WHAT SENSE DOES 'SCIENTIFIC RESEARCH' HAVE FOR US?

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THERE WAS A TIME when scientists were real adventurers. One thinks, of course, of Galileo, Newton and Darwin, but nearer to our own day there were people such as Pasteur, Henri Poincaré, Albert Einstein and the French Nobel Prize scientists François Jacob, Pierre-Gilles De Gennes and Françoise Barré-Sinoussi. Were these courageous scientists perhaps the last witnesses to a time that has now gone for good?

Have research specialists become just high-class technicians who adapt existing technologies or invent new ones to comply with social needs, through the whole gamut from genetic research to nanoscience? If so, what we have now are simply engineers, whose 'genius' consists in improving 'how' things run. There are no more dreamers, asking about the 'why' of things or what symbolic significance a discovery may have. A bias towards the utilitarian in research is certainly favoured by the way current state policy sets goals for science … but that is not our present concern.[1]

My aim here is to illustrate and to defend the vitality of pure science, or 'basic research' (as it is called in English, *recherche fondamentale* in French), that which is not primarily directed to discovering technical applications. I would maintain that this type of research, far from being outdated, is, more than ever, necessary. Moreover I believe that the need for such disinterested research is emphasized by Christian

[1] See, for example, *Les états généraux de la recherche* (Paris: Tallandier, 2004), and Étienne Klein, *Galilée et les Indiens. Allons-nous liquider la science?* (Paris: Flammarion, 2008).

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tradition, beginning with the Bible, where questions about the nature and the names of things are fundamental to the human vocation:

> So out of the ground the Lord God formed every animal of the field and every bird of the air, and brought them to the man to see what he would call them: and whatever the man called each living creature, that was its name (Genesis 2:19).

Research and Its Interpretation

The question to be asked concerns the nature of basic research in science. Of course, the immediate response, quite reasonably, is that the scientist wishes to know and understand and, eventually, to elaborate a theory that makes sense of the world. In some cases, this knowledge can allow us to intervene in the workings of nature, either by some general technique or perhaps by a specific medical practice. However, it seems to me that the primary impulse for scientific research does not lie in the construction of global explanations about the natural world and its future. Rather this human enterprise consists above all in raising objections to what seems obvious, to opinions commonly believed to be true.

Science Opposed to 'Common Sense'

Generally speaking, every human culture tries to offer an explanation of how things work in nature: why the stars give light and how living things, including human beings, develop. Each culture has its own way of accounting for the environment, both recent and remote, in which human beings exist and came to exist. Such is surely one of the functions of myth, an attempt to explain the 'why' of things by narrating how they began. In other words, we all readily subscribe to a series of commonly held opinions about how the world, nature and life itself function. Yet most often, such spontaneous ideas are the very ones that science overturns. This was Galileo's guiding principle when, taking up the theory of Copernicus, he proclaimed, 'No! The sun does not rise and set! No, the earth is not the centre of the universe!' Gradually, the surrounding culture comes to accept such violent shocks, but only by changing its view of how the world works. So, thanks to Newton and Descartes, the far-off stars and the human frame came to be seen as objects governed by

the same general laws that God had set in place, God being the supreme organizer who worked everything out perfectly within an infinite fixed space and according to a time that flows without interruption.

This beautiful synthesis, however, was called into question by twentieth-century physics, which speaks of an expanding universe and of an intrinsic relationship between space and time: both assertions apparently contrary to 'common sense'. While we may be willing to think of a universe that changes and evolves, the notion that the universe is expanding is more difficult to accept. Common sense immediately asks, 'If the universe is expanding, into what does it expand?' Astrophysicists reply that the question makes no scientific sense! But if the universe had a beginning, what was there before it? Once again, the theory of relativity renders that question meaningless, because without space there is no time.[2] Moreover, we have to take quantum physics into account, the science that questions the independence of both the observer and the object observed, and more especially, the predictability of microscopic happenings: the elementary particle is both a particle and a wave.[3] Most of the findings of modern science are similarly 'counter-intuitive'.

[2] See Étienne Klein, *Chronos: How Time Shapes Our Universe*, translated by Glenn Burney (New York: Thunder's Mouth, 2005).

[3] Sven Ortoli and Jean-Pierre Pharabod, *Le cantique des quantiques. Le monde existe-t-il?* (Paris: La Découverte, 2007).

Something similar is true of biology, at least since the work on evolution by Darwin and those who came after him. While we may with some reluctance accept that the present form of some living creature is due to a mutation and that it has developed from some other living creature, it is much more difficult to accept that such a process of evolution applies in general and has occurred not over a period of thousands or even millions of years, but over billions of years. In this perspective, what we are now has a common ancestor with the great apes, which in its turn issued from a common ancestor of all vertebrate creatures, which was itself the issue of monocellular organisms that happened to find themselves on a particular planet—the earth, in the event—equipped with water and impregnated with prebiotic molecules from interstellar space …. So ultimately, difficult as it is to imagine, we are the product of stardust! It is certainly true that scientists in the areas of physics, chemistry and biology, who struggle to make sense of the function of elementary mechanisms, of the molecular relationships in cells and tissues, and of physiological and pathological changes, can rarely rely on common sense to guide them.

The corroborative findings of modern science have excluded certain ways in which we thought about the world—as a flat earth, for example, or as home to living species that appeared independently, without interconnection. But the various sciences do not provide the 'meaning' of things. We are no longer in an age when science is supposed to inform us, by some deductive process, as to political and moral principles. Scientific discoveries are open to many sorts of human interpretation: materialist, spiritualist and so on. Some interpretations are no longer possible, as mentioned above, but every major scientific breakthrough is a 'negative philosophical discovery', to quote a phrase of Étienne Klein.[4] Science as such does not discover 'values', and this is the point that interests us here. What are we to make of contemporary science from the spiritual, indeed Christian, point of view? How can we be scientists and find meaning in our own existence?

Alternative Interpretations

My meaning may become clearer if I mention some of the interpretations that are current today and which I find inadequate:

[4] Klein, *Galilée et les Indiens*, 45–46.

- *Materialistic determinism*: according to this interpretation, the scientific method has to be materialistic, reductionist and atheist. The dominating principle is one of 'reduction': the universe is *not* this or that; human life is *only* a question of DNA and hormones; religion is *nothing but* a particular state of the brain; prayer is *only* an illusion which brings a certain physical well-being and prolongs life (neuro-theology).

- *Spiritual explanation*: equally to be avoided, in my opinion, is the interpretation that would find in any scientific progress an opportunity to refer directly to a 'creator God'; the network of universal physical constants are then supposed to be the result of some original arrangement that programmed the appearance of life;[5] or the complexity of living organisms is such that it can only be explained by reference to a higher intelligence.[6]

- *Radical pessimism*: yet another approach that to my mind needs to be excluded distrusts all scientific and technical progress because of possible eventual negative consequences. Necessary discernment is one thing; total rejection another!

My own interpretation of modern science relies—as might be guessed—on the view that it can serve as a 'corroborative enterprise', such as I have already suggested.

From One Way of Seeing to a Paschal Crossing

Science, then, takes common sense and turns it upside down. The first to suffer from this is the scientist him- or herself. The investigation often leads to a change in the way of seeing things; former categorisations are no longer valid. It can happen in a particular field of research that an experience or result forces a different way of imagining things and necessitates the discarding of what had seemed beautiful, simple and attractive. If we ask why the scientist accepts that a viewpoint that has been disqualified must be abandoned, the

[5] This is the famous 'anthropic principle': see, for example, Trinh Xuan Tuan, 'Dieu et la science. L'univers: du Big Bang au "réglage fin"', *Le Monde des Religions*, 39 (January–February 2010).

[6] This point of view is adopted by those who speak of 'intelligent design' or 'higher intelligence'. For more information, see Jacques Arnould, *God vs Darwin*, translated by Dawn Colsey (Hindmarsh: ATF, 2011).

The Agony in the Garden, *by William Blake*

reason is that the scientist 'knows' that another hypothesis could be more efficient. To be more exact, it is not so much a 'knowledge' as an instinctive certainty: the investigator continues to think—often against all outward appearances—that behind the apparent chaos there lies a coherence which is there to be uncovered. It is this confidence, this 'faith', that allows the person investigating to relaunch the research. This may then lead to the acceptance of a change of theory; a resolution to alter one's way of thinking; the rejection of one hypothesis in favour of another, which may have less aesthetic attraction but is more faithful to the results. It is this 'move' which constitutes the 'salt' of scientific research; it is what purifies and at the same time gives savour and taste. Such an 'experience' is what the research scientist seeks, fears and welcomes.

To experience such a 'collapse' in the way one thinks is, to my mind, quite close to something that happens in normal life, though certainly at a more physical and vital level. We find from time to time that the 'hypotheses' we took for granted, that is to say the certainties on which we relied, the affections and friendships that formed our lives, are no longer there. There are moments when even the reasons we have for living break down. We can no longer rely on our former ways of thinking about ourselves, our world, the universe, the human race, our relations with others, with society, with the Church and … with God.

This is what happened to many figures in the long history of the Bible: Adam in the garden, Cain with the death of Abel, Abraham about to sacrifice Isaac, Moses on Mount Sinai, Elijah on Mount Horeb, Jonah in Nineveh, and … Jesus on the cross. The Gospels provide a narrative of the life of Jesus of Nazareth in which he is very soon aware that he is on the road to a certain death. He might have been represented as moving towards his death with the certainty that he was dying for a good cause, surrounded by his friends and members of his group. But that is not the case: instead he is abandoned by all. Again, he might have figured as the Jewish prophet, unjustly condemned to die. But he is not even allowed that sort of death: it is not a Jewish death by stoning, but crucifixion, a Roman death reserved for slaves. God Godself abandons Jesus, as is clear from his cry from the cross.

What we learn from the Gospels is that at the very moment when all the certitudes that Jesus might have had about God, his people and himself are obliterated, he is given the power to 'cross over' and forgive. And so we believe that it is because of this that he is the first risen from the dead, that he is the Son of God and that he grants us existence. Following him, we also can cross over all the deaths that are to come, all those trials which seem bereft of meaning. Jesus is the 'ferryman of Gethsemane'.[7]

Human Experience: Believing and Knowing

My correlation of the experience of the research scientist with that of the believing Christian is not intended to be apodeictic. It is not as if it is possible to deduce a certain spirituality from science, nor that science can be conscripted into the Christian fold—as if anyone doing such research was, without knowing it, a Christian. My modest claim is that it is possible to focus on research from a spiritual angle. In this way one may at least locate the respective places of knowing and believing in our contemporary culture, and perhaps even come to speak about God in a novel way.

Our contemporary culture is packed with factual knowledge and at the same time full of uncertainties. Never before have we known so

[7] The beautiful expression is borrowed from Emmanuel Falque, *Le passeur de Gethsémani. Angoisse, souffrance et mort: lecture existentielle et phénoménologique* (Paris: Cerf, 1999).

much about the origins of the universe, of life and of humanity yet, despite such a wealth of information, been so fearful of the future. Indeed one seems to reinforce the other; such is the case nowadays with regard to the future of our planet. What is the good of all this information if we no longer understand how to live?

I am convinced that a proper definition of the role of science in contemporary society will allow us to understand that 'knowing is not enough for living'. No matter how precisely we are able to establish where living beings on the earth came from, and just how biological life starts and ends, such information will tell us nothing about how to live in a way worthy of a human being. For this we need to make a commitment—a decision—and to have a certain confidence. Science has nothing to say about morals. Rather it needs to be informed by them—as is clear with problems of bioethics today. Our contemporary scientific knowledge is not, at least as far as I can see, a threat to the existence of humanity, nor indeed to belief in God. On the contrary, it is a call to vigilance and action on our part, with confidence in the future. The great temptation is to neglect such vigilance and confidence and to take refuge in 'knowing', as if believing that there is some overall explanation: and whether it comes from the sciences or from religion is beside the point.

Science has nothing to say about morals

A Christian has to be well aware of this temptation to *know*, because it is a theme that runs right through the Gospels: 'And if anyone says to you at that time, "Look! Here is the Messiah!" or "Look! There he is!"—do not believe' (Mark 13:21). To believe in the Son of Man one needs to some extent *not* to know. Such 'non-knowing' is not ignorance, but an avoidance of credulity. Any following of the gospel message is not a process of knowing: either in competition with or in accordance with other ways of knowing. In fact, in today's world to *believe* is more likely to be a rejection of reductive explanations, the 'nothing-but' talk that surrounds us. Instead faith seeks to defend, at any price, a primordial not-knowing with regard to evil, death and life. No! Death cannot be explained simply by biology, nor evil by history (see Job), nor life just by genes—not even by God, since God is not the explanation of the world.

What Room Is There for God and for Hope?

There was a time when, in order to keep a place for God in the midst of scientific explanations, one spoke of God as the great clock-maker or as a huge computer, or even as a sort of fundamental element required to ensure the coherence and functioning of the cosmos. Historically, this was the epoch of deism. Then, gradually, that God was pushed further and further into the margins, as the need for Him as an explanation was replaced by other theories, until finally scientists got rid of any God 'residue'. Is it, however, really necessary to keep some 'place' for God?

Here we return to that piercing old question of the Psalms, 'Where is your God?' (Psalms 42:3). In the face of never-ending misfortune, and so much of it unbearable, is it still acceptable to speak of God and of hope? We can, of course say 'No!' and pass on to more 'serious' matters, or simply do our duty in life. But, in my view, the Christian has to continue asking the question while avoiding the temptation to reply as if endowed with some lofty knowledge, as if the Divine was somehow the underwriter for some magnificent metaphysical construction or provided an explanation for all universal laws and constants. Such knowledge sidesteps any belief in God …. This is exactly what happens in the case of the demons in the Gospel: 'I know who you are, the Holy One of God' (Mark 1:24), says the unclean spirit of the man possessed, and Jesus silences him. These demonic words are those of one who *knows*. They speak a limited truth which does violence to the truth of commitment and trust: far better to reject it!

'Where is your God?' I would suggest that one has to reverse the question, as happens so often when reading the Bible. That is the case when I read the well-known chapter 7 of the Second Book of Samuel. There we hear the story of David, finally crowned and installed in his palace in Jerusalem, who wants to build a house for God. As he says to the prophet Nathan, 'I am living in a house of cedar, but the ark of God stays in a tent'. Nathan replies to the King, 'Go, do all that you have in mind: for the Lord is with you'. But that same night, 'The word of the Lord came to Nathan,

> Go and tell my servant David: Thus says the Lord: Are you the one to build me a house to live in? …. The Lord declares to you that the Lord will make you a house. (2 Samuel 7:5, 11)

I interpret this message as follows: 'You are living in a new world, defined by science and its explanations. And now, as a believing inhabitant of that world, you would like to find somewhere to put God, a locus for God. The temptation is to allocate a role for God: God could be the one who flicked his finger to start the Big Bang, or God might be the author of universal constants in the cosmos, the expert who drew up the programme whereby life began, some sort of superior Intelligence ("intelligent design"), or God could even have retired to enjoy himself as the great clock-maker …. Well, God is telling you that it is God, Godself who will make a home for you.' In other words, to live as a Christian in the world today does not mean locating God within some coherent, non-contradictory explanation of the universe, but instead trusting in God's word and in God's promise that it will be possible tomorrow to have our home in this world, and to dwell therein,[8] even if it has become troubling and full of risks because of science and new technologies, even if it is 'materialistic' ….

Within today's society, caught between the sciences and technological progress, the name we must give to Christian confidence is 'hope'. As Christoph Theobald has said,

> The evolution taking place in civilisations, the phenomenon of globalisation and the techno-scientific upsurge in everyday life is pushing the spiritual traditions of the human race back into their final corners and is forcing Christianity to take a more radical grasp on hope …. This hope is the only 'reasonable' act capable of preserving the moral purpose of the universe even in the very abyss of evil and tested by the its own immensity.[9]

To back up his position, Theobald relies on a reading of St Paul's epistle to the Romans (4:18), where Paul presents Abraham as 'hoping against hope'. This hope is a liberation, 'for it makes us emerge both from the fear that death inspires, and also from the fascination that its overcoming can hold over us', and by that is understood the

[8] In classical Greek, the word for house is *oikos*, whence comes the term 'ecology'. And the deeper meaning of ecology is therefore that every living being should come to live in the world as in a real *home*.

[9] Christoph Theobald, 'Entre fascination pour les techno-sciences et craintes écologiques, quelle espérance?' text of a talk given to the Colloque du Réseau Blaise-Pascal, 28–28 March 2009, *Connaître*, 31–32, 'Faire confiance à la science?' (July 2009), available at http://evry.catholique.fr/IMG/pdf/connaitre_31_32.pdf.

fascination and the fear—both quasi-religious—that the technosciences can inspire.

We believe that humanity can face up to death and not be overwhelmed by it, not even by our own scientific and technical knowledge, provided we remain vigilant, thanks especially to this 'basic research'.

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