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Great are the works of the LORD: they are studied by all who delight in them Ps 111:2 (NASB)

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Editorial

Issues for the 21st century

I am preparing material for a series of lectures on natural resources of sedimentary basins. Most of the world's energy resources come from such basins, in the form coal, oil, natural gas, and some uranium. A predictive model for oil production is known as the Hubbert curve. When used in conjunction with data from 42 countries (Richard C. Duncan and Walter Youngquist, "Encircling the Peak of World Oil Production, National Resources Research 8 (1999) 3:219-232) the model shows that world oil production will peak by 2007 at 30 billion barrels per year. By 2020 global production will drop to 24.6 billion barrels per year. By 2040 production will be about half of what is presently consumed. The implications of this not only for transport and urban living but also agriculture, education, and health in the third as well as the first world deserve serious consideration. If correct (and not all agree on this assessment), this model indicates that radical changes will be necessary in energy usage over the next 40 years. These require careful thinking to ensure Biblical demands for justice are met. As Ian Hore-Lacey points out in his book review, at present most Christians who write on ecological issues do so from a theoretical basis, without experience in the God-given role of sharing the earth's resources. Indeed, some seem to make a virtue out of such lack of experience. I would suggest that to discuss a theology of environmental stewardship without direct input from Christians working in agriculture, husbandry, mining, forestry, energy production, and water resources is as self-defeating as trying to develop medical ethics without input from health care professionals.

Cloning is another issue for the 21st century. It is a topic to which several ISCAST fellows have made major contributions, notably our chairman, Professor John White, through his role with the Australian Academy of Science.

Media interest in cloning and related topics continue to develop and expand. Recent news items have highlighted this, such as plans of the Raelians to sponsor human cloning (which they see as leading to "eternal life"), a complete ban on all government-funded cloning research (including therapeutic cloning) by the US House of Representatives. Meanwhile an Italian embryologist has reportedly begun a reproductive cloning trial program involving 200 couples, and there has been the announcement by a company based in Worcester Massachusetts of the first successful cloning of a human embryo. In Australia, Archbishop Pell in Sydney has called for complete banning of human cloning for any purpose. So this issue of the Bulletin contains an article on this issue by Denis Alexander that is longer than any previously published by us. I believe that it's content is timely and its inclusion justified by the extreme ethical significance of this issue at the moment.

The tragic events of September 11th are another 21st century challenge. While the issues that drive people to resort to terrorism are not technological, technology provides the terrorist with the tools, the targets, and the opportunity for publicity. Furthermore, immediate procedures to contain and defend infrastructure and social systems against terrorist acts will also be in part technological. Terrorism on the scale of September 11 blurs the boundary between war and crime and may make it necessary for new formulations of long established understandings of the role of civil authority and the role of both the individual Christian and that of the Church with respect to it. Christians will need to reflect carefully on these issues and the technology that may be applied.

News

From the chairman

I hope to communicate with you quite regularly about the activities of the National Board of ISCAST. The Board only meets a few times during the year with much of the initiative for ISCAST's work resting with the Chapters.

At its meeting on 19 November 2001 the Board's chief concerns were ***finalisation*** of the AGM papers of ISCAST Ltd. for the year 2001 and preliminary consideration of the program for 2002. Although not yet directors, it was a pleasure to welcome Professor Peter Barry and Professor John Pilbrow to the Board Meeting.

I am glad to say that the report to the Annual General Meeting from the auditors will show that, thanks to the contributions of Fellows and Associates and the success of the COSAC '01 conference in Adelaide, our financial position is sound and we can contemplate new activities in 2002.

The Board continued its consideration of a proposal that ISCAST should take over the publication of the Pacific Journal of Theology and Science. At its October meeting hesitation about the financial implications of this were raised and a business plan for the Journal requested. Despite the fact that a full business plan has not yet been obtained, it was agreed that if ISCAST takes on the Pacific Journal it will retain the present high quality format and content. Under these conditions there is a need for decisiveness in the next month. I will be polling all ISCAST Fellows and Associates about their willingness to take the Journal for an additional, initial $20 per year subscription. If there are enough subscribers to allow the Journal to break even approximately we will go ahead. The Board saw this as the only way to get a quick answer about the likely economic viability of the journal. This will be a major undertaking for ISCAST and the proposal would be that the Journal would, essentially, take the place of the Bulletin with that publication becoming something more of a newsletter. The Board will decide on this matter at its meeting on 17 December.

What should be the national program for 2002? This was a key item of discussion. We are taking into account that the next COSAC conference will be in 2003 most likely at Avondale College in the New South Wales Central Coast. Coming from COSAC 2001 in Adelaide, it was clear that ISCAST has many resources within its own Australian membership. The Board decided that in 2002 we would use those resources to provide talks in as many places as possible and has called for suggestions for speakers so that a program can be drawn up in December. It is expected that Fellows and others travelling on other

business might make a slightly longer stay in their destinations to help in the ISCAST work and minimize travel costs. A budget, however, of $2000 has been set aside to initiate the process.

The Board also discussed the possibility of setting up an ISCAST scholarship competition for honours or masters degree work on a subject related to science and theology from the evangelical point of view. This matter will be further explored in December.

ACT

Professor John White, Chairman of ISCAST, has been appointed to the editorial board of *Science and Christian Belief.* John will also be chairing a committee for the Anglican Diocese of Canberra and Goulburn to provide advice to clergy and others on ethical and moral as well as scientific aspects of modern biotechnology.

Jonathan Clarke has had a number of speaking engagements at the College of Humanities and Sciences at YWAM in Canberra. The first of these was a general presentation on exploring God's world. The second was a weeklong series on creation, science and environmental theology. The highlight of the course was a field trip to Wee Jasper to look at fossils preserved in a range of rock types and to get students to understand how geologists interpret fossiliferous sedimentary successions. From this they began to get a feeling for the history of the earth and an appreciation of the glory of God as revealed in the history of the earth.

QLD

Allan Wilson: A thanksgiving

When Allan Wilson passed to be with his Lord ISCAST lost one of its most fervent supporters. Although during the last few years ill health, both his own and that of his wife Betty, prevented Allan from taking a very active role, he still supported us in prayer.

Allan was born in Adelaide, and received all his early training there. He graduated from Adelaide University with first class honours in geology in 1943. There were, at that time, few opportunities for professional geologists in Australia, and he became a schoolteacher. He never lost his interest in school students, and was always prepared to offer advice to any who came to him with problems.

It wasn't long before his expertise was recognised, and he joined the staff of Adelaide University as a lecturer in 1947. He soon moved to the University of Western Australia, where he gained a D.Sc. in 1957. In 1960 he became Professor of Geology and Head of the Department of Geology at the University of Queensland, where he stayed until retirement in 1986. The Isotope Laboratory of the Department of Geology (now Earth Sciences) will be a perpetual memorial to his efforts to make the Department a leading one in Australia.

I met Allan shortly after I joined the staff at UQ in 1965. Allan was very active in AFES (IVF as it was then), and a number of meetings were held at the Wilson's house in Kenmore. These covered all sorts of topics, and it soon became clear that Allan was very widely read in areas other than geology. He was even able to discuss some deep theological issues with theologians on their own turf.

As a committed member of the Church of Christ he was in demand as a speaker in many of their churches. He usually spoke about some aspect of science, and was able to show many young people that scientific research was not incompatible with a deep personal faith. He was largely responsible for the setting up of the Church of Christ Theological College in Brisbane (now, unfortunately, closed), and was President of the Board for a number of years. He lectured to the students there on Old Testament Background and Archaeology. He was so loved by the people that they elected him to serve as President of the Queensland Conference of Churches of Christ for 1989-1990.

There were many tributes paid to Allan at the thanksgiving service held on 9th June. Space does not permit the inclusion of many of these, but two, one from a colleague and the other from the minister of the church should be recorded, and taken to heart by all Christians, whether scientists by profession or not. A colleague said "When Allan studied science he was studying God, and discovering more about the God he knew and loved". And the minister who had close contact with Allan for many years said "I have met a number of people who held their science here, and their religious faith over there, and hoped they would never have to deal with the two at the same time. Not so Allan Wilson".

Allan will be sorely missed, but his legacy as a man who loved geology and loved God will live on in the hearts and minds of many.

Ken Smith

SA

Dr Mark Worthing has now moved from Luther Seminary to Tabor College to take on the position of Dean of Studies. Mark is also editing the latest issue of the *Pacific Journal of Theology*, which will contain some papers that were presented at COSAC2001. He is to be a speaker at the *Science and Complexity* conference at St. Marks College, Canberra, in January 2002.

VIC

Dr. Brian Edgar, ISCAST Fellow and Principal of the Bible College of Victoria has been appointed to the Federal Government's new Gene Technology Ethics Committee which will, through the office of the Gene Regulator, provide advice to the parliament concerning all legislation affecting gene technology.

Professor Allan Day has also been appointed to the editorial board of the journal *Science and Christian Belief*. Allan is therefore the third ISCASTian on the editorial board of this important journal.

Allan Day also sent the following report on the second ISCAST(Vic) Annual Lecture which was held on Sep 19th with Assoc. Prof. David Young as the guest lecturer. The subject "Evolution and Creation, Why all the Fuss?" returned to a subject, which in many minds has been resolved, but continues to be a problem for a significant number of Christians. Prof. Young is both a Christian and a Professor at the University of Melbourne where he teaches evolution in biology classes. His book, "The Discovery of Evolution", published by Cambridge University Press gives a helpful view of the historical development of the theory of evolution over a period of some 200 years
He expressed dismay that so many Christian bookshops promote creationist books denying evolution, but also that many popular scientific writers on evolution express an atheistic standpoint. It seemed paradoxical that some parts of the Christian Church were still bogged down on this issue 150 years after the Darwin debate . In proposing a way to resolve this paradox he suggested:

1. The importance of recognising that the current debate had become painfully political presenting a significant barrier to open inquiry. Hostilities tended to become entrenched in a polemic debate with opposing parties keen to score points and to persuade the uncommitted by the use of rhetoric, rather than discussing important issues calmly.

2. That we appreciate the key role evolution plays in biological science. In trying to understand the world around us scientists develop theories in relation to current research. Thus evolution was proposed in the 19th C. to account for the diversity of species through space and time based on data gathered over two centuries. It still remains the central theory in biology, because it makes sense of so much data thereby providing a tool for research in many topics.

3. He suggested that it was equally important to appreciate the theological doctrine of creation. In contrast to other philosophies of the day, this doctrine was formulated as a doctrine of creation out of nothing. It emphasised that nothing exists independently of God's creative power. This implies that God's creative power is not confined to the beginning, leaving the universe to run on its own, but rather should be thought of as "continuous creation". These concepts are well able to cope with an ancient universe unfolding gradually with time.

4. Finally he pointed out that it does Christian theology no good to engage in criticism of evolutionary biology as part of a response to difficult questions. In dealing with the significance of chance for example, external criticism of biology is often ill informed and so proves self-defeating. Introducing divine action to cover some apparent deficiency in current theory only generates a 'God of the Gaps' rendered redundant by later advances of science. Such a response confuses divine and natural causes and so undermines a Christian concept of creation. So Professor Young called on Christians to 'do their theology better', and to explore problems in collaboration with biologists.

The discussion that followed was helpful and marked by grace, humility and good humour.

Articles

Cloning Humans—Distorting the Image of God?

Denis Alexander

The author is Chairman of the Program of Molecular Immunology at The Institute, Cambridge, UK; Fellow of St. Edmund's College, University of Cambridge; and Editor of the journal "Science & Christian Belief" (www.cis.org). His latest book is entitled "Rebuilding the Matrix—Science and Faith in the 21st Century" (Lion: Oxford, 512 pp hb; £20) This paper is an edited and shortened version of one first published by the Jubilee Centre in Cambridge.

Introduction

Dolly the sheep, the first mammal to be cloned from an adult cell, created a furore when her birth was announced in 1997. Within months of the news breaking, 2.5 billion people worldwide had been exposed to the story. It is now likely that human cloning will be attempted soon somewhere in the world and Christians should be giving careful thought to the theological and social implications of such a development.

The cloning debate is marked by semantic confusion due to the many nuances of the word. Cloning can mean, for example:

- Making identical copies of a particular stretch of DNA using molecular biology.
- Generating a group of genetically identical cells from a single parental cell by cell division.
- Creating a group of genetically identical individuals descended from the same parent by asexual reproduction (as occurs in many plants).

This paper addresses 'reproductive cloning' which is a quite different application of nuclear transfer to therapeutic cloning. Human clones could be generated in the same way as Dolly by using the nucleus from a somatic cell of a male or female to fertilise an enucleated donor egg *in vitro* followed by the implantation of the embryo in a surrogate mother (who may or may not be the nucleus-donor). The child born would then be a clone of the donor of the cell nucleus, genetically identical except for mitochondrial DNA. If the procedure was repeated several times using multiple surrogates (or the same surrogate multiple times) then a clone of (almost) genetically identical individuals would be reproduced.

For the remainder of this paper the term 'cloning' will be used as shorthand to refer to the 'Dolly approach' to reproductive cloning.

Why Clone Humans?

Seven different reasons for cloning humans have been suggested, ranging from the medically serious to the bizarre:

- As a way of overcoming infertility due to absent or dysfunctional gametes. By using nuclear transfer, the donor nucleus could come from a somatic cell from either partner, generating a child clonal with respect to one of the 'parents', but not to both.
- As a source of completely compatible transplantation tissue.
- To replace a child who has been lost through disease or by accident. In this scenario a couple who can no longer have children lose their only child but arrange for the child's cells to be cultured following death (or even as an insurance before death). By nuclear transfer the child's DNA is then used to fertilise the mother's egg (or a donor egg) generating a 'replacement child' of identical sex and physical appearance.
- The duplication of individuals with particular talents or abilities.
- To enable homosexual couples to have children sharing the genes of one of them. In the US lesbian partners are already having children following *in vitro* fertilisation using donor sperm, whereas male homosexual partners have, more rarely, paid a surrogate to carry a child procreated using a donated egg.
- Out of curiosity, possibly allied with a scientist's or doctor's ambition to create the first human clone.
- In a cultic context (such as the Raelians).

Theological Perspectives

Are there intrinsic theological objections to cloning? Or is cloning unwise only because the procedure remains unsafe (as outlined below), a situation that may change with further biomedical advances? The Biblical teaching that appears most relevant to the cloning debate concerns the 'image of God'.

The Image of God

Bible commentators have emphasised two major themes in the 'image of God' concept. The 'essentialist' perspective draws attention to God-given qualities, such as moral and spiritual capacities, consciousness, free-will, reason and language, intrinsic to each and every individual, that distinguish humans from animals. However, this perspective alone, critical as it is, does not do full justice to the Biblical context in which 'image of God' teaching is placed. Many commentators have drawn attention to the 'relational' (or 'functional') perspective that is implicit in the Biblical passages that refer to the 'image of God' and, arguably, it is this insight which is most relevant in the cloning debate. It is our intrinsic God-given moral and spiritual capacities that enable us to reflect God's image in the relationships that He has ordained. Far from being rivals, the essentialist and relational perspectives are complementary.

There are three passages only in the Old Testament that provide explicit teaching about the 'image of God' (Genesis 1:26–28; 5:1–5; 9:1–7), whereas the theme is more common in the New Testament, particularly in the context of the restoration of the image, spoilt by sin, through Christ's redemptive work. The Genesis passages are of particular importance in establishing 'creation ordinances', meaning general principles valid for all people of all cultures in every era (such as the principle of caring for the environment). They draw attention to the awesome responsibility given to humankind to reflect God's character on earth. The 'image of God' language encompasses the whole range of relationships in and through which this reflecting process should occur, in particular relationships between God and humankind, and between men and women in sexual union:

The Relationship between God and Humankind

The reflection of God's character on earth begins with a strong hint at God's own relational character: "Let **us** make man in **our** image ... " (Gen. 1:26), an allusion greatly expanded in the Trinitarian theology of the New Testament. There is no explicit reference to the trinity in the Genesis passages, but magnifying Old Testament truths with the lens provided by the New is often a fruitful exercise. God has been Father, Son and Holy Spirit for all eternity, a being in everlasting personal relationship, and as God creates humankind in His image, so He likewise creates beings intended to be in relationship both with Him and with each other.

It is striking that the Genesis 'image of God' passages refer in each case to the relationship between God and Adam in the sense of humankind, explicitly referring in each case to the diversity of His creation in making male and female (cf. Gen. 1:27, 5:2 and 9:6–7). The love that exists between Father, Son and Holy Spirit is to be reflected not by the atomised selves so characteristic of western individualism, but in the love displayed in human relationships. "We learn from the Trinity that relationship is of the essence of reality and therefore of the essence of our own existence... God has created us for relationship, for He is relational". God's love as He relates to humankind is demonstrated by the bestowal of delegated responsibilities to rule over His creation, not as tyrants but as responsible stewards (Gen. 1:28).

Relationships between Men and Women

The second way in which we should reflect God's image is unambiguously presented as sexual union leading to procreation: *Adam* was to be fruitful and increase in number (Gen. 1:28); *Adam* was created male and female (Gen.5:1–2), a comment followed by an exposition of fruitfulness (Gen. 5:3–32); significantly, fruitful procreation still remains the mandate in humankind's post-Fall state (Gen. 9:6–7). The creation ordinance of sexual union within the boundaries of a loving, committed, marriage relationship is continuously emphasised throughout the Bible[7]. Only by being fruitful and filling the earth can it be subdued (Gen. 1:28). The image of God is 'passed on' by sexual union leading to a family resemblance (Gen.5:1–3). When the New Testament searches for language that will do justice to the profound implications of becoming one flesh within the context of marriage (Gen. 2:24), it is the relationship between Christ and His Church which provides the striking analogy (Eph. 5:22–33). Fruitfulness results in families, environments in which children should experience their parents' love and receive adequate care and protection, social units which contribute to the stability and health of society. God could have created a world of unisex humans, but instead He chose His image to be reflected by males and females. God could have made us to reproduce asexually, as many species do, but in fact He made us as relational sexual beings.

Relational Perspectives

'Image of God' theology has profound implications for human cloning. To assess these implications accurately, we must first correct some factual misconceptions and also consider the possible social consequences of cloning.

Cloning and Genetic Determinism

Two of the suggested reasons for cloning are based on a false premise: it is not the case that genetic identity implies identity of personality, talent or biography. Human development is shaped by a complex and continuous interplay between the individual and their environment. Identical twins are notable as much for their differences as for their similarities. Clones would be even more different than twins because they would not share the same womb, they would be born at different times and would have different mitochondrial DNA (of possible relevance to their athletic prowess). The grieving parents who seek to replace their dead child by cloning will be disappointed, for the clone will have a different personality, different gifts and interests, and a different biography. Each child is unique and irreplaceable. The parents would double their suffering by the tragedy of unfulfilled expectations and the clone might live under the terrible burden of knowing that s/he could never live up to those expectations.

The desire to replicate exceptional human talent would probably be similarly disappointed. There is no convincing evidence that complex human behaviours of any kind are inherited. Hitler's clone might decide to become an Austrian bus-driver. The cloned athlete might turn out to be more interested in stamp collecting. Genetic determinism is a myth. Nevertheless, physical beauty and athletic potential are to a large degree inherited. Many diseases also have a genetic component. The clone might experience a deep sense of genetic fatalism as s/he observes the medical history of the nucleus-donor, assuming that the clone knows the identity of this individual.

Social Disruption

Families are God's ordained way of structuring society so that sexual union is linked to procreation within the solid bonds of a marriage partnership, and so that children are reared, protected, disciplined and educated within a loving and stable environment. Extensive reproductive cloning would profoundly disrupt and upset the social structure of the family, and therefore of society. Procreation in the context of a loving relationship would be replaced by a sexless reproductive technique for which neither love nor a relationship is necessary. Such would not be the case with infertile couples for whom cloning would, in this respect at least, play an analogous role to artificial reproductive technologies such as *in vitro* fertilisation (IVF), processes perfectly compatible with a loving relationship. But outside such contexts cloning by fertile couples represents a deliberate decision to reproduce without sexual union. In addition, cloning differs significantly from other technologies in that the clone's genetic endowment would be from a single individual.

The fact that genetic and personal identities are distinct does not imply that biological relationships have no bearing at all on human interactions. The evidence suggests otherwise. People who have never known their biological parents have a powerful drive to discover and meet them—the theme of numerous books and films. Cloning would divorce genetic parenthood from relational parenthood. Biological parenthood for *Homo Sapiens* begins when two haploid cells merge to generate an embryo of diploid cells. The biological parent of the clone would not be the nucleus-donor, but the parents of the donor. The genetic parents of the clone would therefore be the grandparents in generational terms. If the clone was reproduced in turn to populate the next generation, then the biological parents would now be the great-grandparents, and if cloning were continued the parents would become ever more distant in time. Neither adoption nor IVF requires a redefinition of parenthood, but cloning does, driving a wedge between biological and familial relationships. The clone might never have the opportunity to know their biological parents because they died long ago, leading to a crisis of identity.

It is often claimed that cloning is "just like twins". Not so. We have already noted some biological differences, but the relational differences are more profound. Twins are siblings born at the same time from the same mother. A clone would be the twin, not of a sibling, in the first instance, but of the person—the relational parent—who undertakes to care for the clone, assuming that this person is the nucleus-donor. This is twinhood across generations, something quite different from normal twins. The relational parent will be reminded constantly as the clone grows up that

the child is his or her genetic twin, but bears no genetic relationship nor resemblance to his or her partner, who may well feel excluded from the developing relationship between the nucleus-donor and the clone. Cloning represents a denial of the mutuality of marriage. When the clone grows up, his or her genetically unrelated relational parent might have the unsettling experience of seeing the clone looking virtually identical to his or her partner as on the day when they first met.

Social dislocation will be further exacerbated by increasing the number of cloned children. Large families with, for example, 6–12 children remain common in various parts of the world. Cloning might prove particularly attractive to the rich and to the narcissistic who might wish to reproduce multiple replicates. Paid surrogacy is already an option in the USA, and in countries where poverty is rife many women would be willing to bear the clones of the rich. The consequence could therefore be large collections of physically identical siblings, all growing up to look increasingly like their identical nucleus-donor. Relational dysfunction could be worsened where there is a mixture of clones and normal children.

The welfare of the clone should be paramount in any discussion of cloning. As Mark Phippen, head of the University of Cambridge Counseling Service, comments: "Consciously or unconsciously the nucleus-donor is bound to compare, to note the similarities and differences, to make assumptions about their child's character and abilities. Psychologically, issues such as identity problems would be expected; there would likely be difficulties with the process of individuation and 'leaving home'; perhaps also with forming intimate relationships ...". There is an issue here of human privacy and of human self-determination, which could so easily become smothered by the nucleus-donor's narcissistic tendencies.

Cloning and the Image of God

Does reproductive human cloning help or hinder to reflect God's image in humankind? Clearly if human clones are ever born, then God will love them as much as any other human-being. Likewise Christians should be the first people to display acceptance and practical compassion towards cloned children. The day could come when the psychological and social disruption introduced by cloning will simply represent yet one more contributing factor towards family breakdown, and the churches should respond accordingly with practical help and counsel, just as at present.

Such reflections underline the need for balance in the debate about cloning. If human cloning ever happens, this will not represent some catastrophic challenge to Christian faith. Arguably it would be a lesser evil than adultery, child abuse or divorce. Nevertheless, the Biblical data do suggest that cloning would have a long-term distorting effect on the image of God in humankind, due to relational disruption. For that reason it should be opposed, not because it involves a novel reproductive technology, but because it risks establishing a new social order that fails to reflect God's image in humankind adequately.

Theological disquiet applies to both major aspects of the image of God already considered. Of course a clone could repent and become a child of God like any other person, but that is not the point. The Bible describes a God of diversity, of three-in-oneness, who has delegated stewardly responsibilities to males and females, humans in diversity, who subdue the earth, procreating and caring for their children in the context of loving married relationships. Biology and theology are in harmony, singing from the same hymn-sheet. That is God's pattern. Cloning disrupts this pattern by splitting the biology and the theology, by divorcing procreation from a loving and committed sexual union and by generating a disturbing discontinuity in sibling and parental relationships, thereby undermining family structures. Such structures are already under intense pressure, and their breakdown leads to immense personal suffering, psychologically and often physically, and to major economic costs for society.

Just as reflections can be distorted by rough surfaces, so can God's image in humankind be distorted by departing from the familial and social framework that He has established for our well being.

Technical Risk Perspectives

The breaking of a creation ordinance would be expected to have deleterious consequences which can be measured. Cloning is no exception in this respect.

Risk-taking is judged according to the practical benefits that might potentially be obtained. People dying from cancer may agree to novel

and risky therapies because they represent their last chance. The stakes are high. Such is not the case with cloning. No one will die if cloning remains banned. Of the seven reasons listed above put forward to justify human cloning, six are weak, misconceived or too bizarre to consider seriously, and only one, a potential use in infertility treatment, has any medical justification. Those infertile due to dysfunctional gametes deserve compassion and further research efforts to resolve their predicament, but experimenting with children, physically and psychologically, is no way to tackle infertility. One day it may be possible to induce cultured cells to develop into eggs or sperm, thereby solving infertility due to gamete dysfunction.

In general there seems little point in cloning apart from satisfying human curiosity, or from ill-conceived instrumentalist views of children as 'replacements' or as sources of donor tissue. And the risks of cloning are considerable:

- It took 277 attempts to generate Dolly. Foetuses produced by nuclear transfer are ten times more likely to die *in utero* than foetuses produced by normal sexual means, while cloned offspring are three times more likely to die soon after birth. Cloning humans would always remain experimental, with risks of high foetal loss and deformities in the newborn.
- All somatic cells accumulate mutations in their DNA during the course of life. These are not passed on to offspring during normal mating and are usually harmless. However, if several mutations accumulate in the same cell, then the cell may become cancerous. In nuclear transfer the nucleus from a random somatic cell is used in which the DNA will already have accumulated unknown mutations. These could lead to cancer in the clone.
- Genomic imprinting represents a further risk factor. Although genes encoding the same proteins are present in duplicate on paired chromosomes in somatic cells, in genomic imprinting one copy of a gene is switched off depending on whether it came from the father or mother. In nuclear transfer the normal imprinting process may be disrupted, leading to abnormalities in development.
- Dolly was created by nuclear transfer from the mammary gland of a 6-year-old ewe and her cells already showed signs of aging soon after birth. The long-term implications of this remain unknown.
- As Ian Wilmut, leader of the team that cloned Dolly, warns: "How can all the potential hazards be identified and quantified so that we know in advance what the risks would be if anyone did attempt to clone a human being? They can't". Human cloning will always represent an experiment and experimenting on children is wrong. There are times when human curiosity should for ever remain unsatisfied.

Conclusions

The spectre of reproductive human cloning arouses a strong sense of disquiet in most people irrespective of their religious beliefs. This intuitive disquiet is well justified. Intrinsic theological objections to cloning draw attention to the way in which it would undermine God's image in humankind, an image underpinned by key creation ordinances that God has established for humanity's health and social well-being. Cloning bypasses the safeguards that God has put in place to protect the structure of families and the welfare of children. The possibility of cloning continues to attract a powerful curiosity and fascination. But the suggested reasons for cloning humans are weak and far out-weighed by the possible risks.

Ironically, it is in sex-saturated societies that the secular proposal has arisen to reproduce without sex. Biblical teaching has always emphasised the beauty and wonder of sexual union within a loving and committed relationship. The prospect of cloning now provides the Church with an opportunity to emphasise the same teaching within a totally novel context.

Denis R. Alexander

Science and Christian Belief

The Journal of Christians in Science (UK).
It comes out twice a year and contains many thoughtful articles.

Cost: Aust$50 for one year's subscription

For subscription contact Helen Joynt, Administrative Secretary ISCAST (Victoria)

Book Reviews

Environmental Stewardship

The Care of Creation: Focusing concern and action, 2000, ed. R. J. Berry, IVP, 213pp.

Christian engagement with environmental issues has been belated, on the whole. Prof. Lynn White's 1967 essay provoked a defence at the time (e.g. Schaeffer's *Pollution and the Death of Man*, 1970) leading to a more sophisticated articulation of creation theology and its implications since. But never a year goes by without some exalted cleric announcing that Christians ought to wake up to his list of new-found greenish concerns.

In 1990 the World Council of Churches addressed the need for Christian engagement with environmental issues, but did so in a way which eroded the proper basis of this engagement: humans being made in the image of the Creator. As a result, the Evangelical Declaration on the Care of Creation was launched in 1994 to set the record straight, stake out some ground in the green agenda and guide the faithful.

Ron Syder in setting the context points out that "if we do not offer biblical foundations for environmental actions, we will have only ourselves to blame if environmental activists turn to other, finally inadequate, world views and religions". He is right in the sense that we need to do this for the benefit of many, but naive in presupposing the general absence of any ideological commitment which is profoundly anti-Christian as well as being effectively opposed to the science and technology which arises out of a Christian understanding of creation.

This book is a presentation and collection of theological comment on the Declaration, from mainstream evangelical theologians and others in various parts of the world, edited by Prof. R. J. (Sam) Berry. The 18 contributions are diverse, and add up to a valuable collection bearing upon 1990s concerns and understanding of environmental issues.

The contributors cover a lot of ground very helpfully, and they are all the more valuable for each being tied to the Declaration (despite its shortcomings). But the tenor is academic (most authors are Professors) rather than practical, and but for one item they do not address how farming, mining, forestry or other activities and industry mediating the bounty of creation to the needs of people should be conducted. There is a glaring gap in relation to the utilitarian aspects of creation and our stewardship of it.

Both the Declaration and this commentary on it are shaped by the "green" and perhaps the Romantic perspective which focuses on greed, 'perverted stewardship' and a litany of environmental degradation rather than on responsibly utilising God's bounty for the benefit of people on his earth. Where one would expect to see a balance between utilitarian and conservation aspects expounded, e.g. Calvin De Witt on 'Creation's environmental challenge to evangelical Christianity' (expounding the Declaration rather than commenting on it) we have caricatures presented as though the economic dimension of life did not exist.

The 160 core pages of the book avoid mention of industry such as mining and forestry, except by way of listing the standpoints and presumed motivation of those who attack the Declaration. We have only the park/gardening metaphor of stewardship, and even that has been divorced from anything developmental, e.g. Ephesians 2:10—we are God's workmanship created in Christ Jesus to do

good works, etc. It is not clear whether this omission is an oversight, or whether the subject too difficult to reconcile.

In a valuable but ultimately negative chapter, Richard Baukham on 'Stewardship and Relationship' concedes the value of science-based economic development, but says "it was fatally flawed. It saw no value in nature other than its usefulness for practical human ends". He briefly shows how recent thinking about stewardship attempts to correct the balance, but leaves the matter there. So how, exactly, should we view the world's natural resources? They are clearly part of what is entrusted to us for use (c.f. Deut 8:9), and our civilization (not to mention the survival of most of the world's population) clearly depends on them. So why are they regarded as unmentionable?

While the Declaration's tone of repentance does have the virtue of taking seriously the fall, it would have been more appropriate to the early 1970s than 1994, and it comes across to me as largely a "me too" catch-up which has been partly overtaken by major efforts in environmental management and remediation which do not get a mention.

The book makes it clear that the Declaration was forged under heavy fire from the US Christian Right (Calvin Beisner being the *bete noir),* which may explain its bunkering down in the other direction. One chapter, 'The Declaration under siege', documents a slanging match where apparently neither side learns from the other. Obviously they are a key audience or at least a reference point for the book. In this regard I am not suggesting that the Declaration is significantly wrong, simply that it is unbalanced. It is deficient in neither affirming nor celebrating the Creator's purposes regarding natural resources and the technology to utilise them, nor acknowledging the positive human steps to reduce environmental impacts in the process. The balance is not redressed in the commentary, and this is its chief shortcoming. Regrettably, it invites more of the scorn already heaped by a few on the Declaration itself.

The environment is a contentious issue, all the more so as urban dwellers forget where their food, fibre, fuel, and other materials come from, let alone how they are extracted and processed. Christians who engage in comment on environmental issues are not free to ignore these basic facts of modern life however, if they are to maintain their integrity. Green Romanticism is a cop out. Christian stewardship of creation means that we need to help one another try and see that creation from the Creator's perspective, and discern as best we can his purpose in all the varied and extraordinarily abundant provision he has made. We also need a sound and mature understanding of technology as a human attribute of people created in his image, such as I have attempted in my 1996 *Zadok Paper*. Then we can get a better idea of how to approach the whole creation with a coherent sense of utilitarian, aesthetic and spiritual goals.

Ian Hore-Lacy

Are things getting worse?

The Skeptical Environmentalist: measuring the state of the world. Bjorn Lomborg. University of Cambridge Press, 2001.

Every day we are bombarded by a litany of environmental Armageddon—the oceans, the atmosphere, even the land itself are being poisoned, the world is running out of food, clean water, energy, and minerals, forests are being destroyed and species are becoming extinct at unprecedented rates. This message is repeated on the radio, television, in newspapers, taught in schools, and preached from pulpits. A question almost never asked is the factual basis behind the claims, apart from some generalisations: “We are losing 40,000 species a year”, “Temperature is going to rise by almost five degrees over the next century”, or “The battle to feed humanity is over … hundreds of millions will starve to death”. This book, written by an Associate professor of Statistics at the University of Aarhus, Denmark, documents the statistical base that allows us to measure the state of the world and changes in it. It covers in great detail issues such as food, water, wealth, pollution, greenhouse, ozone depletion, energy, biodiversity, carcinogens, forest cover, sperm count, genetically modified food, comparative risk, cost benefit analysis, and chemical usage.

The results will be a surprise to most people. In almost every category people globally are materially better off than they were 50 years ago. Despite a doubling of the world’s population in that time, per capita food consumption has increased on every continent and the proportion of starving has decreased. Paul Ehrlich’s 1968 prediction of mass starvation in the 1970’s (quoted above) has proved utterly false. Similarly from 1950 to 2000 per capita income in both the developing

and developed world has tripled, while the income differential between the richest and poorest 20 and 30 percent of the world has fallen from a factor or 14 and 10 in 1960 to 12 and 8, respectively. This has been achieved despite a near tripling of the world's population since 1950. This is significant in that the over the next 200 years the global population is predicted to less than double, and, more significantly, plateau. There are therefore grounds for optimism that the challenges of the future will be met, just as those of the past were met.

But, some might argue, what has been the environmental cost of this economic development? Lomborg demonstrates that air quality in London is better than it has been at any time since the 16th century. Water quality in rivers and lakes of Britain and the United States, examples of highly developed countries, have improved significantly over the last 30 years, while the levels of persistent chemical pollutants in the Great Lakes have fallen markedly in the same period. Lomborg also shows a very strong correlation between wealth and environmental quality. Protecting the environment is a luxury which communities can afford best when they are wealthy.

The book also considers broader issues of policy in areas such as food production, development, issues of poverty, development, and food production. The section on greenhouse gas policies is especially informative and salutary.

In the face of these data we must ask why the litany of environmental doom is so popular? There are many reasons, but important among them is that many environmental lobby groups are funded in response to crisis advertising. There is not much financial future for Greenpeace or FOE if they try to fundraise by saying that things are getting better!

This is not to say I agree with everything in this book. The author is more pessimistic about the long term future of nuclear power than I am, and more optimistic about both solar energy and fossil fuels. A minority of his statistical arguments also appear forced. The great strength of the book is that it goes back to the primary statistical data. To this end there are nearly 3,000 footnotes.

Lomborg is not a naive optimist. He recognises there are genuine problems facing both the present and the future. He also recognises that the solutions to past problems have not simply happened, but are the result of concerned efforts by governments, corporations, and lobby groups. If present and future challenges are to be met these efforts must continue. This book does point out that there are grounds for hope, not despair. This book is not simply recommended reading, it is essential reading for everyone interested in the care of God's creation. The $50 I spent on this book was an excellent investment.

Jonathan Clarke

The deadline for submissions for the next issue of the Bulletin is:
February 28, 2002

Word limit for articles is 1,000 words. For letters, reflections and book reviews it is 600 words. Exceptions may be made in exceptional cases.

Please submit to Jonathan Clarke 43 Michell St., Monash, ACT 2904, or to the email address on the front page (preferred).