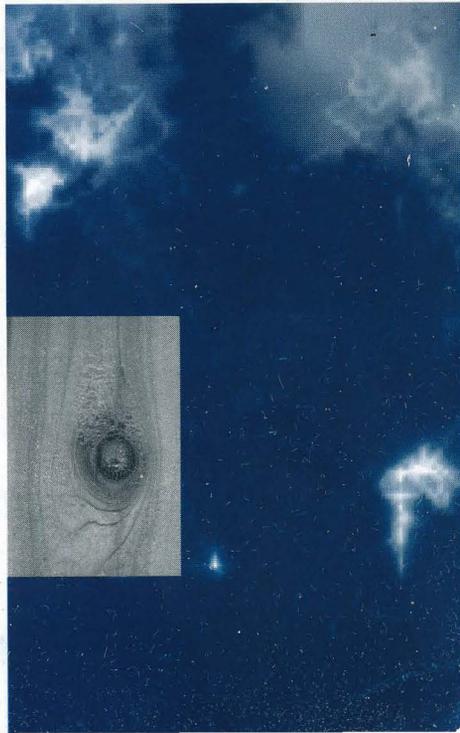
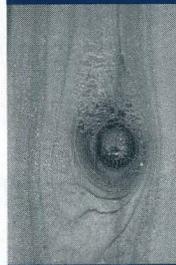




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Contents

	page
Editorial	2
The Challenge of Sustainability	- Sir John Houghton 3
Einstein, God and Time	- Jason Runyan and Justin Walker 17
	- A.B. Robins 21
Book Reviews	24
Cumulative Index Part 5: He - Rese	30
Faith and Thought - Application for Enrolment	36

Editorial

Much has been written and talked about in recent months on the subject of making poverty history. But what about trying to make greed history? I received the following from missionary friends in Ghana.

After Bible Study one Tuesday, Gladys gave me two enormous yams to help with my visitors. I said, "Do you have these to spare?" She looked amazed at my question and I felt humbled by her reply, "I should not give what I have to spare but because I have". How this made me think. Do I give what I have to spare or do I give just because I have?

Today, as we stopped by the side of the road to picnic inside the car, we were aware that a group of about ten very poorly dressed children was coming towards us. We had the car windows down and were eating. As they came closer they formed a group obviously discussing something to do with us. They approached. Were they going to ask for money? As they came nearer they showed us they had some yellow berries, about the size of a cherry, in their hands and they were eating. They approached the car to offer one to each of us. We accepted and realised we had half a container of *Pringles*, a luxury our son Michael had bought us the day before, so I shared these among them. They were delighted and went off to share them among themselves having never tasted anything like this. They returned and we gave them the empty container, an empty cheese box and a small empty tin which pleased them greatly and I was given another berry. They had nothing but their generosity. I thought of the boy with his five loaves and two fishes as they, like him, had little but generously gave what they had. The berries tasted delicious too. Let us learn from those materially poorer than ourselves. Let us try to Make Greed History.

As Christians we must be in the forefront of concern for the welfare and sustainability of the world God has entrusted to our care. In his presidential address, which is the main article in this issue, Sir John Houghton has focussed on the challenge of sustainability and our Christian response to it.

We welcome comments on this and other issues raised in the journal.

The Challenge of Sustainability

Victoria Institute Presidential Address

(1 October 2005)

Sir John Houghton

I am honoured to be following in a highly distinguished line of Victoria Institute Presidents. The first President, the Earl of Shaftesbury, was active in combating exploitation of the poor in areas of newly industrialized England. The second President, Sir George Stokes, President of the Royal Society and Lucasian Professor of Mathematics at Cambridge contributed to many areas of geophysics, including the formulation of the basic fluid-dynamical equations, known as the Navier-Stokes equations that govern the circulations of the atmosphere and the oceans. He also wrote a substantial work on Natural Theology. The work of both these Presidents, who between them took the Institute from its beginning in 1865 to the beginning of the 20th century, is strongly connected to the topic of my lecture today. Sir George assisted in setting up foundations of the scientific understanding of the earth's climate and Lord Shaftesbury assisted in awakening the conscience of Christians to major issues of social concern especially those arising from industrialization.

Sustainability, the title of my lecture today is an enormous subject and much talked about in our time. I first want to say a little about what it means, then try and give you some indication of its breadth and importance and then concentrate on climate change and energy where the challenge of sustainability is most acutely felt.

What is sustainability?

Imagine you are a member of the crew of a large space ship on a voyage to visit a distant planet. Your journey there and back will take many years. An adequate, high quality, source of energy is readily available in the radiation from the sun. Otherwise, resources for the journey are limited. The crew on the spacecraft are

4 FAITH AND THOUGHT

engaged for much of the time in managing the resources as carefully as possible. A local biosphere is created in the spacecraft where plants are grown for food and everything is recycled. Careful accounts are kept of all resources, with especial emphasis on non-replaceable components. That the resources be *sustainable* at least for the duration of the voyage, both there and back, is clearly essential.

Planet Earth is enormously larger than the spaceship we have just been describing. The crew of Spaceship Earth at six billion and rising is also enormously larger. The principle of Sustainability should be applied to Spaceship Earth as rigorously as it has to be applied to the much smaller vehicle on its interplanetary journey. Professor Kenneth Boulding a distinguished American economist was the first to employ the image of Spaceship Earth. In a publication in 1966 he contrasted an 'open' or 'cowboy' economy (as he called an unconstrained economy) with a 'spaceship' economy in which sustainability is paramount.¹

Sustainability is a word that not only concerns physical resources. It is also applied to activities and communities. Because I am a scientist and my audience are mostly scientists, in this lecture I shall mostly be concerned with sustainability of resources and of our environment. However, it is increasingly important to realize that environmental sustainability is also strongly linked to social sustainability - about sustainable communities - and sustainable economics. *Sustainable Development* provides an all-embracing term. The Brundtland Report, "Our Common Future" of 1987 provides a milestone review of Sustainable Development issues.

There have been many definitions of Sustainability. The simplest I know is 'not cheating on our children'; to that may be added, 'not cheating on our neighbours' and 'not cheating on the rest of creation'. In other words, not passing on to our children or any future generation, an Earth that is degraded compared to the one we inherited, and also sharing common resources as necessary with our neighbours in the rest of the world and caring properly for the non-human creation.

Crisis of Sustainability

The human activities of an increasing world population - now at 6 billion - together with the accompanying rapid industrial development, are leading to degradation of the environment on a very large scale. However, some deny that degradation is happening; others deny that degradation matters. Scientists have an important role in ensuring the availability of accurate information about degradation and also in pointing to how humans can begin to solve the problems.

Many things are happening in our modern world that are just not sustainable². In fact, we are all guilty of cheating in the three respects I have mentioned. The box lists five of the most important issues, briefly showing how they are all connected together and also linked to other major areas of human activity or concern. To

illustrate these connections let me use the example of deforestation. Every year tropical forest is cut down or burnt equivalent approximately to the area of the island of Ireland. Some is to harvest valuable hardwoods unsustainably; some is to raise cattle to provide beef for some of the world's richest countries. This level of deforestation adds significantly to the atmospheric greenhouse gases carbon dioxide and methane so increasing the rate of human induced climate change. It is also likely to change the local climate close to the region where the deforestation is occurring. For instance, in the Amazon if current levels of deforestation continue, some of Amazonia could become much drier, even semi-desert, during this century. Further, when the trees go, soil is lost by erosion; again in many parts of Amazonia the soil is poor and easily washed away. Tropical forests are also rich in biodiversity. With loss of forests there will be much irreplaceable biodiversity loss.

Important Sustainability Issues

- Global Warming and Climate Change; linked to Energy, Transport, Biodiversity Loss, Deforestation;
- Land Use Change; linked to Biodiversity Loss, Deforestation, Climate Change, Soil loss, Agriculture, Water
- Consumption; linked to Waste, Fish, Food, Energy, Transport, Deforestation, Water
- Waste; linked to Consumption etc
- Fish; linked to Consumption etc

All these issues therefore present enormous challenges. For much of the rest of the lecture I want to address in some detail the issue with which I have been most concerned, namely that of global warming and climate change, explaining the essential roles of both science and faith in getting to grips with it.

Global Warming and Climate Change

A hundred years ago, the French painter, Claude Monet spent time in London and painted wonderful pictures of the light coming through the smog. London was blighted by *local pollution* - from domestic and industrial chimneys around London itself. Thanks to the Clean Air Acts beginning in the 1950s, those awful smogs belong to the past - although London's atmosphere could be still cleaner. Global Warming and Climate Change is about *global pollution*, emissions of gases such as carbon dioxide to which we are all contributing that spread around the whole atmosphere and affect everybody. Global pollution requires global solutions.

6 FAITH AND THOUGHT

I start with a quick summary of some of the science of Global Warming³. By absorbing infra-red or 'heat' radiation from the earth's surface, 'greenhouse gases' present in the atmosphere, such as water vapour and carbon dioxide, act as blankets over the earth's surface, keeping it warmer than it would otherwise be. The existence of this natural 'greenhouse effect' has been known for nearly two hundred years; it is essential to the provision of our current climate to which ecosystems and we humans have adapted.

Since the beginning of the industrial revolution around 1750, one of these greenhouse gases, carbon dioxide has increased by over 30% and is now at a higher concentration in the atmosphere than it has been for at least half a million years. Chemical analysis demonstrates that this increase is due largely to the burning of fossil fuels - coal, oil and gas - especially in the industrial, buildings and transport sectors, about one third from each. If no action is taken to curb these emissions, the carbon dioxide concentration will rise during the 21st century to two or three times its preindustrial level. Human activities have also led to a doubling in the atmosphere of the amount of methane, also a greenhouse gas (although less important than carbon dioxide) over the past 200 years.

The climate record over past centuries shows a lot of natural variability including, for instance, the 'medieval warm period' around 1300 and the 'little ice age' around the period 1600 -1800. The rise in global average temperature of about 0.7 °C (and its rate of rise) during the 20th century is well outside the range of known natural variability. The year 1998 is the warmest year in the instrumental record. A more striking statistic is that each of the first 8 months of 1998 was the warmest on record for that month. There is strong evidence that most of the warming over the last 50 years is due to the increase of greenhouse gases, especially carbon dioxide. Confirmation of this is also provided by observations of the warming of the oceans⁴.

Over the 21st century the global average temperature is projected to rise by between 2 and 6 °C (3.5 to 11 °F) from its preindustrial level; the range represents different assumptions about emissions of greenhouse gases and about the sensitivity of the climate model used in making the estimate. For *global average* temperature, a rise of this amount is large. Its difference between the middle of an ice age and the warm periods in between is only about 5 or 6 °C (9 to 11 °F). So, associated with likely warming in the 21st century will be a rate of change of climate equivalent to say, half an ice age in less than 100 years - a larger rate of change than for at least 10,000 years. Adapting to this will be difficult for both humans and many ecosystems.

Talking in terms of changes of global average temperature, however, tells us rather little about the impacts of global warming on human communities. Some

of the most obvious impacts will be due to the rise in sea level that occurs because ocean water expands as it is heated. The projected rise is of the order of half a metre (20 inches) a century and will continue for many centuries – to warm the deep oceans as well as the surface waters takes a long time. This will cause large problems for human communities living in low lying regions. Many areas, for instance in Bangladesh (where about 10 million live within the one metre contour), southern China, islands in the Indian and Pacific oceans and similar places elsewhere in the world will be impossible to protect and many millions will be displaced.

There will also be impacts from extreme events. The extremely unusual high temperatures in central Europe during the summer of 2003 led to the deaths of over 20,000 people. Careful analysis leads to the projection that such summers are likely to be average by the middle of the 21st century and cool by the year 2100.

Water is becoming an increasingly important resource. A warmer world will lead to more evaporation of water from the surface, more water vapour in the atmosphere and more precipitation on average. Of greater importance is the fact that the increased condensation of water vapour in cloud formation leads to increased latent heat of condensation being released. Since this latent heat release is the largest source of energy driving the atmosphere's circulation, the hydrological cycle will become more intense. This means a tendency to more intense rainfall events and also less rainfall in some semi-arid areas. Since, on average, floods and droughts are the most damaging of the world's disasters, their greater frequency and intensity is bad news for most human communities and especially for those regions such as south east Asia and sub-Saharan Africa where such events already occur only too frequently. It is these sorts of events that provide some credence to the comparison of climate with weapons of mass destruction.

Sea level rise, changes in water availability and extreme events will lead to increasing pressure from environmental refugees. A careful estimate⁵ has suggested that, due to climate change, there could be more than 150 million extra refugees by 2050.

In addition to the main impacts summarised above are changes about which there is less certainty, but if they occurred would be highly damaging and possibly irreversible. For instance, large changes are being observed in polar regions. If the temperature rises more than about 3 °C (~5 °F) in the area of Greenland, it is estimated that melt down of the ice cap would begin. Complete melt down is likely to take 1000 years or more but it would add 7 metres (23 feet) to the sea level.

8 FAITH AND THOUGHT

A further concern is regarding the Thermo-Haline Circulation (THC) – a circulation in the deep oceans, partially sourced from water that has moved in the Gulf Stream from the tropics to the region between Greenland and Scandinavia. Because of evaporation on the way, the water is not only cold but salty, hence of higher density than the surrounding water. It therefore tends to sink and provides the source for a slow circulation at low levels that connects all the oceans together. This sinking assists in maintaining the Gulf Stream itself. In a globally warmed world, increased precipitation together with fresh water from melting ice will decrease the water's salinity making it less likely to sink. The circulation will therefore weaken and possibly even cut off, leading to large regional changes of climate. Evidence from paleoclimate history shows that such cut-off has occurred at times in the past. It is such an event that is behind the highly speculative happenings in the film, *The day after tomorrow*.

I have spoken so far about adverse impacts. You will ask, 'are none of the impacts positive?' There are some positive impacts. For instance, in Siberia and other areas at high northern latitudes, winters will be less cold and growing seasons will be longer. Also, increased concentrations of carbon dioxide have a fertilising effect on some plants and crops which, providing there are adequate supplies of water and nutrients, will lead to increased crop yields in some places, probably most notably in northern mid latitudes. However, careful studies demonstrate that adverse impacts will far outweigh positive effects, the more so as temperatures rise more than 1 or 2 °C (2 to 3.5 °F) above preindustrial values.

How sure are we about the scientific story I have just presented? The world scientific community has carried out the most thorough assessments of the science and likely impacts of human induced climate change through the work of the Intergovernmental Panel on Climate Change (IPCC) - formed jointly by the World Meteorological Organisation and the United Nations Environment Programme in 1988. I had the privilege of being chairman or co-chairman of the Panel's scientific assessment from 1988 to 2002. In its reports⁶ the IPCC has honestly and objectively distinguished what is reasonably well known and understood from those areas with large uncertainty. No assessments on any other scientific topic have been so thoroughly researched and reviewed. The Academies of Science of the world's eleven most important countries (the G8 plus India, China and Brazil) has recently issued a statement endorsing the IPCC's conclusions⁷. The account I have presented here is largely based in the IPCC's reports.

Unfortunately, there are strong vested interests that have spent tens of millions of dollars on spreading misinformation about the climate change issue. First they tried to deny the existence of any scientific evidence for rapid climate change due to human activities. More recently they have largely accepted the fact of anthropogenic climate change but argue that its impacts will not be great, that

we can 'wait and see' and in any case we can always 'fix' the problem if it turns out to be substantial. The scientific evidence cannot support such arguments.

International action regarding climate change began in 1992 with the establishment at the Earth Summit at Rio de Janeiro in 1992 of the Framework Convention on Climate Change (FCCC) - agreed by over 160 countries. The Objective of the FCCC in its Article 2 is "to stabilise greenhouse gas concentrations in the atmosphere at a level that does not cause dangerous interference with the climate system" and that is consistent with sustainable development. Such stabilisation would also eventually stop further climate change. However, because of the long time that carbon dioxide resides in the atmosphere, the lag in the response of the climate to changes in greenhouse gases (largely because of the time taken for the ocean to warm), and the time taken for appropriate human action to be agreed, the achievement of such stabilisation will take at least the best part of a century.

Global emissions of carbon dioxide to the atmosphere from fossil fuel burning are currently approaching 7 billion tonnes of carbon per annum and rising rapidly. Unless strong measures are taken they will reach two or three times their present levels during the 21st century and stabilisation of greenhouse gas concentrations or of climate will be nowhere in sight. To stabilise carbon dioxide concentrations, emissions during the 21st century must reduce to a fraction of their present levels before the century's end.

The reductions in emissions must be made globally; all nations must take part. However, there are very large differences between carbon dioxide emissions from different countries. Expressed in tonnes of carbon per capita per annum, they vary from about 5.5 for the USA, 2.2 for Europe, 0.7 for China and 0.2 for India. The global average per capita, currently about 1 tonne per annum, must fall substantially not only to enable stabilization of carbon dioxide concentration but also to allow for the expected increase in human population during the 21st century. Ways need to be found to achieve the large reductions required that are both realistic and equitable; I refer to this issue later on.

The Kyoto Protocol set up by the FCCC represents a beginning for the process of greenhouse gases reduction, averaging about 5% below 1990 levels by 2012 by those developed countries who have ratified the protocol (the USA is the main country that has failed to ratify). It is an important start demonstrating the achievement of a useful measure of international agreement on such a complex issue. It also introduces for the first time international trading of greenhouse gas emissions so that reductions can be achieved in the most cost effective ways.

After the Kyoto reductions by 2012, it is essential that all countries join in the agreements. The UK government, for instance, has taken a lead on this issue and has agreed a target for the reduction of greenhouse gas emissions of 60% by

10 FAITH AND THOUGHT

2050 - predicated on a stabilisation target of doubled carbon dioxide concentrations together with a recognition that developed countries will need to make greater reductions to allow some headroom for developing countries. Economists in the UK government Treasury Department have estimated the cost to the UK economy of achieving this target. On the assumption of an average growth in the UK economy of 2.25 % p.a., they estimated a cost of no more than the equivalent of 6 months' growth over the 50 year period⁸. Similar costs for achieving stabilisation have been estimated by the IPCC.

Three sorts of actions are required if such reductions are to be achieved⁹. First, there is energy efficiency. Approximately one third of energy is employed in buildings (domestic and commercial), one third in transport and one third by industry. Large savings can be made in all three sectors, many with significant savings in cost. Take buildings for example. Recent projects such as BedZED in south London demonstrate that 'zero emissions' buildings are a practical possibility (ZED = Zero Emissions development); necessary energy is provided from renewable sources. Initial costs are a little larger than for conventional buildings but the running costs a lot less. In the transport sector, hybrid vehicles and fuel cell technology promise substantial fuel savings. Aviation, however, continues to grow unsustainably and economic measures, such as taxation on aviation fuel, urgently need to be applied. Within the industrial sector many companies are making serious drives for energy savings.

Secondly, a wide variety of non-fossil fuel sources of energy are available for development and exploitation, for instance, biomass (including waste), solar power (both photovoltaic and thermal), hydro, wind, wave, tidal and geothermal energy. These need to be developed as rapidly as possible so as to provide for energy needs in the long-term. In the medium term, a contribution from nuclear energy, also largely fossil-free will probably need to be maintained. Thirdly, there are possibilities for sequestering carbon that would otherwise enter the atmosphere either through the planting of forests or by pumping underground (for instance in spent oil and gas wells). The opportunities for industry for innovation, development and investment in all these areas is large.

I now address those who argue that we can 'wait and see' before action is necessary. That is not a responsible position. The need for action is urgent for three reasons. The first reason is *scientific*. Because the oceans take time to warm, there is a lag in the response of climate to increasing greenhouse gases. Because of greenhouse gas emissions to date, a commitment to substantial change already exists, much of which will not be realised for 30 to 50 years¹⁰. Further emissions just add to that commitment. The second reason is *economic*. Energy infrastructure, for instance in power stations also lasts typically for 30 to 50 years. It is much more cost effective to begin now to phase in the required

infrastructure changes rather than having to make them much more rapidly later. The third reason is *political*. Countries like China and India are industrialising very rapidly. I heard a senior energy adviser to the Chinese government speak recently. He said that China by itself would not be making big moves to non fossil fuel sources. When the developed nations of the west take action, they will take action - they will follow not lead. China is building new electricity generating capacity of about 1 GW power station per week. If we want to provide an example of effective leadership we need to start now.

Science and Technology

Science and Technology are widely seen as the solutions to many of our environmental problems, for instance, to the movement to fossil free energy to mitigate human induced climate change. Some argue simplistically that technology on its own will provide - *The three solutions are Technology, Technology and Technology or Leave it to the market that will provide in due course*. Science and technology are tools, the most powerful tools we possess, but they must not be put in the role of being masters. Solutions need to be much more carefully crafted than these tools can provide on their own. A long-term strategy for addressing the problem of mitigating climate change is required. It has to be internationally developed and agreed (all nations are involved); the economy and the environment have to be considered together (environmental costs need to be internalized within the economy); social and quality of life values have to be properly taken into account as has also energy security (too much reliance on politically vulnerable fuel sources could lead to dangerous crises).

Further, technology has to be appropriate to the situation in which it is deployed. This can only be established through thorough analysis. For instance, a large challenge for the government of China is how to stem the increasing flow of population from rural areas to the cities. One way would be to provide more modern energy – electricity and heating – through small scale plants in local areas, rather than only building very large plants to provide primarily for cities.

For science and technology to contribute effectively to environmental sustainability, they need to be more integrated with social and policy considerations. Perspectives from both the natural and social sciences need to be integrated holistically so as to understand better the dynamical interplay by which environment shapes society and society in turn reshapes environment. Scientists and technologists need more humility as they apply their skills. A further message for scientists is that they should not just seek to identify problems but also seek for and propose solutions.

When talking to scientists and technologists about tackling problems of sustainability, I often emphasise the three qualities of *honesty* (especially accuracy and balance in the presentation of results), *humility* and *holism*, *3Hs*, an alliteration that assists in keeping them all in mind.

Technology Transfer from developed to developing countries is also vital if energy growth in developing countries is going to proceed in a sustainable way. There are large opportunities for generating energy from readily available waste material (see later paragraph under New Paradigms). Solar energy schemes can also be highly versatile in size or application. Small solar home systems can bring electricity in home size packages to villages in the third world – again with enormous benefits to local communities. At the other end of the size scale, large solar thermal or PV projects are being envisaged that couple electricity and hydrogen generation with desalination in desert regions where water is a scarce resource.

Creation Care - a Christian challenge

People often say to me that I am wasting my time talking about environmental sustainability. 'The world' they say 'will never agree to take the necessary action'. I reply that I am optimistic for three reasons. First, I have experienced the commitment of the world scientific community (including scientists from many different nations, backgrounds and cultures) in painstakingly and honestly working together to understand the problems and assessing what needs to be done. Secondly, I believe the necessary technology is available for achieving satisfactory solutions. My third reason is that I believe we have a God-given task of being good stewards of creation.

Let me say more about what Christian stewardship of creation means. In the early part of Genesis, we learn that humans, made in God's image, are given the mandate to exercise stewardship/management care over the earth and its creatures (Gen 1 v26,28 & 2 v15). To expand on what this means, I quote from a document 'A Biblical vision for creation care' developed following a meeting of Christian leaders at Sandy Cove, Maryland, USA held in June 2004¹¹.

According to Scripture only human beings were made in the divine image (Gen. 1:26-27). This has sometimes been taken to mean that we are superior and are thus free to lord it over all other creatures. What it should be taken to mean is that we resemble God in some unique ways, such as our rational, moral, relational, and creative capacity. It also points to our unique ability to image God's loving care for the world and to relate intimately to God. And it certainly points to our unique planetary responsibility. The same pattern holds true in all positions of high status or relationships of power, whether in family life, education, the church, or the state. Unique capacity and unique power and unique access create unique responsibility. Being made in God's image is primarily a mandate to serve the rest of creation (Mk 10:42-45).

Only in recent decades have human beings developed the technological capacity to assess the ecological health of creation as a whole. Because we can understand the global environmental situation more thoroughly than ever before, we are in a sense better positioned to fulfil the stewardship

mandate of Genesis 1 and 2 than ever before. Tragically, however, this capacity arrives several centuries after we developed the power to do great damage to the creation. We are making progress in healing some aspects of the degraded creation, but are dealing with decades of damage, and the prospect of long-lasting effects even under best-case scenarios.

We cannot hide behind an earth that will not last or has no future. Jesus has promised to return to earth – earth redeemed and transformed¹². In meantime earth awaits, subject to frustration, that final redemption (Rom 8 v 20-22). Our task is to obey the clear injunction of Jesus to be responsible and just stewards until his return (Luke 12 v 41-48). Exercising this rôle of stewards provides an important part of our fulfilment as humans. In our modern world we concentrate so much on economic goals – getting rich and powerful. Stewardship or long-term care for our planet and its resources brings to the fore moral and spiritual goals. Reaching out for such goals could lead to nations and peoples working together more effectively and closely than is possible with many of the other goals on offer.

Aiming at goals

To make progress towards sustainability we need goals or targets to aim at. Any commercial company understands the importance of targets for successful business. Targets are needed at all levels of society - international, national, local and personal. Often, there is a reluctance to agree or set targets. A common question is, 'Can we not achieve what is necessary by voluntary action?' Although voluntary action has achieved a few successes, in general, it fails badly to bring about change on anything like the scale that is required.

There are many examples of international targets that have been agreed. Within the UN Framework Convention on Climate Change (FCCC), targets for reductions of greenhouse gas concentrations in some developed countries by 2012 have been set within the Kyoto Protocol. Discussions are beginning about internationally agreed targets for later dates that need to involve all major countries. In the meantime, some countries or states (e.g. the UK and California¹³) have set real or aspirational targets of their own.

At the World Summit on Sustainable Development at Johannesburg in 2002, some new targets were established for example, to halve the proportion of people without access to clean water and basic sanitation by 2015; to use and produce chemicals by 2020 in ways that do not lead to significant adverse effects on human health and the environment; to maintain or restore depleted fish stocks to levels that can produce the maximum sustainable yield on an urgent basis and where possible by 2015; to achieve by 2010 a significant reduction in the current rate of loss of biological diversity. Many felt these targets were too vague or too weak. But at least they have provided something rather than nothing to aim at.

14 FAITH AND THOUGHT

Nationally, environmental standards, of which there are many (e.g. for use and disposal of chemicals or for air pollution), are examples of targets, some of which can be considered adequate and others (e.g. for air pollution) need to be substantially strengthened. National targets are also being set for waste disposal, e.g. by recycling.

More targets are needed in other areas, for example concerned with land degradation and deforestation. Also targets must be realistic; the promotion of unachievable targets is counter-productive. Adequate analysis as to how targets are to be realised must be carried out before targets are proposed or publicised.

New paradigms

Not only do we need goals but also new attitudes and approaches in the drive towards sustainability – again at all levels of society, international, national and individual. Let me mention two particular examples. First, we need to look seriously at measures of sustainability and accounting tools to apply those measures. For instance, our country's economic performance is currently measured in GDP, a measure that takes no account of environmental or indeed many other concerns; it is a measure that increases with more conflict or more crime! Although considerable effort has been put into other more appropriate measures for instance the Human Development Index (HDI), the idea of Natural Capital or the Environmental Footprint, they are inevitably more complex and none are widely used by policy makers. In many respects considerations of the economy have to take second place to those of the environment¹⁴. The dominance of the 'market' is often also allowed to ride over environmental considerations. The economy, the market and the principles of free trade are 'tools' – important tools, but they must not be allowed to be in the position of 'masters'.

A second example of a new attitude to be taken on board, again at all levels from the international to the individual, is that of 'sharing'. At the individual level, a lot of sharing often occurs; at the international level it occurs much less. Perhaps the most condemning of world statistics is that the rich are getting richer while the poor get poorer – the flow of wealth in the world is from the poor to the rich. Considering the Aid and Trade added together, the overwhelming balance of benefit is to rich nations rather than poor ones. Nations need to learn to share on a very much larger scale.

We often talk of the 'global commons' meaning for example air, oceans or Antarctica – by definition these are 'commons' to be shared. But more 'commons' need to be identified. For instance, there are respects in which Land should be treated as a resource to be shared or fish and other marine resources. Or, in order for international action regarding climate change to be pursued, how are allowable emissions from fossil fuel burning or from deforestation to be allocated. How do we as a world share these natural resources between us and especially

between the very rich – like ourselves - and the very poor?

The FCCC has very soon to start negotiations including all countries regarding allocations of carbon dioxide emissions. One proposal is that the starting point is current emissions, so that it is reduction levels from the present that are negotiated. That is called 'grandfathering'. Another proposal by the Global Commons Institute called 'Contraction and Convergence'¹⁵ is that from some future date – for instance, 2030 or 2050 - emissions should be allocated equally per capita with transfer of allocations allowed through trading. The logic and the basic equity of the second of these is in principle quite compelling – but is it achievable?

Sustainability will never be achieved without a great deal more sharing. Sharing is an important Christian principle. John the Baptist preached about sharing (Luke 3 v11), Jesus talked about sharing (Luke 12 v33), the early church were prepared to share everything (Acts 4 v32) and Paul advocated it (2 Cor 8 v13-15). The opposite of sharing - greed and covetousness - is condemned throughout scripture.

One aspect of sharing, the importance of which is increasingly recognized by agencies concerned with aid and by others, is not just to share our food or other goods with the third world but to share our skills, for instance in science and technology. I give you one example from my experience as a Trustee of the Shell Foundation¹⁶, a large charity set up by the Shell company particularly to support the provision of sustainable energy in poor countries. In general, this is not being done through grants for individual projects. It is often said that it is better to provide a hungry man with a fishing rod than with a fish. It is even better to find someone who will set up a fishing rod factory! So the Foundation's programmes are increasingly concerned with the creation of local enterprises and the loan financing to enable them to get started. Examples of such enterprises are some that build and market simple efficient stoves using traditional fuels that will substantially reduce the amount of fuel that is used and also reduce indoor air pollution with the serious damage to health that it causes, and others that provide sustainable and affordable energy to poor communities often from the use of readily available waste material (e.g. rice straw in China, coconut shells in the Philippines etc). The potential for the multiplication of such projects is large. An aim of the Foundation is to catalyse other bodies and agencies in the creation of mechanisms for the large scale-up of such programs so that they can become significant on a global scale both in the provision of energy to poor communities and also in reducing greenhouse gas emissions.

These new attitudes are not just to provide guidance to policy makers in government or elsewhere. They need to be espoused by the public at large. Otherwise government will not possess the confidence to act. For the public to take them on board, the public have to understand them. To understand, they

have to be informed. There is a great need for accurate and understandable information to be propagated about all aspects of sustainability. Christian churches could play a significant role in this.

We, in the developed countries have already benefited over many generations from abundant fossil fuel energy. The demands on our stewardship take on a special poignancy as we realize that the adverse impacts of climate change will fall disproportionately on poorer nations and will tend to exacerbate the increasingly large divide between rich and poor.

My wife always reminds me when I speak on this subject that I need to indicate the sort of actions that individuals can take. There are some things that all of us can do. For instance, when purchasing vehicles or appliances we can choose ones that are fuel efficient; we can ensure our homes are as energy efficient as possible; we can purchase our electricity from a 'green' supplier guaranteeing that it is from renewable sources; we can use public transportation, car-share more frequently or travel less. Also we can support leaders in government or industry who are advocating or organising the necessary solutions. To quote from Edmund Burke, a British parliamentarian of 200 years ago, 'No one made a greater mistake than he who did nothing because he could do so little.'

In conclusion, I like very much the symbol of the Celtic Cross, the cross of Jesus surrounded by a circle denoting the world, illustrating that the redemption Jesus accomplished includes not only humans but the whole of creation¹⁷. And we humans have the responsibility of being stewards of God's creation until Jesus returns. In a parable about stewardship in Luke 12, Jesus instructs his disciples ending with the clear message, 'Unto whomsoever much is given, of him shall much be required.' (Luke 12.48 AV) The challenge to all of us is unmistakeable and daunting. But we also have the assurance that we do not have to act on our own. As God walked with Adam and Eve in the garden in the Genesis story, so he will come alongside us to help us as we seek to do his work here on earth.

References

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- 2 See, for instance, UNEP, 'Global Environmental Outlook 3', pp 446, Earthscan Publications, London 2002
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- 4 see recent paper by J Hansen et al in Scienceexpress for 28 April 2005 / 10.1126/science.1110252
 - 5 Myers, N., Kent, J. 1995. *Environmental Exodus: an emergent crisis in the global arena*. Climate Institute, Washington DC.
 - 6 See Footnote 3.
 - 7 See web site of Royal Society of London, www.royalsoc.ac.uk
 - 8 see energy review by government strategy unit, <www.strategy.gov.uk/work_areas/energy/index.asp>
 - 9 for more information about energy futures see my Prince Philip Lecture to the Royal Society of Arts, May 2005, entitled 'Climate Change and Sustainable Energy' available on the John Ray Initiative website, www.jri.org.uk.
 - 10 see for instance J Hansen et al in Scienceexpress for 28 April 2005 / 10.1126/science.1110252
 - 11 from an unpublished statement 'Biblical Vision for Creation Care' prepared by participants at a conference of Christian leaders at Sandy Cove Maryland, USA in June 2004.
 - 12 N.T.Wright – 'New Heavens and New Earth – the Biblical Picture of Christian Hope' No B11, Grove Books
 - 13 The UK target has already been mentioned. Governor Schwarzenegger of California has proposed a target reduction for carbon dioxide of 80% by 2050.
 - 14 See for instance Jonathon Porritt, 'Capitalism as if the World Matters', Earthscan 2005
 - 15 See <www.gci.org.uk>
 - 16 <www.shellfoundation.org>
 - 17 cf John 3 v 16 – 'God so loved the cosmos...'; Romans 8 v 20-21; Colossians 1 v20.

Einstein, God and Time

**Conference held in conjunction with the Ian Ramsey Centre
at the Clarendon Laboratory, Oxford, 12 - 15 September, 2005.**

Report by Jason Runyan and Justin Walker

As part of the celebrations marking the 100th anniversary of Albert Einstein's revolutionary 1905 papers on special relativity and quantum mechanics, the ***Einstein, God and Time*** conference drew internationally renowned speakers to the Clarendon Laboratory, Oxford, UK to look at relevant themes in the interface of science, philosophy and theology. With approximately 150 people in attendance, the eight major lectures were augmented by 25 shorter papers, giving participants the opportunity for detailed and varied discussion. The conference was co-hosted by the Ian Ramsey Centre, The Science and Religion Forum and the University of Oxford, Department of Physics. This occasion also marked the 30th anniversary of the Science and Religion Forum as well as presenting an ideal setting for the celebration of the 80th birthday of Revd. Dr.

Arthur Peacocke, who has contributed greatly to the study of relations between science and religion and who was awarded the Templeton Prize for progress in Religion in 2001. What follows are some memorable snippets and summaries from the conference.

Prof. Jürgen Moltmann, Professor Emeritus of Systematic Theology at the University of Tübingen, gave the Ian Ramsey Lecture, challenging the packed lecture theatre to consider “When God and Time Meet: the Resurrection of the Body.” Moltmann pronounced the hope that Biblical scripture promises about when the God of life meets time and bodily resurrection into a new life occurs. He addressed such questions as, “What age shall we be in the resurrection?”, “Is there gender in heaven?” and “When will this happen?” Moltmann stated that it is immediately upon death that we will have a newly-constituted, resurrected life as part of a new creation. As Jesus said to the thief on the cross, “Today you will be with me in eternity.” Moltmann noted that christianity is about embodied, lived life - a life of love and hope. Thus, it is life in the body that must be lived and this life can be resurrected through the experience of Christ’s resurrection and the re-birth, or new life, that is already present through the Holy Spirit. In Christ, God manifested himself in flesh to redeem life. The resurrection of the Lordship of Jesus gives over to the God of the living and the dead. While death may be seen as the end of life, life can also be seen as the end of death. It is here that God’s goal for our lives will be fulfilled. He sees that at this point, “We will participate in the living God.”

At this conference, the Gowland Lecture was initiated in recognition of the contribution of Revd Bill Gowland, a Methodist minister who founded the Christ and the Cosmos Initiative (CCI) to help all Christians gain an understanding of the universe in an age of science. Over the last year, the CCI has merged with the Science and Religion Forum and the lecture remains a memorial to this heritage. The first Gowland Lecture was given by **Prof. Russell Stannard**, Emeritus Professor of Physics at the Open University, who presented a lucid, concise introduction to Einstein for the non-specialist, literally “Einstein for the Terrified”. By use of illustrations and images from common-day perception, Stannard explored some of the surprising implications of Einstein’s theory of special relativity. He described how it is we live in a world where ironing can be done faster upstairs than downstairs, where you can lose weight if you just stand still, and where you will live longer if you keep moving. For example, just as there is a loss of information when looking head on at a pen (a two-dimensional perception), he argued, there is a loss of information between three-dimensional perception and four-dimensional space-time. It is only through the dilation of time and matter, as a result of different movements through space, that we see that there is another dimension, time, to the paths of all objects.

Prof. John Hedley Brooke, who holds the Andreas Idreos Professorship in Science and Religion at Oxford, presented a historical view of the physicist, philosopher and, yes, even religious Albert Einstein in a lecture "If I were God ... Einstein and Religion". Brooke unpacked a complex picture of Einstein whose physical contributions seem to raise issues for Christian theology and views of God, but whose own personal religion was deeply connected with the practice, and limits, of science. The paradoxical, or perhaps even contradictory, nature of Einstein's views is revealed in his statement, "I am deeply religious unbeliever." Einstein's understanding of God resists the categories many have tried to put on it. He was emphatically not an atheist, nor straightforwardly a pantheist, but still rejected the idea of a personal God. Brooke described Einstein as "his own man with his own God."

In looking at the implications of the general relativity for theology, **Dr. Antje Jackelén** of the Lutheran School of Theology at Chicago and director of *Zygon* distinguished between theological eschatology and scientific cosmology but observed that they can have reciprocal relationships with each other. Theological eschatology deals with the meaning of the universe and the end of evil, while scientific cosmology is interested in the maximization or culmination of information. A scientific perspective can be shown to have deficits when contrasted with theology as well as vice versa. By holding theological eschatology and scientific cosmology in juxtaposition, Jackelén articulated a meaningful approach toward a dialogue between science and religion. While eschatology cannot do without the faith in the promise given by revelation, cosmology helps to purify theological eschatology from anthropocentric narrow-sightedness. Einstein's contribution to cosmology by way of general relativity helps to bring out the interconnectedness of humanity with the rest of creation as well as the dialectic between the "already and not yet" seen in the Christian faith of Biblical scripture. General relativity captures the flux and tension between the already and not yet as well as the potentiality of the future of the past, the future of the present, and the future of the future in the promise of God and the divine initiative of a new creation.

Dr. Harvey Brown, lecturer in Philosophy of Physics at Oxford, asked what it was that Einstein really contributed with the theories of special and general relativity. He noted that Poincaré anticipated Einstein's relativity principle and, with Lorentz, had almost all of Einstein's equations. But it was Einstein that took the slowing down of the oscillation of electrons - the radiation of light from a light source - as a result of speed and generalized it to every object in space-time coming up with universal time dilation. Brown argued that while Einstein developed his theory of time dilation through imagining an ideal clock, his understanding of an ideal clock was not well-developed. Further, a complete explanation of quantum mechanics can only be made from quantum mechanics; the mechanics that

describe these constitutions. Yet quantum mechanics gives trouble to the notion of an ideal clock. Brown then went on to make a case of how it was possible to get time dilation from mechanics. Time is just movement and all movement is connected to a path. Physics and mechanics do not say any point is important but look at what there is in the universe as a whole. And both distance and time are path-dependent. Brown observed that while “we have a feeling of ‘now’ today, the day before and the day before, this is not significant to physics.”

Prof. Chris Isham from the department of Theoretical Physics at Imperial College, London addressed the challenges of quantum cosmology. Isham brought out the tension between an instrumentalist physics that sees measurement to bring a physical quantity ‘into being’ and a quantum cosmology that requires a cosmic observer without measurement. In the desire to have a realist interpretation, without exact measurement, Isham proposed a contextualised logic, where a truth value is dependent upon the context in which it is considered. Isham, along with Jeremy Butterfield, has proposed that Topos logic can allow for such a contextualisation by making context an object and thus giving propositions that are only “partly true” or “partly equal” under a string of measurements (in a context) and thus multi-varied. As he stated, “the truth values are all ‘later’ contexts in which the propositions are definitely true.” This would allow for a non-instrumentalist quantum cosmology about reality itself.

Dr. John Polkinghorne, former president of Queens’ College and Professor of Mathematical Physics at the University of Cambridge, in his talk “Space, Time and Causality”, commenced by observing that, while “our thinking is constrained by empirical knowledge”, it is “not determined by it”. What is determined requires metaphysical thought and belief. But Polkinghorne maintained that reality is real enough that we can account for scientific as well as moral and ethical reality. It is from this standpoint of being a realist about what it is that science can tell us, but being firmly committed to the reality of experience as well, that Polkinghorne launched into his discussion about Space, Time, Causation. About space, he noted that there is a lot we do not know, and about the flow of time he observed that mathematical physics has no way to register, but Polkinghorne stated that experience of temporality should be taken seriously. He observed, “you have to believe that mathematics and the physical sciences is all of reality to claim then that, because it escapes mathematical representation it does not exist.” Finally, Polkinghorne sees causality as being about the nature of the relationship between events and that this can occur within a block universe. He stated, “Causality is a matter of metaphysical decision”. But for Polkinghorne, science describes the experiential world we inhabit and, therefore, the experience of temporality and of agency are irreducible. In conclusion, he looked at the coming together of matter in unique ways and in the forming of new behaviours as a sign that science

is going to have to change the way it thinks about reality. What happens at the macro-level we inhabit is as real as what happens at the micro-level of physical analysis.

The Conference Banquet was held on September 14 in honour of the **Revd Dr Arthur Peacocke's** 80th Birthday. In tribute to Peacocke, Brooke said his "achievements are legion and legendary" and applauded Peacocke's "signal contribution" both to the Science and Religion Forum - which he served almost without interruption from 1972 to 2001 as its chairman, Vice-President and President - and to the Ian Ramsey Centre which he directed for the larger part of its history. The evening address was given by the Revd Dr Kenneth B. Wilson, OBE who, in expressing gratitude for Peacocke's leadership in the field of science and religion, observed that he had been "at the right place at the right time" giving "the right word for the right moment". In response to these signs of appreciation, Peacocke stated, it is a "great uplift for me to see so many people interested in the areas for which I have struggled."

The final day of the conference commenced with a dialogue and discussion led by Isham and Polkinghorne on 'Can God know the Future?' which highlighted where exactly they differed and where it was they agreed. Polkinghorne held that God does not know the future but is opening up possibilities and potentialities in his faithfulness to fulfil his promises. Isham responded that the idea of progression and the future is illusory, but that God, in his sympathy, experiences all that happens, including our illusions.

The conference concluded with a Plenary Session where the speakers entertained discussion and debate over the many topics the conference addressed. Questions were asked by the speakers and participants alike, with topics ranging from our ability to distinguish mental time from real time to whether determinism is applicable to space-time. The result was a rare inter- and multi-disciplinary discussion with experts engaging and integrating diverse topics and fields, encapsulating the character of this extraordinary conference.

The Editor gratefully acknowledges the opportunity to use the above abstract published by the Science and Religion Forum (Reviews 46, 2005), in particular the permission given by Dr David Batholomew to do so. He was himself at the Oxford Conference, and agrees with the writers of the above as to its range and depth. What follows is a summary of some of the short papers which formed part of the conference. Of necessity these are selective because there were three simultaneous sessions, and thus the following are the Editor's choice!

Gerald Bostock, in his talk 'Origen, Time and Creation', outlined this remarkable theologian's ideas on creation. Origen lived from 185 to about 225 A.D. - a very early Father of the Church. 'Time did not exist before the world', which seems to pre-figure the Big Bang, but Origen did not see time as endless, being finite, as is the world. Our language is not rich like the Greek, where time can be 'chronos' (clock time), 'kairos' (the right time) or 'aion' (eternal time). Origen would not have accepted Einstein's space-time since, for him, space was multi-dimensional, as was time. The speaker ended with the following: 'The creation of Biblical fundamentalism is a very recent heresy. The first great Christian philosophy of Origen had at its centre the Big Bang. God had no need of time when He formed this world as a physical expression of His timeless wisdom.'

John Emmett outlined his MA thesis 'Time and a new conceptual model of the triune God'. This he calls quantum interaction theology. He drew an interesting parallel between the Feynman diagrams for nuclear bonding and the relationship between Father, Son and Spirit. The triune God is the total interaction in this system, and we can construct triads to depict these relationships, e.g. Father-Son-Spirit; transcendent-connective-immanent; creator-sustainer-redeemer, and these can be mapped like Feynman diagrams. Another related concept could be: 'there and then-space and time-here and now.' Others were suggested.

On a totally different level, **Neil McDonald** was concerned with speech, in particular in relation to Genesis 1 3-10. The first act of creation was 'God said - let there be light' i.e. before space and time. Claus Westerman writes along these lines, and emphasises that light and darkness show temporal antithesis, not spatial.

Two papers, back-to-back on the second day were presented by a Jewish and an Arabic scientist, and took most of us into somewhat uncharted waters. **Nathan Aviezer** described the 16th century Jewish approach, the Kabbalah, and its relation to Einstein's relativity and to string theory. Kabbalah means 'to receive' and suggests that every idea in the spiritual world is correlated with the physical world - different from the Genesis account. God, the ultimate being, is one we know nothing about; sephirot are his emanations, which are observable. There are many sephirot, seven are broken and three intact, and they are similar to the dimensions of science as these are understood. Likewise, in string theory, we have ten dimensions of space, of which three are discernable and seven hidden. Newton described gravity as a force, whereas Einstein proposed that it was not a force but a distortion of space. Quantum mechanics (1910 - 1930) was shown to be probabilistic and compatible with nature, whereas Einstein's gravity was not compatible with quantum theory. It is still impossible to reconcile these: maybe string theory will provide a way. Quantum gravity works in ten dimensions of which only three are observable.

The contribution by **M.B. Altaie** was entitled 'Time in Islamic Kalam', Kalam being a dialogue. This dialogue proceeds from God, via reason, to nature, and the Koran is a guide to this. There are five basic principles, agreed by the majority: creation:discreteness:continuous creation:indeterminacy:integration of space and time. It was interesting to see how Arabic science has dealt with the physical universe in a totally different way from those of Western science. The speaker concluded by bemoaning the fact that the great philosophies of the Arabic world had been gradually taken over by extremists and fundamentalists such as Al-Qaida, and hoped this could be reversed. It was moving to witness rapprochement between Jewish and Arabic scientists meeting on the common ground of science, though politically apart. Maybe rapprochement could be brought about by the teaching of Dakik Al-kalam

Margaret Yee gave her talk in the last session of short papers. It was entitled 'M1 and M2 at T1 and T2' - where M denotes metaphysics, and T denotes theological standpoints. Are physics and theology opposed, or can they interact? (conciliatory). She drew on Austin Farrer as a multi-disciplined, inclusive and yet critical expositor (1904 - 1968). Knowledge of God does not come from science, though science can advance theological enquiry. She claimed that a synthesis of metaphysics and theology has implications for human life, stem cell manipulation and genetic modification.

Hilary Martin was a proponent of realised eschatology. We live in eternity - the 'last things' are already actualised. There is always a potential time for a new creation, which compares with the materialist - (all is perishable), and the Platonist - (the soul survives). The kingdom is both now *and* in the future.

Daniel Scott gave a good exposition of the Christian Scientist (C.S.) viewpoint. Space, time, matter are all illusory, and maybe what we have seen from the quantum world brings us closer to this idea. Mary Baker Eddy stated that Jesus was the most scientific man who ever lived. She claimed that science was behind all miracles of healing. It is interesting that Einstein attended Christian Science meetings, though was never a member. In C.S., God is mind, intelligence and love, unbounded by space, time or matter. In this, C.S. differs from theology and physics, and Dr. Scott outlined the accounts of creation in the Bible as C.S. understood them. Our perception of creation is marred by our mortality, and only the spiritual has any significance. The task of C.S. is to follow the example of the Master Christian by striving to break through the limitations of mortal existence, and heal sickness and sin in the way He taught. (Though didn't Jesus see sickness as evil, and very real? - Ed.)

Book Reviews

Samuel M. Powell. *Participating in God - Creation and Trinity.* 2003. Augsburg Fortress, Minn. USA. pb \$18. 238pp. ISBN 0.8006.3602.3

The author, in his Preface, sets out two assumptions which guided him in what he calls 'an exercise in systematic theology'. These assumptions are:- that the christian faith is true, and that the picture of the world that natural science gives us is reliable (p. xi). It follows that readers should share these assumptions in order to benefit from his treatise. Powell weaves together faith and science in a convincing way.

The book falls into three parts, firstly, 'creation and trinity', secondly, 'understanding the universe in a trinitarian way', and thirdly, 'trinitarian ethics'.

The first part is divided into 'regulatory', 'hermeneutical' and 'ethical' dimensions. There is a useful review of the church fathers - Irenaeus, Athanasius and Basil for example - and their views on creation which this reviewer found useful, though a personally better acquaintance with philosophy would have been helpful! Nonetheless, it is always salutary to realise how much insight these early writers had, and what they still have to teach us. The Hellenists and, later, Augustine, Newton and Darwin are also developed at length, ending with Tillich. The first part of the book ends with the sentence:- 'the gospel is the message that in the midst of human finitude and sin, God's kingdom has appeared', which seems to summarise this section, if not the book itself (p. 57).

The second part of the book - which is about half the whole work - was to this reviewer easier to understand, dealing as it does with the world as we see it. The balance between 'identity' and 'difference' is worked out in a variety of ways. There are four sections - persistence and change, generic and individual features, part-whole relationships, and the relatedness of all things. Within each of these sections further sub-divisions are made, namely from the point of view of: the physical world, the biological world, human existence, finitude, and the kingdom of God. This gives this second part a unity of purpose, though perhaps it is somewhat lengthily worked out. It was useful to read this major section of the book at a single sitting to maintain the unity. As we move from the physical through the biological, and on to the human existence, it goes without saying that we see increase in complexity, so that 'identity' and 'difference' are harder to disentangle, but the author stresses that even the physical, such as large stars, although showing individuality, are nonetheless only hydrogen and helium, and undergo the same processes (p. 94). There are many such comparisons between identity and difference especially, of course, in the region of human existence. The author is optimistic throughout this book: - 'there can be no truly generic universal features until there is a single all-embracing community in which beliefs,

values, practices of all communities find their fulfilment (p. 96). But to balance: - 'conformity is bland when a society is intolerant of diversity and where ... pressures are such as to cause the great majority to shun the expression of individuality (p. 97). The ultimate kingdom of God is both a future and a present reality. This central section has many enlightening and hopeful things to say to our confused and uncertain world, and would repay re-reading at regular intervals! Perhaps a few quotes would help to emphasise this. 'A person is only known through that person's relationships' (p. 128). Regarding the biological world 'the electron is determined by its environment, the organism by its environment and its responses to the environment' (p. 136). In the realm of human existence, we have a very relational area. How we treat our world is of prime importance to the author - 'in ancient times, with a small population, the primary task was physical survival and the maintenance of civilisation. Today it is not civilisation that is in dire straits, but the natural world' (p. 157). This is a comment on Gen. 1 28.

The final section, on ethics, takes as its starting point the statement that 'the Christian faith, especially the doctrine of creation, is associated with a way of *being* in the world. Belief in such a doctrine includes commitment to this way of *being*' (p. 163).

The section on ethics is a working out of this idea in different ways, in particular, comparing the tendency towards world-transcendence vis-à-vis the tendency towards world-participation. Do we renounce the 'world' or embrace it, as Christians? The views of Paul, Calvin, Bonaventure and Augustine are examined, with others. There is an interesting discussion on 'manic' (sic) consumerism and its dangers, which is apposite for readers in the 'West'. Also the dangers of TV and its advertising are spelled out. In summary, 'the doctrine of creation affirms that God's relation to the universe does not depend on us, and in certain ways does not involve us. Consequently the universe does not exist *for us*' (p. 200). Stewardship is the 'name of the Game'.

This book is life-affirming and God-affirming. All in the end is God (reviewer's note, not the author's, though it does explain the book's title). The final sentence is worth quoting. 'Christian faith is true to its calling when it helps the church faithfully to maintain the rule of faith, to understand the faith by assimilating human knowledge, and helps the church to live out its doctrines faithfully and in an intellectually responsible way. In seeking to fulfil this calling, its constant hope is that its words may become a prayer of thanksgiving and praise to the God who made the world, and continues to make all things new.'

There is a good bibliography, and useful index.

Reviewed by A.B. Robins.

Donald J. Wiseman, *Life Above and Below. Memoirs*. Tadworth, 2003. [Obtainable from Mr. D. Simmons, 48 North Acre, Banstead, Surrey. SM7 2EG; email: dwh.simmons@talk21.com - £6.50 plus postage and packing.]

This, the autobiography of a long-serving Vice President of the Victoria Institute, has been written to a considerable extent in response to requests for information about the author's career, particularly his service in the RAF during the war. For many years he was unable to speak of the later because wartime secrecy applied until the 1970s. The title of the book reflects this aspect (*Above*) and another important part of the author's life, his involvement in archaeology (*Below*), but implicit in the text is another aspect of *Above*, his Christian faith.

He gives an interesting account of his early years. Born in 1918, the son of Christian parents, he came to faith already as a schoolboy, and made a major stand about it when he was baptised by immersion in 1932. His father, Percy J. Wiseman, spent his career in the RAF, ultimately at the rank of Air Commodore. He served for a time in the Middle East, and having a great interest in the archaeological background of the Bible, was able to bring back Babylonian antiquities such as cuneiform tablets and cylinder seals which intrigued the young Donald. His father's knowledge of the ancient Near East led him to publish his volumes *New Discoveries in Babylonia About Genesis* (1936) and *Creation Revealed in Six days* (1948), both of which were reissued together in a single volume under the title *Clues to Creation in Genesis* in 1997 with an introduction by Donald who, because of his known involvement in the subject is often assumed to have been the author of both himself.

Donald began his higher education in 1936 at Kings College, London, studying ancient history, but was persuaded by Dr. W.J. (Bill) Martin of the University of Liverpool, a good all round Semitist who is not much known because he published very little, to concentrate on ancient oriental languages. He was allowed to adjust his course and began Akkadian (Assyrian and Babylonian) under S.H. Hooke at Kings, and managed to persuade Sydney Smith, the Keeper of Egyptian and Assyrian Antiquities in the British Museum, to give him private tuition in the language. He also began Hebrew at Kings and, unknown to him, the Professor of Hebrew, S.L. Brown, entered his name for an Exhibition in Oriental Languages at Wadham College Oxford.

The war formed a major interruption in his life. He volunteered for the RAF in 1939, and by 1940 was Personal Assistant to Air Vice-Marshal Keith Park, who was in command of all fighter aircraft in southeast England. When Park was posted to other commands Donald served as Intelligence Officer at different locations, and fairly early in this period, he says that "With many hours of night flying and experiences behind me, including details of enemy beacons, and of

successful flight intruder operations, I thought the time had come to write another intelligence report.” (p. 26). This Report apparently contained observations very close to those derived from the Ultra secret source known as Enigma which was being decoded at Bletchley Park. As a result of this report he was summoned to Admiralty House where he was questioned closely. This led to his transfer to Ultra Intelligence, and he continued in the administration of material deriving from it throughout the war. That the Ultra operation had even existed remained secret for many years after the war, and it was only in 1974 when F.W. Winterbotham published his book *The Ultra Secret* revealing what had gone on, that those who had been involved felt they could speak about it. In keeping with this commitment to secrecy, Donald had never mentioned this aspect of his way, and though he felt he was no longer strictly limited in this respect after 1974, he did not speak much about his experiences. It is therefore of great interest that he gives a reasonably full account of his part in this operation (pp. 26-52). The basic point about this was that many top secret German military communications were being decoded, but so that the Germans should not realise that this was happening and stop using the coding machines which they thought were secure, the information derived from them had to be used with extreme care. In some cases desirable military outcomes had to be sacrificed in order to protect the secrecy. Donald served for a time as one of those who carried this information to commanding officers in the field with guidance as to its careful use. For the last part of the war he served as Chief Intelligence Officer Mediterranean Allied Tactical Air Force under Field Marshal Harold Alexander, Commander in Chief Mediterranean, giving daily intelligence briefings on the basis of Ultra material, as the forces advanced through North Africa and Italy. At this time, still in his twenties, he had risen to the rank of Group Captain, the equivalent of full Colonel in the Army. For his services he was awarded the O.B.E.

At several points he records contacts with other Christians serving in the forces and mutual support in the faith. His own faith remained firm, and when he was demobilised in 1945 he took up the Exhibition at Oxford where he became fully involved in the OICCU, in his final year as President. At Oxford he resumed his study of Hebrew, now with G.R. Driver, at that time Old Testament Editor for the New English Bible, and of Akkadian with O.R. Gurney. He says concerning his studies “I felt a call to apply my interest in Biblical languages to an understanding of the culture of the ancient Near East to the better understanding of the Bible and to further this among educated Christians” (p. 56). As during the war, so in his time at university he refers to continuing contacts with others whose names have been well known in Christian work for many decades since.

After taking his Oxford degree he took up the post of Assistant Keeper under Sydney Smith in the Department of Egyptian and Assyrian Antiquities in the

British Museum. His first assignment there was the publication of a group of Akkadian cuneiform tablets of the second millennium B.C. from the excavations of Sir Leonard Woolley at Tell Atshanah, ancient Alalakh, in Syria. These contain material of indirect relevance to the Old Testament (pp. 59-60, 62), but a more mainstream contribution to Old Testament study was provided by his publication in 1956 of a group of texts in the British Museum known as Babylonian Chronicles which included one tablet covering the years 605-594 B.C. providing the precise date not previously known, 16 March 597 B.C., of the capture of the Jerusalem by Nebuchadnezzar (p. 62). His book *Chronicles of the Babylonian Kings (626-556) in the British Museum* caused a considerable stir. In his time at the Museum he was often called upon to answer enquiries from the public, many of them relating to the Bible, and his book *Illustrations from Biblical Archaeology*, published by the Tyndale Press in 1958, was helpful both to those who could use it in the galleries and to those who could only read it at home.

While he was at the Museum, he several times took part as epigraphist in the excavations of the British School of Archaeology in Iraq under M.E. L. Mallowan (husband of Agatha Christie) at Nimrud ancient Kalhu (biblical Calah) publishing many of the cuneiform tablets which came to light, but in particular an inscribed stone stela of the Assyrian king Ashurnasirpal II recording his conquests and the establishment of his palace with details of a great feast celebrating its completion (pp. 79-81). He was able to note that the number of guests recorded at the feast, 69,574, showed an interesting comparison with the figure of 120,000 given in the book of Jonah for the population of Nineveh (4:11), and he drew attention to the fact that this difference in the figures matches the actual areas of the two ancient sites, the surrounding walls of Nimrud extending to 4.75 miles and those of Nineveh to 9.25 miles. He was an integral part of the Nimrud expedition, and in his own Memoirs Mallowan refers to him as "my dear friend Donald Wiseman. Ever ready to turn his hand to anything and of imperturbable good humor he took in good part our gentle mockery of his fundamentalist inclinations."

He lists (p. 125) but does not discuss another text of Biblical interest found during the Numrud excavations, which he published in 1958 as a long journal article, "The Vassal-Treaties of Esarhaddon", also issued as a book under the same title. This played a part in discussion of Biblical covenants, a topic which was prominent in the Old Testament field for some years. The text was found in fragments, and according to Mallowan in his Memoirs, Donald "spent three years on the task of reconstituting the text from hundreds of fragments, a remarkable feat of stamina and methodical discipline as the world of learning will recognise, for he achieved his task by a masterly tabulation of the pieces ... He arrived at his office one hour before due time every day and left an hour after it."

In the years after the war he was involved in the establishment of Tyndale House, a residential theological library in Cambridge, and of the Tyndale Fellowship of evangelical academics. In this he acted for many years as Chairman of the Old Testament Group, and gave helpful encouragement to many younger scholars entering the field.

He left the British Museum in 1962 to take up the Chair in Assyriology at the School of Oriental and African Studies of the University of London, and while there his known interest in Old Testament studies alongside Assyriology brought a number of foreign scholars to carry out postgraduate work under him (pp. 101 - 02). At SOAS he became a close colleague of J.N.D. (later Sir Norman) Anderson, the Islamic scholar, and together they started the Senate House Precincts Christian Fellowship, which met at lunchtime for Bible Study (p. 104). When Norman Anderson retired, he led it on his own. It is not easy to lead such a group well, but it was clear to anyone who was part of it that he was particularly good at it.

Many of us have difficulty in remembering in which year we did something, and there is some evidence of this in the book. He was elected a Fellow of the British Academy in 1966, at a time when he had many different involvements, and while he gives this date on p. 105, he demotes it, so to speak, to 1969 on p. 103. FBA, a mark of academic recognition, is the equivalent in the humanities of FRS in the sciences.

Many other aspects of his life are covered in this book, another notable involvement being his participation in the preparation of the New International Version of the Bible in which his old friend Dr. W.J. Martin played a major part. The NIV was published in Britain in 1979, and Donald helped to ensure a wide dissemination by suggesting to the Executive Director of the Gideon Association, which had been distributing the Authorised Version for years and was often asked for a more modern version, that they adopt the NIV. As a result, this is the version which may now be found in many hotel bedrooms.

Reviewed by Terence C. Mitchell.

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continued (after Vol. 90) as *Faith and Thought.*

1979 (Vol 106) to 1983 (Vol. 110)

Cumulative Index - Part 5

The first part of this index was published in Bulletin 27 (April 2000) and covers volumes 1 to 43 [1866 to 1911]; Part 2 (Bulletin 28) volumes 44 to 70 [1912 to 1938]; Part 3 (Bulletins 29 - 31) volumes 71 to 100 [1939 to 1973]; Part 4 (Bulletins 32 - 33) volumes 101 to 105 [1974 - 1978]. Part 5, which began in Bulletin 34 and is continued below, covers volumes 106 to 110 [1979 - 1983].

Abbreviations

Asterisk (*) - the first page of an article; **c** - correspondence; **d** - contribution to a discussion; **f** - and pages following; **r** - review; **rw** - writer of a review.

To save space, titles of papers and headings are indexed under key words only and not given in full. Also, '10' is omitted in volume numbers: e.g. 6-107 indicates volume 106 page 107.

Hazor	8-57	Hitching, F.	9-155r, 171
healers, holistic	10-244r	Hitler, A.	6-66; 7-228
healling	7-218r	dream of	8-23
hearing and doing	8-90r	Hitzig, F.	10-37
heaven		Hoekma, A.A.	7-137r
Psychology of	6-22	Hofstadter, R.	10-139r
replacements	7-134	holistic healers	10-244r
Hebb, D.O.	8-15	Holmes, A.F.	10-251r
Heidegger	7-219	Holy Land	6-87
Heisenberg, W.	9-112	Holy Spirit	9-207
helium	8-82; 9-121	homeless minds	6-96*
hell	7-17; 8-182r	hominids	7-81
Helm, P.	10-184	homosexuality	7-226r; 10-193
Helmer, C.J.	6-78rw*; 7-10*, 128*; 8-179rw;	Hooykaas, R.	9-120
	9-15rw	hope. Theology of	8-91r
Helmholtz, H.L.F. von	9-220	Hopkins, H.E.	7-223rw, 224rw; 9-84rw;
Magnetic field	8-110		8-185rw
Henry, C.F.H.	10-218r	Hort, G.	10-53
heredity	10-105	Hosea	8-185
heresies, early	10-189	Howarth-Williams, M.	6-27f
hermeneutics	6-1; 7-219r	Houston, J.	7-144r
Herod the great	7-128f	Hoyle, Sir F.	7-17; 8-10, 81r, 101, 103, 109;
Herschel, Sir W.	8-18		9-4, 12, 220*r; 10-123
Hesketh, R.V.	10-12	Hubble, E.	9-20f; 10-186
Hesse, M.	7-181; 8-128	Hume, C.W.	8-98
Hicks, J.	6-84; 7-38, 84; 10-184	Hume, D. on miracles	8-15
Hildebrandt, F.	9-200	Hume, G.B.	10-91r
Hindu meditation	10-150	human	
History		nature	7-57, 59r
and faith	10-18*	rights	7-13
biblical view	10-54*	guinea pigs	9-238
Christian	10-76f	sciences	6-179f
patterns in	6-191r	relationships	6-131
tribal	9-93	humanism	6-130; 7-132*

hurt mind, healing	10-221r	Jacob, J.R.	8-17
Hut, P.	9-177	with M.C.	8-16r
Huxley, Sir A.	8-101	Jaki, S.L.	6-4; 8-7r
Huxley, T.H.	6-61	James, Wm,	7-127
Hyder, O.Q.	7-54r	Japan. Automation	8-117
hydrogen cyanide	9-144	schools	8-116
hydrogen peroxide	9-7	Japanese. Morality	9-237
hymns	9-242r	Jarvis, C.S.	8-4
Hynds, F.	10-183	Jaspers, K.	6-24
hyssop	9-179	Jastrow, R.	6-77r
		Jeans, Sir James	10-147
ice ages	6-18	Jeeves, M.A.	10-152
ice nuclei	10-9f	Jeremiah	6-116; 7-17; 10-254r
ideology	6-94	Jerusalem	8-126, 131f
and idolatry	6-3, 91f	Jesuits	7-101
identity; mind-body	10-161	Jesus	
Identity Theory	10-141	Godhead of	7-54r
idola	6-197	Gospels and	7-48
idolatry	6-110f	only way	7-55r
and prophetic task	6-195*	date of birth	8-26
idols and ideologies	6-91*	hard sayings of	10-246*
Ilkley Group	6-89	supremacy of	10-229r
illiteracy	9-110	teaching of	10-208r
Illich, I.	7-227	Jews	
illusion and substance	6-122*	children	6-20
illusion of omnipotence	7-124	origin (!)	8-117
image	6-122f	John the Baptist	8-76
immanence	6-64f	John, Gospel of	6-80r
immortality	7-88, 140	Jones, D.G.	8-86r; 10-117
incarnation	10-190	Jones, G.	8-63*r
Inch, T.D.	9-168	Jones, G.S.	10-78
income guaranteed	6-135f, 141f, 143	Jones, R.V.	6-14
indigenizing	8-43f	Joseph	6-86; 8-3
induction	7-168f	Josephus	8-26
inerrancy	10-127	Joyner, D.	9-234rw
infant development	7-123f	Jukes, T.H.	8-104
"information"	8-11	Jung, C.	10-154
information coding	9-146	justice, industrial	10-10
information - limits of	10-20f		
intuition	10-203	Kalsbeck, L.	6-167
invention	7-228	Kafka, G.	7-44
in nature	9-6	Kaufmann, W.M.	7-88
IQ and heredity	8-22	Kayaam, Omar	9-112
Isbister, J.N.	6-23*, 178rw*	Keith, Sir Arther	6-10
Isidore	7-155	Kelly, L.G.	7-186
Islam	7-137f, 157	Kelvin, Lord	9-101, 218, 220
intolerance	7-13	Kendall, J.	7-15
cosmology	8-9	Kendall, R.T.	10-210r
and Christian witness	10-213r	Kennedy, E.W.	7-229rw
Islamic Slavery	9-180	Kibble, D.G.	7-23*; 10-186*
Israel and U.S.A.	9-16	Kidner, D.	7-61, 233r; 8-185r; 9-238rw
Israel in Canaan	8-56f	Kierkegaard, S.	6-34
Iverson, J.	10-185	killing. Higher form	9-236r
Ives, E.W.	10-18*	Kings. Book of	10-19
		kin. Selection	6-53f

- Kitchen, K.A. 10-52
 Kitcher, P. 9-216r
 Kirby, A.J. 8-145*
 Kirby, R. 7-52
 Kirk, A. 8-12f, 35
 Kirk, J.A. 7-215r
 Klaproth, M.H. 8-18, 99
 Knight, D. 7-142r
 Knight, G.A.F. 10-254r
 Knowledge
 value-free 7-202*
 end of 9-97
 Koestler, A. 7-19; 10-154, 184
 Kofahl, R.E. 6-6
 Kraay, J. & A. Tol. 8-90r
 Kraepelin 6-153
 Krasny, J. 7-62
 Kropotkin, P. 7-10
 Kuhn, T. 6-182; 7-40f, 168f, 195f, 203
 Kumar, S. 7-227r
 Küng, H. on virgin birth 8-25

 labels 10-14
 Labour Party 6-164
 Ladd, G.E. 10-185
 Laing, R.D. 6-23f, 152f, 167; 7-227
 laissez faire 6-185
 Lakatos, I. 7-168f, 173f
 Lake, F. 6-42, 44 etc.
 Lancaster, R. 9-108
 language 8-116; 7-227; 9-98, 228
 language Apes 6-14; 7-18, 162
 Laplace, P.S. 8-17
 laser weapons 10-15
 last aid 9-239r
 launch under attack 9-169; 10-197
 laws 6-166, 168
 Lawrence, Brother 9-242r
 Laycock, H.T. 7-83d, 86
 Lavoisier 7-142
 Lazarus, E. 8-134
 Lee, B. 10-5
 Leech, K. 6-31
 Legacy, bright 10-234r
 Leith, J.H. 7-62, 229r
 Leviticus 7-213r
 Levontin, D. 8-138
 Lewis, C.S. 7-83; 9-100
 Lewis, H.D. 10-183
 Lewis, J. 8-187r
 liberation theology 6-195; 7-56, 61, 217,
 218; 8-31f
 libraries. Ancient 6-19
 life
 abortion 7-50r
 after death 10-156*
 elsewhere? 8-10, 23, 113
 improbable 8-83, 7-19
 origin 6-13, 77; 8-24, 115;
 9-4, 106, 127*; 10-82r
 in space 7-17, 81; 9-220f
 "soup" 9-5, 130, 133f, 150
 light pipes 9-7
 light. Velocity 6-6
 Lindsey, H. 10-139
 Lipson, H. 8-101
 living, supernatural 10-220r
 Livingstone, D.N. 10-139
 Loane, M.L. 10-231r
 Locke, D. 10-184
 locusts 10-11
 Loery, R. 10-213, 239rw
 Loftus, E. 9-92
 logical positivists 7-34f
 logical indeterminacy 10-114
 Loisy, A. 6-81
 Longley, C. 9-108, 226
 Lopez, N. 10-251rw
 Lord's Supper 9-94f
 Lorenz, K. 10-116
 Louth, A. 7-187
 love 7-38
 Lovejoy, A.O. 7-89
 Lovelace, R.F. 7-62r, 222r
 Lovell, Sir B. 8-186r; 10-123
 Lovelock, J.E. 8-20, 68*r, 111
 Lucas, R.C. 7-62
 Luckenbill, D.D. 10-53
 Luckmann, T. 6-92, 197
 Luhman, R.S. 6-80rw, 85rw; 7-34*;
 9-85rw, 86rw, 161rw; 10-156
 Luke, gospel of 6-78r; 7-62, 224; 9-94
 Luria, A.R. 9-94
 Luther, M. On alchemy 7-160; 8-90
 Lyon, D. 6-110*, 195*, 178rw, 184rw;
 7-147r, 148r; 8-28*, 177r; 10-232r
 Lysenko, T.D. 7-17, 71
 Lyttleton, R.A. 9-103
 McAllister, W.T.B. 7-62
 McClintock 10-11
 McConville, G.J. 6-5; 9-241; 10-223rw
 McCrossen, V.A. 8-138
 Mackay, D.M. 6-178r; 7-60, 202*, 235r;
 8-86rw; 10-81r, 117, 152,
 156, 183, 184
 McKee, A. 10-83r
 Macauley, R. 7-53r
 machines 7-235
 Macquarie papyrus 9-5
 magicians 8-13

- magnetic field 8-19, 107f, 110f
 magnetism. Earth's 7-75
 Maitland, S.R. 7-102
 Malcolm, N. 10-160, 183
 Malory, J.D. 7-57r
 Malz, Betty 10-220r
 Man
 evolution of 9-231
 knowing 9-84r
 nature of 6-178; 7-145r, 210f
 Pitldown 6-9
 Sartre on 6-155f
 unique 8-187r
 Mandeville, D.C. 6-15; 7-148rw
 Mandylon 7-68
 Mannheim, K. 10-78
 margins of science 8-13fr
 Mark 7-62
 Mars 8-23
 Marsden, G.M. 10-124*
 Marshall, I.H. 6-78r; 7-62; 8-179r;
 9-94; 10-54*
 Martens, E.A. 8-184r
 Martin, Chas. 8-76r
 Martin, D. 6-184r; 7-185; 8-83r
 Martin, E.L. 7-128r*; 8-26r
 Marx. Marxism 6-92, 111, 156;
 7-18, 72; 8-21, 28*, 65,
 116, 177r; 9-159*
 Mascall, E.L. 7-85, 224; 8-103; 9*-172
 Maspero, G. 10-52
 materialism 7-142
 mathematics 7-24
 Matheson, S. 6-195, 198
 Matthews, L.H. 8-24
 Maury, M.F. 9-103
 Maxwell, J. Clerk. 7-86; 8-12
 Maynard-Smith 10-108
 Medawar, P.B. 7-180
 Mede, J. 7-104
 medicine in 1500 AD 8-13
 meditation 6-15; 7-232
 Mellanby, K. 10-4
 membership 10-2
 memory 7-227; 9-92
 Mendel, G. 10-106
 mental health 7-57r
 metal bending 8-162*r
 meteorites 9-15, 224
 Oceanic craters? 101
 methane 9-12
 Meyer, J.R. 9-103
 Mid Atlantic Ridge 9*-230
 Middlebrook, M. 7-225r
 Millard, A.R. 10-34*, 41
 Miller, G.A. 9-99
 Miller, Wm. 7-108
 millennium 6-18, 19; 7-140; 9-160r
 millennialists 8-123f; 10-126
 Mills, A.A. 7-71
 Milne, B. 7-223r
 mind. Not a unity 9-176
 Mind-brain 10-157
 minerals 6-19; 10-5
 miracle 6-84; 7-12
 O.T. 6-22
 criteria 10-24, 48f
 Missouri Synod 10-128
 Mitchell, B. 7-41f, 186
 Moberley, E.R. 10-193
 models 6-46; 7-30, 133f; 6-68; 7-57
 Mol, H. 6-197
 Molybdenum 7-81
 Motmann, J. 8-32
 Moncrieff, J.E. 7-59rw
 monsim 10-141, 156
 Monod, J. 7-227; 8-9
 Monro, R.E. 6-12
 Montefiore, Sir M. 8-124f; 8-131f
 morality, divine 10-29f, 66f
 Morley, D. 7-47r
 Moore, James 6-61r*
 Moore, J.R. 10-139
 Morreal, J. 10-185
 Morris, B. 7-185
 Morris, Desmond 6-52
 Morris, H. 9-218; 10-139
 Morris-Whitcomb. Views 6-3f
 mortality rates 9-16
 Morton, R. 9-84r
 Moses 8-4
 motherhood 6-113f
 Moule, H. 9-18
 mountain formation 9-103
 Mount Sinai 8-5, 6
 Muller, M. 7-8
 murder. Definition 9-16
 muscle 8-166f
 mutations 9-224
 Myers, E. 9-176
 mysticism 7-52r
 myths 7-228
 Nabataeans 9-189
 nativity 7-128*r; 8-26
 natural killers 9-7
 Natural Selection 6-13; 10-104
 nature. Spoilation 7-80
 necessity and freedom 6-151*
 neck of giraffe 9-155r

34 FAITH AND THOUGHT

need and greed	8-19	optical activity, Natural	9-15, 135f
negentropy	8-12	order in nature	9-174, 234f
Negev	9-183*	Ordway, F.I.	8-24
Neill, Bishop S.	10-229r, 239r	Orgel, L.	8-100
Neisser, W.	9-93	Origen	10-140, 190
neologisms	8-20	Otto, R.	6-94
neuro-sciences	8-86r	out-of-body	9-109
neutrinos	7-166; 9-235	Owen, H.P.	6-83; 10-192
Newcome, J.	9-242rw	pacifism	9-161r
Newell, A.G.	7-185*	Pais, A.	10-204
Newman, J.H.	7-106	Palestine Exploration Fund	8-137
New Testament survey	9-86r	and Restoration movement	8-118*
Newton, Sir I.	7-75, 160; 8-17	Paley, Wm.	6-63
Nicholls, B.J.	7-62; 8-81r	Palfreman, J.	8-16
Niebuhr, B.	6-158f, 167	panda's thumb	9-228*r
Nielson, K.	7-45	Papacy	7-99
Nile water	9-183	parapsychology	6-16f; 8-14
Nixon, President	9-109	paradigms	
Noah	8-3	in science	7-167*; 195f
Noddak, I.	9-97	paradise	7-89
No God, of gaps	8-112	Parfitt, H.D.	10-170
non-Pauline Christianity	8-75r	patriarchs, Ages	8-3
Norman, E.	6-137; 8-34	patriarchal, narrative	8-77r
nothing-buttery	6-179	particles	9-109
nuclear holocaust. Weapons	10-79r;	Partridge, A.C.	7-196
	7-68, 151	Paskin, N.	9-222
nucleation. Ice	10-9	Pasteur, L.	7-17
nucleotides	9-144	Patrick, J.	7-80
Numbers	10-254r	Pauli, W.E.	9-96
Numbers, R.I.	10-139	Paxman, J.	9-236r
number theory	10-13	payment	6-137
numerics	8-5	Pearce, E.K.V.	7-81; 8-18; 10-118*, 123
Nurk, A.	10-52	Pears, D.	10-183
nature vs nurture	6-54f	Peet, J.H.J.	9-4c, 127*, 181df
Nuzi	8-78	penal theory	6-152
Oak Tree Grove	8-120	Penelhum, T.	10-184
Occam's razor	8-15; 9-225	Penfield, W.	10-184
Occultism	7-53; 9-110	penicillin	9-179
ocean, Early	9-181,	Perkins, D.	6-188r
salt in	8-69	perpetual motion	7-87
Oded, B.	10-52	Perry, M.	10-211r
Offard, D.	7-79	personality development	7-123*
Ogden, S.M.	10-155	Pfungst, O.	7-18
Ohno, S.	9-225	phage	6-19
oil	7-156	Phillips, D.Z.	7-37
oil in Israel	8-113; 9-11	philosophy of religion	8-73r
Olbers, H.W.M.	9-19	phosphine	7-71
Old Testament		photorespiration	8-71
and history	8-184r; 10-34	phrenology	8-66
Oliphant, L.	8-133	physics, Buddhist	7-229
omphalos question	9-122	physics, History	8-190r
Once saved, always saved	10-210r	Piepkorn, A.C.	10-53
Oparin	7-18; 9-145	pilgrim principle	8-45
Open University	7-150	Pitldown man	6-9f; 8-24; 9-232, 241

- pineal gland 10-148, 157
 Pinnock, C.H. 8-93r
 Pippard, B. (Sir) 8-101; 9-17; 10-204
 pitchblende 8-18
 Pittman, M. 9-240rw
 Pitt-Francis, D. 10-234r
 Place, V.T. 10-161
 plagues of Egypt 8-4
 plate tectonics 8-22
 platypus, duck-billed 10-120
 pluralism 6-94, 99
 plutonium 7-76; 9-8, 10; 10-6, 12, 199
 Polanyi, M. 7-29
 politics, ruthlessness 9-110
 politicization, of Christianity 8-35, 38
 Polkinghorne, J. 10-241r
 Pollard, W.G. 7-13
 pollution, in Russia 10-4*; 7-210*
 polymerization, in abiosynthesis 9-140f
 polywater 9-12
 Pompeii 6-19
 Poole, J.D.B. 10-210rw
 Pope Pius XI 9-238
 Popes 7-137
 Popper, H. 8-90rw, 102
 Popper, K. 7-33, 164, 167f; 9-217; 10-154
 Popper and after 10-83r
 population 7-153f; 9-16
 pornography 6-21.
 Porter, L.A. 6-80rw
 positivism 6-128
 positron 7-77
 poverty 7-80, 154
 powders 7-15
 Powerscourt Conference 7-110f
 prayer, early Church 6-14; 9-161r
 preaching 8-184r
 premonitions 6-16
 Price, H.H. 7-43; 10-154, 184
 Prickett, S. 7-197
 Priestman, K. 10-244rw
 private/public 6-97
 process theology 6-14; 7-144; 10-152
 progress 7-146; 6-110*
 prophecy 7-137fr, 152; 9-83r, 161r;
 10-19, 26, 60
 prophecy
 failure 8-22
 interpretation 7-97*
 self fulfilling 6-21
 prophetic task 6-198
 prophets 6-92, 198
 providence 7-12, 163; 8-23
 Psalms II 10-254r
 Psalm 23 6-88
 Psalmanazar, G. 6-11
 psychiatry 6-24f
 psychology
 comparative 6-51f
 consciousness 8-20
 of religion 7-79
 psycho-kinesis 10-148
 Psychic Studies 10-211r
 Puritans 9-85
 purpose 7-117, 181
 in nature 6-12f
 quail 8-7
 quantum concepts 8-145*
 quantum physics 9-112
 quarks 9-124
 quasars 9-22f
 quasi - memories 10-112
 Quastler, H. 7-87
 Quinton, A. 10-184
 racism 9-231
 Radcliffe-Smith, A. 6-67*df
 Radioactive Wastes 10-199
 radio freaks 10-16
 Rain, O.E. 10-35
 Ramsey, I. 7-17
 Rank xerox copier 9-229
 rapture 7-109f, 138, 140
 Raven, C.E. 9-195*
 Ravetz, J.R. 7-33
 Rawlinson, H. 10-37
 Ray, D. 10-249rw
 reason enough 8-93r
 Rees, D. 7-232r
 Rees, M. 9-177
 reformed tradition 7-229r
 regressions 10-172
 Reichembach, B.R. 10-185
 reincarnation 7-163; 8-114, 162; 10-172
 Reisser, P. 10-244r
 relativity 9-29f, 114f
 relativism 7-224
 reliability of records 10-35ff
 relics 7-92
 religion 6-96
 defined 6-92
 opiate 8-116
 in school 10-17
 religious experience 6-82r
 religious movements, new 10-89r
 religious wickedness 7-14
 renewal 7-222r
 repeatability 8-15
 reservoirs 9-104

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