts the presence of
the machine? Once I would have asked
Healing. I go now to be doctored,
To drink sinlessly of the blood
of my brother, to lend my flesh
As manuscript of the great poem
of the scalpel. I would have knelt
long, wrestling with you, wearing

[2] Note that this is *not* inferring divinity from 'order' (a design argument from which God emerges), but claiming that if the Judeo-Christian God exists, then 'order' is explicable (starting from God to see what follows).

[3] First published in R. S. Thomas, *Laboratories of the spirit*, Macmillan (London:1975), © Kunjana Thomas 2001, used with permission.

you down. Hear my prayer, Lord, hear
my prayer. As though you were deaf, myriads
of mortals have kept up their shrill
cry, explaining your silence by
their unfitness.

It begins to appear
this is not what prayer is about.
It is the annihilation of difference,
The consciousness of myself in you,
of you in me; the emerging
from the adolescence of nature
into the adult geometry
of the mind. I begin to recognise
you anew, God of form and number.
There are questions we are the solution
to, others whose echoes we must expand
to contain. Circular as our way
is, it leads not back to that snake-haunted
garden, but onward to the tall city
of glass that is the laboratory of the spirit.

Thomas and other poets who have profoundly explored Isaiah's *Deus absconditus*, from John Donne to Gerard Manley Hopkins, are now constant companions in my exploration of the theology of science: poetry reaches places that other *genres* cannot reach! Indeed, after reading Stephen Fry's guide to 'DIY poetry', *The Ode Less Travelled*, I started to write poetry myself. The poem *Benedictus* has already appeared above. By way of conclusion, here is another poem, written during Advent season 2007, which encapsulates much of what I want to say.

Discerning Divinity

'The heav'ns declare the glory of the Lord':
Proof of his greatness, wisdom these afford.
All creatures great and small we see on earth
The love of God has brought them all to birth.
'Magna opera Domini' we read
In Free School Lane engraved on oaken creed.[4]

But Nature can be read in other ways
That do not flatter so the Ancient of Days.
'The heavns' eternal silence frightens me.'
This was the cry of Pascal's libertine.
We need no 'God hypothesis' to prove
Laplace's result that orbits stably evolve.
Some say that Nature's red in tooth and claw,
'Survival of the fittest', rather raw.

[4] 'Great are the works of the Lord, studied by all who delight in them' (Psalm 111:2) – engraved in Latin (*Magna opera domini* …) on top of oak doors in Free School Lane, Cambridge, guarding the entrance to the (old) Cavendish Laboratory.

The microscope since Hooke has sore revealed
Sundry infectious agents to harm our weal.
Magna opera Domini? We face
A suffering globe in aeons of silent space!

If God is there, then old Isaiah is right,
'You are a God who's hidden from our plight.'
The 'glory' spoken of in Psalm nineteen
Must be a different kind from what we deem
Appropriate for God enthroned in heaven
Remote and far away from all our leaven.
Perhaps our thoughts on God are sore in error
Dissociating him from all our horror.
In fact, the Roman soldier hit the mark:
'This man is truly son of God,' he remarked
Hearing the cry of Jesus on the tree
'My God, My God why'st thou forsaken me?'

Saint John called this the Son of Man's own hour
Of glory, subverting human modes of power.
The presence of this God is truly hidden.
T'is 'glory', but not the kind that we'd have bidden.
The Cross and empty tomb together yield
A paradigm how God will be revealed.
Discarded grave clothes interpret Golgotha
That God is present in th'anathema.
The 'glory' spoken of in Psalm nineteen
Must be interpreted afresh to mean
The glory of the only begotten Son
Whose death has not the love of God undone.

The Cross of Christ our university
For learning to discern divinity.
The hidden God of Christ did not create
A world where explanations must relate
To God at every step along the way,
Giving the 'God hypothesis' a say.

A 'cruciform epistemology'
Is Paul's Corinthian theology:
Jewry and Gentiles, they did not dispute
The Cross for both a place of ill repute:
Those seeking after God should not look here,
Divinity was likely found elsewhere!
But at this most unlikely place to meet
God chose here all humanity to greet.
The Cross thus authorises us to look
For God where God's own presence wears a cloak.
Faith is enjoined to tarry at those places

Where absence, pain and pointlessness it faces.

Discerning hidden presence cruciform,
Boldly we learn to take this as the norm
For revelation of divinity
While on this time-bound side of Eternity,
Where matter cannot yet bear the full weight
Of glory undimmed. For that we must wait.
For now, the pinnacle of matter bearing
Divinity: a body scarred and bleeding,
In Eucharistic Bread and Wine remembered
A suffering divinity en-mattered.
Thus 'Nature red in tooth and claw' may witness
To glory cruciform with Godly likeness.

'I am the resurrection and the life,'
The Crucified One says to all who strive
To take the Cross and follow on this way
While waiting for the final Easter Day.
Corruption will then put on incorruption
When space-bound matter undergoes transition
To bear the full weight of divinity.
Then hiddenness will yield to clarity.
Meanwhile, we dwell in Holy Saturday
O Risen Jesus, teach us how to pray
And how to love you, heart and soul and mind,
Your hidden presence everywhere to find.

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