What is important in this vignette is that it was the man of faith, a Jesuit priest, who provided the theoretical account that matched the empirical evidence, while it was the atheist who resisted that account because of his ideological commitment to atheism, developing an alternative account with no empirical basis, and holding on to it well after conclusive evidence had convinced most in the field of his error. This is not a story of atheistic and scientific reason slaying the irrational man of faith, but quite the opposite. Hoyle's atheism blinded him to the evidence and caused him to reject the scientific advance made by Lemaitre. Commenenens have indeed suggested that Lemaitre's faith made him more open to the possibility of a universe with a finite existence, and hence more open to follow where good theory and mounting evidence took him.

The other interesting thing to note here is that the notion of a Big Bang allowed the metaphor of evolution to be extended well beyond the realm of the biological world where it originally resided to provide an account of the universe as a whole. Not only did life evolve on our planet, the whole universe evolved over a period of some 15 to 25 billion years. This goes beyond theories of natural selection and genetic inheritance, to uncover a dynamic within the cosmos towards greater complexity. It is precisely this sort of possibility that influenced the religious vision of Teilhard de Chardin, and continues to inform the thinking of theistic evolutionists ever since. Lemaitre's discovery has changed the way we view the whole universe, far beyond the original scope of Darwin's insight into biological evolution.

Conclusion

These three stories are good examples of people of faith making significant contributions to the development of modern science and the way we look at the world. Mendel in the field of genetics, de Chardin in the area of human evolution, and Lemaitre in the area of modern cosmology. One might go so far as to say each contribution was ground-breaking. Each was supported by their religious community to pursue their scientific endeavours, and each was deeply committed to their Christian faith, leading lives of regular prayer, liturgy and other forms of religious observance. Their scientific work was not seen as problematic or outrageous by Church authorities, though de Chardin’s non-scientific writings did cause him problems. In fact the Catholic Church itself has a long history of supporting people in scientific research, a point tacitly admitted by Dawkins, particularly through religious orders such as the Jesuits. There is a larger story here to tell of Christian support for scientific research and we need to reappropriate this history as a counter-narrative to the dominant ideology that faith and science are implicitly opposed.

30 In fact Lemaitre was elected to the Pontifical Academy of Sciences in 1934, and became its president in 1960. His work on the Big Bang received special mention by Pope Pius XII.

Uncertainty in Science and Belief in God

George Emelius

The elusive horizon of the sublime

One obvious argument for the plausibility of atheism is the ability of science to provide natural explanations of phenomena once regarded as supernatural, and once responded to in superstitious ways. If a person takes the position that anything we can give meaning to is at least in principle accessible to scientific investigation, then scientific progress deems the supernatural to inevitable and final redundancy. Such atheist belief is in tension with the belief shared by many people that human awareness and ability to understand will always encounter boundaries and limitations. It is also in tension with the widely shared intimation that the universe and all in it, including human life, have some sort of deeper meaning and purpose. Scientific method, however, neither invokes nor explores questions of ultimate purpose or meaning. In this paper I raise questions about limits of scientific methodology, about the uncertain nature of nature itself, and about how we use language in scientific and religious discourse. I argue that it is consistent with scientific insights that on their own they will continue to leave humankind in a position of astonishment, and that intuition and imagination will for ever point beyond current knowledge. When imagination is open to the unknown and unknowable, whether in science or religion, productive conversation between them is possible.

In his book The God Delusion, Richard Dawkins writes that it may be possible to be religious without belief in the supernatural. Many people would identify with his observation that ‘a quasi-mystical response to nature and the universe is common among scientists and rationalists.’ His then makes the more questionable assertion that such a response has ‘no connection with supernatural belief’. Dawkins himself, as a scientist and rationalist who shares that common sense of awe, recognizes it as religious in character. To make this point he quotes Einstein’s thoughts on what religion meant to him, and finds resonance with his own religious experience.

‘To sense that behind anything that can be experienced there is something that our mind cannot grasp and whose beauty and sublimity reaches us only indirectly and as a feeble reflection, this is religiousness. In this sense I am religious.’ Dawkins continues: ‘In this sense I too am religious, with the reservation that ‘cannot grasp’ does not have to mean ‘forever ungraspable’.

I sense a certain winful faith on Dawkins’ part—a hopefulness that humankind is, at least in principle, on the road towards a grand ‘theory of everything’. However, I believe that to be highly unlikely, for at
least three inter-related reasons.

Firstly, the human mind may remain inescapably limited, even amongst the most creative and technologically supported parts of humankind. Indeed, it may be incapable of ever constructing a true 'theory of everything', even if 'everything' is assumed to be limited to that which is potentially accessible to scientific investigation. No doubt there will be insights and understandings developed in the future which are beyond our imagination today. Questions for research will arise that we do not even know to ask today. However, on experience to date, answers to research questions are more likely to raise more questions than to bring knowledge to some sort of satisfactory completeness.

Secondly, there is much in human experience that resists rational explanation, and may well for ever do so. It is, for example, perfectly possible to construct an explanatory scaffold of sociological, psychological and other scientific insights around the deeply significant experiences of relationship which are so important to being human. However, these insights do not make up the experiences themselves.

Thirdly, nature itself is often on trajectories that are open-ended, for ever creating and revealing the new and the unpredictable. In that case too, that 'something that our mind cannot grasp' may for ever alluringly appear on the retreating horizons of human awareness.

Reducing anything and everything to laws and component parts of which we have understanding—be they laws of physics, atoms, neurons, or something else—is increasingly understood as an inadequate way of understanding much in nature. The last few decades have seen development of a deeper understanding of how and why so much we are aware of has inherent uncertainty and open-endedness. It is to this contemporary challenge to reductionist thinking which we now turn.

The end of certainty and some limits of science

In the last few hundred years, there have been several occasions where particularly successful science has led to popular extrapolations of ideas well beyond where their applicability was properly established. For example, in the mid seventeenth century, Descartes speculated that the bodies of animals, including humans, could be regarded as complicated machines governed by the laws of physics. By the end of that century, the extraordinary success of Newton's mathematical formulation of mechanics further encouraged mechanical, deterministic, reductionist ways of imagining nature. In such a view, since universal laws determine how the universe changes over time, if sufficient is known about its present state, its history may be deduced and future predicted. Similarly, the laws of physics which control man-made machines were supposed to control all features of nature imagined as machine-like. Most of nature, however, is immensely more complicated than the gross astronomical features dealt with by celestial mechanics, or than machines ever devised by humans. This is particularly obvious with life.

The tension between a deterministic world-view and the behaviour of living beings reaches its most acute form in human decision making and action. It is a tension which has exercised philosophers and theologians alike. As Ilya Prigogine, who was awarded the 1978 Chemistry Nobel Prize for his work on non-equilibrium thermodynamics notes:

Again and again, the great thinkers in Western traditions, such as Immanuel Kant, Alfred North Whitehead, and Martin Heidegger, felt they had to make a tragic choice between an alienating science or an antiscientific philosophy. They attempted to find some compromise, but none proved to be satisfactory.

A possible reason for the lack of satisfactory deterministic explanation of how living organisms function is to say that the amount of information required is simply too great to retrieve or to compute. However, the assumption that underlying determinism exists and is only hidden by human limitations is not necessarily correct. If it is not correct, it becomes a barrier to deeper insights into the relationship between the behaviours of living organisms and their underlying physical functioning. Karl Popper identifies the depth of this problem when it comes to understanding what it is to be human:

I regard Laplacian determinism—confirmed as it may seem to be by the prima facie deterministic theories of physics, and by their marvellous success—as the most solid and serious obstacle to our understanding and justifying the nature of human freedom, creativity, and responsibility.

During the last century, the limits of conditions under which the laws of physics support determinism have been increasingly understood. In the 1920s, the development of quantum mechanics showed that the atomic scale matter behaves probabilistically, and the determinism assumed by classical physics depends on averaging atomic-level probabilities over the very large numbers of atoms found in everyday size objects. By the last few decades of the twentieth century, it became increasingly apparent that deterministic descriptions also fail for many complex entities, including all living things. Determinism is typically derived from 'bottom up' descriptions. With a machine this works, because its behaviour is determined by how its parts are designed, how they interact and what energy is available. For a machine, a complete description of behaviour in terms of matter, energy and design is possible. Such a description is, however, complete in a specific and limited sense. In particular, it does not address the almost limitless context of human consciousness and inventiveness which led to its conception and construction, and the multiple ways in which its construction and use affect the total earth environment. A great many things in nature, including ourselves and our human affairs are not even amenable in principle to a closed, reductionist description of behaviour. We say they have 'incredibly complex', meaning that we cannot simply reduce how they are and what they do to the sum of their parts, and ultimately to
Embracing unity and an open-ended future

Developing insight into how complex entities evolve and new forms of being emerge, offers a conceptual framework which draws the physical sciences, life sciences and humanities into a single unity. In particular, it offers a way of conceptualizing continuity between biological and cultural evolution, including evolution of human reflective consciousness. Once reflective consciousness is recognized as an emergent attribute, so too is spiritual awareness, at least in the sense which Peacocke describes:

These emergent properties include...mental and personal ones and, I would add, spiritual ones—by which I mean the capacity to relate personally to that Ultimate Reality that is the source and ground of all existence...and in English that reality is 'God'.

The concepts of complexity and emergence challenge the view that the total universe may ultimately be explained in terms of matter, energy and the laws of physics. Science does give a robust description of how material things, whether living or non-living, do depend on this underlying physics for their embodiment. However, there are also emergent characteristics which do not follow these laws or, indeed, any specific laws, and which may take on a 'life of their own', independent of their original embodiment. Human creativity, for example, leads to abundant cultural expressions which evolve in different ways in different cultural environments. Such cultural expressions may be preserved and transmitted on many platforms, and there is no obvious reason why some could not continue to evolve in non-human environments of consciousness which may yet evolve, or of which we are unaware.

Even in its present form, understanding of complexity points towards open-ended trajectories of evolution of life and culture. It is credible that in future new and currently unimagined levels of being may emerge, or may be recognized as present all along. So imagined, the age-old intuitive dualisms between body and soul, the natural and supernatural and the material and spiritual may be subsumed into evolving awareness of a greater reality. Neither the natural nor the supernatural needs to be subordinated to or explained by the other, but each at presently conceived may be seen a limited expression of that something greater which Einstein expressed—'something that our mind cannot grasp and whose beauty and subtlety reaches us only indirectly and as a feeble reflection.' Others may choose the language of religious tradition.

An open door for conversation?

Recognition that there are limits to human comprehension and that there are deeply embedded uncertainties in nature itself are no reason to hold back from exploring issues often held to be particularly sacred, such as the origins of the universe or the beginnings of life. Rather, it is recognition that there is no fundamental incompatibility between scientific thinking and belief that, in and beyond which

---

2 Santa Fe Institute, http://www.santafe.edu/ Accessed 15 June 2011. One research centre is the Santa Fe Institute for the Study of Complexity. A search of its resident and external faculty gives insights into the scope of current research on complex systems.
5 The emphasis here is on 'conceptualizing'. Many features and significant gaps, such as the beginnings of life and the nature of consciousness, remain scientifically unresolved even of active research.
6 Peacocke, 'Complexity, Emergence, and Divine Creativity', pp. 197–198.
is accessible to scientific investigation, there is something more enduring and ultimate. Such recognition also suggests that it would be unwise to shut out the possibility of deeper layers of being and becoming, for there is likely much more going on than we currently have a rational grasp of, or indeed may ever have. It also is no excuse to avoid critical thought on the perceived supernatural in religious traditions. In engaging with our religious heritages, there are numerous questions which need to be asked, and are asked. These include questions about the cultures and world views within which sacred scriptures were formed, the use of language in religious tradition and expression, the evolution of liturgy and ritual, the many ways in which these are received and given expression today, and how beliefs influence how people live individually, in community, and in the wider world. Indeed, variations of these questions may be asked of all human heritage.

I believe that I am not advocating for belief in God based on unresolved gaps in scientific knowledge, nor from belief in imprints of intelligent guidance in evolution. Rather, I believe that the ‘something that our mind cannot grasp and whose beauty and sublimity reaches us only indirectly and as a feeble reflection’ permeates all that we can be aware of—the physical universe and all in it—and that which humans might yet become aware of, and indeed that which humans may never be aware of. When the limitations of both science and religion are accepted, and each is open to critical thought and creative imagination, I am convinced that each has much to learn from the other. However, even when there is such openness, there is still much work to do in order to enable constructive conversation, not least in exploring how language is used in different kinds of discourse. Scientific use of language is quite specific and limited in aim. Scientific work depends on observational evidence which may either support or not support a hypothesis or a theory. In this context, true or false, real or imaginary, or probable within limits, are all descriptions with specific meaning, usually linked to mathematical modelling and statistical analyses. In contrast, the language we use for how we feel about each other, or how we experience much else in life, commonly requires metaphor, analogy and other ways of speaking which are not literally true. The fruits of imagination so expressed attempt to describe experientially real and often shared feelings and perceptions for which the language of true and false may be entirely inappropriate. The difficulty of finding language to express intuition of the unknown and unknowable is even greater. In Einstein’s saying which we have already quoted, he uses the metaphor of a ‘feeble reflection’ to express his intuition that there is a greater, sublime and beautiful ‘something’ which is beyond our human understanding. It is the same metaphor used by St. Paul long before, when he described his awareness of God as like ‘puzzling reflections in a mirror’. As Simon Oliver observes:

One of the most obvious ways in which we speak of God is figuratively or metaphorically. We might understand metaphor in a number of ways, but most generally it should be observed that metaphors are literally false. Yet they certainly carry a weight of truth which we would struggle to express in purely literal speech.

17 Scientific theories and models present a similar problem. They provide frameworks for deducing new possibilities, but how they are formulated imposes limits on what is deducible from them. Sometimes progress requires imagining beyond the theory, no matter how successful and well accepted it is.
18 Ian Detto, Christ in Evolution, Maryknoll, Orbis, 2008, p. 31.
into theological studies and research. To those who will see, there is already lively and productive critical discourse between science and theology supported by a wealth of resources and continually challenged by new ideas.

Questioning the Gods?
Religious diversity and atheism in public life
John G. Quitter

In this paper I argue that a common kind of atheistic challenge to the legitimacy of the religious voice in the public square is less than convincing. I concentrate on the kind of argument which claims that because an advocate of a view has a religious reason for the view, their contribution to public debate is illegitimate in a liberal democracy. This is not so I shall argue. I further argue that there is a more important challenge that religious thinkers need to face if they are to confront public debates constructively. I argue that it arises out of the diversity of religions in contemporary liberal democracy.

Does atheism rule out the legitimacy of religious voices and works in the public forum?

Assume God does not exist and that there are no supernatural other-worldly beings of any other kind. There may be intelligent life elsewhere in the universe but I take it that, at least in the near future, this fact is unlikely to have much bearing on how we live together in a shared, politically organised social life. What follows from God’s non-existence? Imagine that there are those who believe, wrongly, that God does exist and that s/he has revealed herself somehow and what s/he wants of us and for us to live well and enjoy company with God. If there is no God of any kind, does it follow that these folks should not have a say in how they live together in that shared, politically organised social life along with others who do not believe such things?

Liberal Democracy 101

I have to say, I cannot see why they should not have a say and bring to bear their mistaken beliefs, even if they are mistaken, in the formation of the say they have. Our shared social life is one governed by democratic and egalitarian principles founded in the history of religious tolerance that arose out of the conflicts over religion in Europe during the sixteenth and seventeenth centuries. On its basis, we even allow those who have not just wrong beliefs, but wacky beliefs, to have a say for their wacky reasons—like the Shooters, the climate change deniers of this world, the Wrenworth Group, and so on. It is a free country, as they say, and so, our fellow citizens have the freedom to be wrong, or even right, but for wrong reasons. So that Catholics, Anglicans, the Uniting Church and other mainstream Christian, Jewish and Islamic believers should put in their ten cents’ worth in our political and public life is not to be criticised ipsis factis. On matters of public importance such as Aboriginal reconciliation, whether to change the law to permit medical active killing on request, the care of the environment and management of climate change, the treatment of asylum seekers who arrive by boat and the like, religious people have as much right to enter the lists of public debate, with their own arguments and reasons, as any citizen. I take it that no fair-minded person denies this. So, the assumption that God does not exist does not imply that those who believe God does exist are not entitled to have their say and put their arguments for their preferred social decisions, even if these involve some reference to something which does not exist. I take it they would be no worse off than the Marxists who still believe in the essentials.