A Christian theological response to human gene patenting

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Abstract

The publication of the draft of the complete human genome is likely to prove to be one of the most significant breakthroughs for the medical sciences in this millennium because of the potential information it will yield. Patenting of human genetic material is permissible if these ~~are~~ can be shown to meet the four standard criteria applicable to all patents, which are that they are novel, involve an inventive step, are non-obvious and possess an industrial application.

This dissertation addresses the main theological issue concerning patents, which is property as well as the ownership and use of such. It is argued that in the Bible, though a well-defined scriptural doctrine of property is absent, the right to property is tenable provided that it is in principle subordinate to the obligation to care for the weaker members of society. Property, in that regard, is to be used in fulfilment of the common good. I show that patenting human DNA can lead to injustice and therefore does not serve the common good. As this is contrary to the Christian theological understanding of the objective of property, I advocate that the correct response is to reject the practice.

As a second line of argument, I also argue that because of its bi-elemental non-dual nature, human DNA is a metonymy for the human person since both possess a material and an immaterial component. These components are nonetheless inseparable without altering the overall nature of the DNA or the person. In this sense, human DNA is symbolic of the human person and on this account also should not be subjects of patents.

Contents

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Chapter One

Introduction
&
Church and Theological Responses to Biopatents

Introduction

A task of the Church is to be the visible representation of the kingdom of God on earth and as such, to be the salt of the earth and a light to the world. This implies that we have a duty, as Christians, to engage with the issues and concerns that affect not just ourselves but also all that live alongside us. That the Christian voice in ethical issues has always been a strong one is testament to our understanding of the Church's task. Christian theologians, especially ethicists, have long had interests in medical ethics because of the biblical paradigms of physical and mental wellness as exemplified by accounts of physical healing in the Bible. These were performed by Yahweh through the various prophets in the Old Testament as well as the physical, mental and spiritual healing by Jesus in the course of his earthly ministry and later by the disciples after the ascension of the Lord. Medical ethics has, of late, been subsumed into the broader discipline of bioethics. This new name itself suggests it relates to all ethical issues where biological life is affected.

Because of the value that we as Christians place on physical wholeness and wellbeing, Christian bioethics has in the past been primarily concerned with the ethical issues related to health care and also issues concerned with the beginning and the end of life. However, with the advent of the age of molecular biology, the focal point of Christian bioethical reflection has somewhat shifted. Ethics concerning health care must now be considered in the light of the genetic revolution which in the future will make genetic engineering-type treatments, such as gene replacement therapy, a treatment option. The current state of technology is not proficient yet to accomplish this routinely but the state of progress in the biological and medical sciences is likely to make this a reality in the future. What is possible, however, with the current state of technological advancement is the genetic modification of lower life forms such as plants, bacteria, viruses and small laboratory animals as well as the production of clones of such organisms. Indeed these days the making of genetically-modified organisms is deemed routine in a reasonably competent laboratory and does not in itself merit reporting in scientific journals let alone the mass media.

In view of the scarcity of public financial resources for scientific research in academia, a sizable portion of the research budget in research institutions comes from collaborations with industry. This is not necessarily bad as both parties stand to gain from such an arrangement; the academic research department or institute receives much required resources and is able to train more students, whilst the industrial collaborator gets first refusal of any useful data that has industrial application or potential economic value. This can be seen from a purely business investment perspective on the part of the financial provider and can be a morally justifiable one if business ethics are strictly adhered to. However, due to the high cost of chemicals, consumables and highly-specialized instrumentation, research costs for the life sciences are exorbitant and the level of investment required is much higher compared to other types of scientific research. It is not a surprise that researchers and their industrial collaborators wish to protect their work and investments, should products of potential worth, economic or otherwise, emerge as a result of their efforts. The legal provisions for this are in the form of Intellectual Property

(IP) law, specifically patents, which in the earlier industrial age, protected inventions of an altogether more mechanical nature.

The Use of Patents in Biology

In 1930, the Plant Protection Act (PPA) was passed in the US to protect the commercial interest of the agricultural industry and plant breeders.[1] This piece of legislation was formulated as it was recognised that though the rights of those who undertake the breeding of better agricultural and horticultural crops must be safeguarded, biological matter such as plants were not considered to be patentable subject matter.[2]

Patents, as a form of intellectual property protection, have a long history.[3] Its purposes in modern day are two-fold: first, to safeguard the rights of the inventor, and second, to safeguard the national economic interest of the country. This legislation had served well an earlier age dominated by mechanical inventions but had to be reinterpreted for the present age because the biotechnology revolution in science has thrown up new problems. In 1972, Ananda Chakrabarty, then working for General Electric in the US, applied for a patent on a strain of genetically-altered *Pseudomonad* bacteria, which was claimed to be able to metabolise crude oil.[4] This application was denied by the patent

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[1] Jack Wilson, 'Patenting Organism: Intellectual Property Law meets Biology' in David Magnus, Arthur Caplan and Glenn McGee (eds.), *Who Owns Life?* (Amherst: Prometheus Books, 2002), 33-36.
[2] Ibid, 27.
[3] If it is to be believed, the Acontius patent, granted in 1565 for the manufacture of machines for grinding, is often regarded as the first clear case of a grant for a new invention. See Brian C. Reid., *A Practical Guide to Patent Law* (London: Sweet and Maxwell, 3rd ed. 1999), 5.
[4] Ananda M. Chakrabarty, 'Patenting of Life-Forms: From a Concept to a Reality', in David Magnus, Arthur Caplan and Glenn McGee (eds.), *Who Owns Life?* (Amherst: Prometheus Books, 2002), 17-24. What we today commonly refer to as 'recombinant DNA techniques' were at an infancy when this work was done. The bacteria were genetically altered by microbiological techniques that occurred in nature. Chakrabarty claimed that the bacteria may be used to clear up oil spills. This was never proven as critics

examiners even on appeal. It moved through several legislative offices and judicial channels before it reached the US Supreme Court in 1980.[5] There, the Court ruled in favour of the appellant that a genetically modified strain of bacteria was patentable as it met the four criteria of assessing patentability. It based its decision on the fact that they considered that the genetically-altered bacterium was not a product of nature but a man-made invention that merited patent protection.[6] The decision is considered a landmark one as the legal system of one of the world's most important players in the emerging biotechnology industry applied IP law to biological innovations and established that organisms were patentable subject matter. But more than this, the case transformed the *purpose* and *interpretation* of patent law: where in the past patents were granted on mechanical inventions, it now opened the door for patenting not only material of biological origins but also biological life-forms.[7] This, opponents to biopatents claimed, opened the proverbial floodgate.

In 1984, a US patent was granted on a cell line derived from an individual's spleen (patent 04438032). This attracted media attention as the individual sued, not because of what later came to be termed 'biopiracy' but rather for a share in the royalties. However, the landmark decision in biopatents was to come in 1988, when a US patent was granted on the Harvard 'OncoMouse' (patent 4736866). All the cells, germ as well as somatic, of

have pointed out the bacteria were 'genetically unstable' in nature due to the way the new genetic material was introduced into the bacteria.

[5] Wilson, 'Patenting Organism: Intellectual Property Law meets Biology', 25.

[6] Ananda M. Chakrabarty, 'Diamond v. Chakrabarty: A Historical Perspective', in Donald S. Chisum, Craig A. Nard, Herbert F. Schwartz, Pauline Newman, F. Scott Kieff (eds.), *Principles of Patent Law* (New York: Foundation Press, 1998), 783-788.

[7] Technically speaking, the first patent on biological life-form was actually that of Pasteur's US patent (no. 141072), for yeast, free from organic germs of disease as an object of manufacture, see Wilson, 'Patenting Organism: Intellectual Property Law meets Biology', 47.

the transgenic animal contained a recombinant activated oncogene sequence. To create this animal, scientists introduced the said gene sequence into the embryo at a very early stage of its development to allow for integration of this into the animal's genome. As cell divisions continued to occur, eventually all cells in the animal's body would carry that transgene. Further cycles of breeding would give rise to a line of these transgenic animals.[8] The OncoMouse, because the transgene was an activated oncogene, had increased susceptibility to cancer. This meant that these animals could be used as a model for medical scientists who wish to study not just various aspects of cancer development but also potential models for therapy. A similar patent was filed at the European Patent Office but rejected in 1989. However, it was granted two years later.

That same year, 1991, saw the National Institutes of Health (NIH), the US public-funded research organisation file patents for over two thousand five hundred human deoxyribonucleic acid (DNA) segments generated by a laboratory under its aegis. In 1993, while the first application was still pending, they applied for patent protection for another 2,421 new sequences generated again from their in-house sequencing project. These short stretches are termed 'expressed sequenced tags' (ESTs). The functions of these sequences were largely unknown and their applications were listed as merely as 'research tools'.[9] An EST is not the complete sequence of a gene but only short sections thereof and as such does not provide much useful insight to the gene function and regulation. They can however serve as labels in the identification of the gene for further

[8] This protocol to generate a transgenic animal was developed in 1980 and was by 1988 common knowledge.

[9] Whether such short sequences could actually be patented was never found out as the patent applications were later withdrawn.

study, for example as tools in *in silico* gene cloning.[10] Furthermore, inference of the gene function from which the EST was generated can be made if a match is made between the EST and the analogue of the gene that has already been identified from another species. This is possible because many of the biochemical reactions are conserved between the different species; a phenomenon scientists believe is due to evolution. Nonetheless, the gene sequences between the species are not identical.

In practice, it is usual to generate a pair of ESTs for a gene, one from each of the two ends of the coding sequence. Each EST is between 150-400 bases in length representing between 10% to 25% of the full gene which is on average about one and a half kilobase (1500 bases) long. Technically speaking, this protocol involves the generation of a man-made copy of DNA, called complementary DNA (cDNA), using nucleic acid extracted from a cell.[11] The ends of this cDNA molecule are sequenced to yield ESTs. Thus, though ESTs can be cloned into a vector and stored as such for convenience of use, in fact, ESTs are only the short sequences of the two ends of the coding region of a gene. In the context of a functional gene, ESTs do not possess a use *in situ*. The patent claim of the NIH application was very broad and encompassed not just the exclusive rights to the use of the ESTs but included the entire gene they were sequenced from and also the

[10] It has been known for a long time that there can be genes with similar structure because of considerable sequence homology. This has given rise to the acceptance of gene families. Though these genes are not identical, often they can have the same function. Sometimes the different forms are expressed at different developmental stages of the organisms but the entire purpose of such redundancy is not completely understood. With the publication of the draft, a fast and easy way to locate other members of the same gene family has arisen. If a scientist has already identified one gene, he only has to compare its sequence with all the sequences in the human genome database to find all the other potential members of the same gene family. This has come to be referred to as '*in silico* gene cloning', which is merely the identification of sequences of predefined levels of homology.

[11] The nucleic acid is ribonucleic acid, RNA, rather than DNA. There are several functions and thus forms of RNA. However, the form of concern here, messenger RNA (mRNA), carries the protein-coding region only of the gene and not the regulatory portions.

proteins they encoded. Even if the patent applicants were not filing a claim on life itself, it certainly seemed that they were staking a claim on the chemical that drives life.

Another form of genetic information that have potential economic value and hence are deemed patent-worthy are single nucleotide polymorphisms (SNPs). These are not genetic mutations in the genome of particular individuals, per se, but as the name implies, single base differences within a genetic sequence of an entire population. A SNP could affect factors such as disease susceptibility or response to certain types of treatment. As such, they are of interest to the pharmaceutical industry as they can be exploited to develop treatments based on an individual's genetic profile. Databases of SNPs are being assembled. It will be some time until correlations between SNPs and the traits mentioned are established. Patent applications may then claim concrete fulfilment of the utility criteria of SNPs.

Beside these short DNA sequences, whose full functions are not completely understood and are used primarily as tools for further research, it is also possible to patent full genes sequences though this practice seems rarer in practice. The essential difference between short DNA sequences and the sequences of full genes is that the former do not code for functional protein molecules. This point is significant as protein molecules may have potential value as therapeutics or otherwise. In this dissertation, where appropriate I shall make the distinction between the two: short sequence and full gene sequence; but in general I mean both when I refer to them generically as human DNA.

General Responses to Biopatents

The granting of patents on biologically-derived material and life-forms, such as those mentioned above has led to some outcry among many groups of people, including the churches, moral philosophers, and some sections of the legal fraternity. The episode of the NIH attempting to patent ESTs in the early 1990s caused much concern among scientists. Many were against the move as they saw it as detrimental to the true ethos of science. One of these opponents was James Watson. Together with Francis Crick, and Maurice Wilkins, he elucidated the double helical structure of DNA in 1953. He became one of the most respected scientists and subsequently won the Nobel Prize in 1962 for that work. Watson was horrified and opposed the NIH's move to patent ESTs calling it 'outrageous' and 'sheer lunacy'.[12] He did not believe that there was an inventive step involved and that the sequencing step was routine as it was an automated process.[13] Watson at that time was the head of the NIH's genome project; he and David Galas, who was the head of the US Department of Energy's genome project, both strongly opposed the attempt to patent.[14] These sentiments were also shared by Sir John Sulston, an eminent British scientist, who was later to head the UK initiative of the Human Genome Project (HGP). He also did not see that ESTs met any of the criteria essential for

[12] As accounted in Ari Berkowitz and Daniel J. Kevles, 'Patenting Human Genes: The Advent of Ethics in the Political Economy of Patent Law' in David Magnus, Arthur Caplan and Glenn McGee (eds.), *Who Owns Life?* (Amherst: Prometheus Books, 2002), 79-97. History has shown that the work of Rosalind Franklin was instrumental in the success of Crick, Watson and Wilkins. However, she was largely unrecognized for her contribution. Her early death, aged 38, in 1958, is but one reason for this since the Nobel Prize is only ever awarded to those who were alive.

[13] Watson is quoted as say that 'virtually any monkey' could perform this type of research, a remark presumably aimed at J. Craig Venter. Ibid. Venter, originally a government-funded scientist, earned the scorn of many in the academic research community when he attempted to patent short human DNA sequences of unknown functions. See pp. 150-152 of this dissertation.

[14] Ibid.

patenting.[15] Furthermore, he warned of the dangers of monopoly should human genomic data cease to be preserved as public data.[16]

The majority of scientists, especially those involved in the HGP, the joint US-UK public-funded initiative to sequence the entire human genome, are against the patenting of raw genetic data as it would impede free access to the same by other scientists. This is contrary and detrimental to the ethos in science where competition is not necessarily bad as it will ultimately lead to the development of understanding. The noble principle of academia that knowledge was more important than economic returns was at risk partly due to the way science was funded as has been mentioned briefly above. Though the patenting of ESTs by the NIH did not become a reality because of the withdrawal of the application, there is no telling what the result of the appeal would have been if this had not happened.[17] Patenting of genetic material is still possible today if the application can demonstrate that it does fulfil the criteria set for patenting in intellectual property law, as will be discussed further in chapter two of this dissertation.

Beside the scientists mentioned above, many bioethicists, both philosophical and theological, are also against biopatents. Their main criticism is that the award of such patents is tantamount to the award of a patent on life itself. There are two separate issues that have become amalgamated in many critiques on this topic: that of patenting a life

[15] John Sulston and Georgina Ferry, *The Common Thread: A Story of Science, Politics, Ethics and The Human Genome* (London: Bantam Press, 2002).
[16] John Sulston 'Intellectual Property and the Human Genome' in Peters Drahos and Ruth Mayne (eds.), *Global Intellectual Property Rights: Knowledge, Access and Development* (Houndmills, Basingstoke & New York: Palgrave Macmillan, 2002), 61-73.
[17] That it was withdrawn was arguably due to the principles held by the subsequent director of the NIH, the Nobel laureate, Professor Harold Varmus.

form and that of patenting DNA itself. In the examples cited above, the generators of the modified organisms sought patents on the whole modified organism: the genetically-altered *Pseudomonad* bacteria strain capable of metabolising crude oil and the mouse strain that would develop cancer. This, in specific detail, included the following: first, the original genome of the organism; second, the specific genetic material recombined into that genome; third, the method and means used to accomplish this and also any other method and means that may be used to achieve the same end result; fourth, the resultant expressed phenotype of such an manipulation; fifth, the same organism if it is subsequently found to have any other unrelated applications; and sixth, any other organisms that are modified with the same genetic material to produce an organism with the same or even different applications. That the patents were granted despite being so broadly defined was testimony to the skill of the patent attorneys who drafted the patent application despite the long route through the US legal system.

In my opinion these two issues, the patenting of a biological life form and the patenting of DNA itself, though related, should be considered separately as the underlying issues, both secular and theological, are not the same. In the former, we are dealing with both a material entity, the physical body, and also an unquantifiable element, the life of the organism, whether this is defined as consciousness or otherwise according to different academic disciplines. However, the issues concerning the patenting of DNA do not involve this unquantifiable element because DNA cannot be said to be alive despite it being the blueprint for life by virtue of it coding for the biological components necessary for that life.

Aim and Scope of Dissertation

In view of what is being debated in the church circles and by theologians, the aim of this dissertation is to reflect from a Christian perspective and subsequently to provide a Christian theological-ethical response to the patenting of human DNA. Specifically, I shall be arguing that on Christian theological grounds human DNA should not be allowed to be patented. The term 'human DNA' will be taken to include whole genes that code for specific proteins and also portions thereof including expressed sequence tags (ESTs), single nucleotide polymorphism (SNPs), promoters and enhancer sequences, exons, complementary DNA (cDNAs). These partial gene sequences are usually incorporated into either cloning vectors or expression vectors which are themselves DNA that are capable of self-replicating in the appropriate environment under specific conditions. The scope of this thesis is strictly confined to reflecting on DNA in these forms and not when it is incorporated into other biological entities, such as small lab animals or bacteria.[18] It is indicative of my attempt to reframe the current debate regarding the 'patenting of life' as I find this phrase sensationalist and unhelpful both to scientists, who may feel the intentions of their work undermined, and to ethicists who may over extrapolate what DNA is not.

Furthermore, I shall also only be addressing the patenting of human DNA and not that of other species even if there are non-human homologues of human DNA.[19] This is not to suggest that I necessarily hold similar opinions regarding the patenting of non-human

[18] The implication of this present work may possibly have implications for the patenting of whole organisms such as genetically engineered species created as model systems for medical science research. However, the ethics concerned with the patenting of such organisms are outside the scope of this dissertation and is not addressed here.

[19] I explain my reason for this on p 131 of this dissertation.

DNA but because one of my two approaches adopts a religious anthropological perspective which suggests that human DNA must be considered apart from DNA of other species. Notwithstanding, I appreciate the fact that the human genome is in many parts similar to that in other life forms and that sometimes a functional gene of one species can complement the same but non-functional gene in another. However, it is my opinion that the differences are distinctive and must rightly be treated as such. Furthermore, since the ethical issues concerning species, such are human rights and animal rights, etc., are framed differently, I feel that it is also appropriate to extend this distinction to their genes also. Nonetheless, one of my two arguments in chapter five may still be selectively applicable when discussing the patenting of non-human DNA.

In addressing this subject, I hope to articulate the opinions I hold as a Christian scientist tempered with the discipline of Christian bioethics. For this task, I have begun in the first part of this chapter by surveying the history of society's response to the subject from the perspective of secular moral philosophy before I moved on to define the aims and scope of this dissertation. In the remainder of this chapter I shall be presenting the reaction of the church and theologians. In addition, I shall engage with some of these issues that they might serve as the background to my own arguments later in this dissertation. In chapter two, I shall review the legal issues and regulatory provisions relating to gene patenting. In chapter three, I address the primary issue relating to patenting from a theological perspective, which is the notion of property. I shall then proceed, in chapter four, to examine what I understand to be the meaning of the lived human body and the ontological status of human DNA. Based on this, I shall attempt to articulate what I term a 'science-informed theological anthropology'. Finally, in chapter five, I shall draw together the various strands of thought and argue that the patenting of human DNA does not fulfil the objectives of the Christian understanding of property, that patents do not serve the common good and furthermore that it impinges on my understanding of human identity in the resurrected Christ. Based on these lines of argument, I shall move for the rescinding of patents on human DNA and ceasing the granting of new patents.

Church and Theological Responses to Biopatents

In the remainder of this chapter, I shall be presenting Church and theological responses to biopatents.[20] Besides this, I shall be expounding on some of the theological issues in the church pronouncements as well as those brought up by theologians in the process of the on-going debate on biopatents but do not form part of the church pronouncements so as to assess their merits. In doing this, I aim to demonstrate why some of these arguments are inadequate in addressing the issue of patenting human DNA. This is so partly because, unlike arguments from a secular philosophical approach, those from an exclusively theological approach do not seem to be widely accepted as common currency in the public debate on bioethical issues. The remainder of this chapter will serve to illustrate this and also as the groundwork for when I go on in a later chapter of this dissertation to argue what I consider to be the real issues of the debate and to present two major arguments which church reports do not include. While I am largely adopting a Christian theological perspective, I shall in the first instance attempt to utilize notions

[20] I make the distinction between 'Church' and 'theological' responses to refer, on the one hand, to the official standpoints of various Christian denominations and, on the other, the opinions of theologians who though they are writing from a Christian theological perspective are nonetheless not doing so in the capacity of the church. In this section, I shall be expounding theological issues in the church pronouncements as well as those aside from church pronouncements.

shared by Christians and non-Christians alike and subsequently be arguing from an exclusively theological perspective. That such an approach is chosen recognizes the importance of theological arguments even with their pre-supposed inadequacies in speaking to non-Christians.

Theological bioethical reflection on genetics has usually focused on the applied aspects of it, of which ethical deliberations on genetic manipulation and engineering seem to generate the most passionate responses and subsequently result in the issuing of policy statements by churches leaders.[21] The main focal point of these stances relates to the fundamental nature of human life and the dignity and worth of the individual human being. In general, they adopt a positive and hopeful attitude towards genetics although opposition to the patenting of life forms is common. As has been pointed out above, the issues that relate to the patenting of life forms are distinct from those relating to the patenting of human genes, though since the basis of all sub-branches of genetics, and hence its associated patents, involves DNA, there is some overlap of issues. The aim of this section is to analyse the theological issues that apply specifically to gene patenting and discuss these with regards to Christian doctrine.

In 1995, the Joint Appeal Against Human and Animal Patenting, in the form of a statement, was launched by an American coalition consisting of the General Board of

[21] Chapter two of Audrey Chapman's book, *Unprcedented Choices: Religious Ethics at the Frontier of Genetic Science* (Minneapolis: Fortress Press, 1999), 27-76, gives an overview of the responses formulated by North American ecumenical and denominational initiatives. Chapter four of Celia E. Deane-Drummond's book, *Biology and Theology Today* (London: SCM Press, 2001) gives an overview of the churches' response to the wider issues of the new genetics with an emphasis on the British churches' response.

Church and Society of the United Methodist Church and the Foundation on Economic Trends. However, as noted by Audrey Chapman, the Joint Appeal statement issued was more of a public policy statement than a work of ethical or theological analysis.[22] The composition of the signatories of the statement were ecumenical as well as multi-faith but were not all representing the official stance of their various denominations or religions as there were often no such official positions. The statement is thus the lowest common denominator of agreement among the signatories.

On this side of the Atlantic, the Church of England has not made clear its official viewpoint on the patenting of human DNA. There is, to date, no official policy statement issued on the subject although there are publications by members from within the Church. The Presbyterian Church of Scotland accepted a document written on behalf of the Bioethics Working Group of the European Ecumenical Commission for Church and Society (EECCS) as the official stance.[23] The report was written by Donald Bruce, the director of the Church of Scotland's 'Society, Religion and Technology Project', who was a member of the working group. This was made as a response to a draft EC directive aimed at drawing up legislation with regards to the legal protection of biotechnological

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[22] Ibid, 125-165.

[23] The 1997 Church of Scotland General Assembly Report: 'Ethical Concerns about Patenting in relationship to Living Organisms', http://www.srtp.org.uk/ga97pat.shtml (26 May 2004). In addition to this report, Bruce has also written in his personal capacity as a theologian several works on the subject such as: Donald Bruce, 'Patenting Human Genes: A Christian View', *Bulletin of Medical Ethics* (January 1977), 18-20; Donald Bruce, 'Gene Patenting' in Donald Bruce and Ann Bruce (eds.), *Engineering Genesis* (London: Earthscan, 1998); Donald Bruce, 'Whose Genes Are They? Genetics, Patenting and the Churches', in Celia Deane-Drummond (ed.), *Brave New World? Theology, Ethics and the Human Genome* (London: T&T Clark International, 2003), 257-273. As a corpus, these works are an articulation of his personal views which have largely been accepted as the Church of Scotland's official line.

inventions including transgenic life forms and sections of the human genome.[24] As the composition of the working group consisted of scientists, theologians and ethicists, the document did not take a particularly theological tone in their arguments. In fact, of the twelve specific concerns raised, only one was articulated in theological language, the others employed philosophical ethics in their reasoning. Although the views expressed are balanced and informed, it has to be said that on the whole, the report was responding to key articles of the above-mentioned EC draft directive rather than presenting itself as a work of ethical or theological analysis.

The EECCS later merged with the Conference of European Churches' Church and Society Commission (CSC-CEC), whose members were ecumenical and included Anglicans, Lutherans, Orthodox, Reformed, etc. The director of this federation of various denominations, Keith Jenkins, in 2000 wrote to the President of the Council of Ministers of the EU to voice opposition to the patenting of the human genome.[25] He adopted a theological perspective in his approach in his letter and the main points he brought up were: first, that the human genome must be regarded as a common good of all humanity; second, that the human body cannot be the subject of trade because the world and humanity are God's creation; third, that gene patenting injures human dignity; fourth, that discovery of genes does not constitute an invention; and fifth, that ownership and

[24] Proposal for a European Parliament and Council Directive on the Legal Protection of Biotechnological Inventions, COM (95) 661 Final, 13th December 1995. This eventually became the EC Directive on the Legal Protection of Biotechnological Inventions (98/44/EC) and is discussed in detail in chapter two of this dissertation.

[25] Esther D. Reed, 'Thinking Liturgically' in Celia Deane-Drummond (ed.), *Brave New World? Theology, Ethics and the Human Genome* (London: T&T Clark International, 2003), 275- 293.

commercial exploitation of the human genome by a part of humanity would create problems of social justice and equity at the global level.[26]

It is not always the case that when religious leaders speak or become a signatory in an appeal such as the Joint Appeal in the U.S. or the ECCSS and CSC-CEC initiatives in Europe that they are making an official policy statement on behalf of the Church or denomination of which they are a member of. Very often, they are stating their personal convictions and views as members of the religious community. For example, as cited in Chapman's critique of the Joint Appeal, while the U.S. Catholic Conference declined to support the Joint Appeals Statement, ninety-one Roman Catholic Bishops were signatories.[27] On the other hand, the European Ecumenical Commission for Church and Society's report of 1997 was accepted as the Church of Scotland's official stand but not explicitly as such by the other major denominations that were represented in the commission. It is one thing to be represented in a working group to articulate possible viewpoints but another for churches to adopt these as their official stance on the matter. Hence, other than the documents produced by these ecumenical initiatives, there is a paucity of official church statements on the subject of gene patenting as this is often subsumed within the wider context of genetic engineering and subsequently passed over for moral deliberation. Therefore, for the purpose of this dissertation, where there is a total absence of positional statements on gene patenting by the church, I shall use church reports as a source of theological arguments whose merits I will then consider theologically.

[26] http://www.cec-kek.org/English/genomeE.htm (12 June 2005) and as cited in ibid.
[27] Chapman, *Unprcedented Choices, Religious Ethics at the Frontier of Genetic Science*, 130.

Exclusive Ownership of God for His Creation & Ownership Rights

The first theological issue concerning gene patenting was raised in the statement of the 1995 Joint Appeal which reads:

> We, the undersigned religious leaders oppose the patenting of human and animal life forms. We are disturbed by the U.S. Patent office's recent decision to patent human body parts and several genetically modified animals. We believe that human and animal are creations of God and as such should not be patented as human inventions.[28]

It states explicitly that humans and animals are the creation of God. The CSC-CEC letter the EU in 2000 also expresses this same opinion. The letter reads, "From our [theological] perspective, the world and humanity in particular are the creation and creature of God who confers on humanity the management of his work without abandoning it."[29] Opponents of gene patenting within the Church posit that God created humans and all other living creatures and therefore owns all life. This has two implications: that no element of the human can ever be considered an invention and that no one, other than God, has claims to ownership rights so to speak. I shall proceed to weigh these two implications to verify their validity.

In my opinion, the first implication is strictly speaking not a theological issue but a legal one and is dealt with only summarily in this section. That the Joint Appeal subscribes to God as being the creator may be taken to imply that it is against the view that there is an

[28] General Board of Church and Society of the United Methodist Church, "Joint Appeal Against Human and Animal Patenting" (press conference announcement, Washington, D.C., 17 May 1995), see ibid., 125.
[29] Jenkins, Keith, Letter to Hubert Vedrine of the European Parliament, as reproduced in Reed, 'Thinking Liturgically', 276.

inventive step on the part of humans, which is a necessary criterion for patenting. This may be true for raw genetic data and sequence data such as SNPs, but scientists who generate ESTs claim that the state-of-the-art sequencing methods constitute the required inventive step. For example, one step in sequencing DNA is the generation of nucleic acid fragments *in vitro*. There are time-tested protocols available to do this but one of the challenges of science is to develop new protocols. These may be easier or faster ways of doing a particular procedure or an improved protocol that gives more accurate and reliable data. Such innovations are often claimed to be inventions. This is potentially troublesome. In industrial manufacturing, a new and better mouse trap, which does the same job as the old mousetrap, may warrant a new patent. However, this analogy is not applicable to genetics because the nature of the inventions are different: the objective of the new mousetrap may be the same though the object may be a new invention; but in the gene patenting context the object that is supposedly invented, i.e., the EST, remains unchanged. There was arguably an inventive step in the whole process, that of the new protocol. The inventive step did not pertain to the EST and it is therefore not valid to cite that as fulfilling the inventive criteria of the EST which is the object of the patent. Thus, though it may be valid, legally speaking, to say that there is no inventive step in generating human DNA sequence, this lack is not due to God being the creator of humans and animals.

Bruce frames this particular issue in a different way. He cites what he terms, the 'life-non-life distinction', as one of the four theological or ethical points behind the European

Churches working group's opposition to parts of the 98/44/EC directive.[30] He suggests that restrictions on patents on human genes and living organisms are justified because these subject-matters involve additional ethical criteria compared with mechanical or chemical invention.[31] He argues that living organisms as products of nature are set apart from products of industry and hence have an inherent significance; otherwise it reduces them to an equivalent status to mechanical parts in a machine. This line of argument does not debate the technicality of whether genes can indeed be true inventions or mere discoveries but seems to suggest that regardless of this, living organisms and any of their components are not patentable on the grounds that they fall under the category of life, rather than non-life and not because these are creations of God.

The second implication of the statement issued by the 1995 Joint Appeal and the 2000 CSC-CEC letter is an altogether more philosophical and theological one, that pertaining to God's ownership rights as creator. This implies that since God owns all that he created including humans, no one can lay ownership claims to any humans, human life, human body parts or components thereof. The theme of ownership is a key one in the Bible with both practical and religious significance. It is also a central one in this dissertation and is discussed in depth in relation to property in chapter three. Practically, when Christians say God owns all he has created, they presumably mean that he has the absolute rights to determine, by virtue of being the exclusive owner, both its utilisation and its disposal. This concept of ownership assumes *dominium* as its main principle.[32] This view is

[30] Bruce, 'Whose Genes Are They? Genetics, Patenting and the Churches', 266-272.
[31] Ibid, 267.
[32] The term '*dominium*' here is used to refer to both the use and disposal of property. This notion, as well as other concepts of property, will be discussed in detail in chapter three of this dissertation.

actually not in conflict with DNA patenting because owning the patent rights to a gene sequence is not, in fact, owning the rights to the use and the disposal of the sequence.[33] Since a patent, we are time and again reminded, only confers 'negative ownership rights' it is arguably not an attempt to over-ride the absolute rights of the creator even if that is correct theology. Such negative rights only allow the patent owner to dictate what others cannot do with the gene sequences, it does not entitle the patent owner himself to unrestricted utilisation and disposal of the gene sequences; that is subjected to law, both judicial and natural. Therefore, to equate possessing patent rights on DNA sequences to having rights to them with regards to their use and disposal is inaccurate, as will be discussed in chapter two of this thesis.

Ben Mitchell describes human beings as 'pre-owned' and belonging to the sovereign creator.[34] On this premise, he argues against allowing patenting of human beings or human body parts (genes, cells, cell lines, and other tissues). Of the latter, he writes that the right to own one part of a human being is *ceteris paribus* the right to own all the parts of a human being. Though I am against the patenting of human beings or human body parts, my reasons are different and I question Mitchell's theory of ownership and the extrapolation he makes from it. As pointed out above, patents are not ownership deeds as title deeds for land ownership are. Even if they indeed were to be, owning a body part is not necessarily tantamount to owning a human being because on the basis of human

[33] To hold the patent to a DNA sequence is said not to be the same as owning the gene as ownership is supposed to include rights of use and disposal which is not the case for patents. Patents while granting the right to exclude others from using the subject-matter of the patent, does not in itself grant the patent holder the right to do as one wills with it nor does it grant the patent holder the right of disposal of the subject-matter.

[34] C. Ben Mitchell, 'A Southern Baptist looks at Patenting Life' in Audrey R. Chapman (ed.), *Perspectives on Genetic Patenting* (Washington D.C.: American Association for the Advancement of Science, 1999), 167-186.

dignity, the owning of human being is not allowed in any legal code. Therefore if we were to accept this non-ownership law, owning one part of a human being is not necessarily *ceteris paribus* the right to own all the parts of a human being. The human body is made up of organs which consist of one or more tissue type. Each tissue type is composed of the same cell type. All cells have exactly the same DNA within them which is determined by the genotype of the person. Different cell types express different types of proteins, which are all natural elements that are found on a periodic table. In fact, all of the human body if deconstructed can be found on a periodic table. This reductionistic view of the human body overlooks the fact that even if one could assemble all the relevant elements, even in the correct quantities and proportion, one still cannot make a human being or for that matter any body part.[35]

The claim that God is the exclusive owner of all he has created also has spiritual significance. Among all that he created, Israel had a special relationship with him. This particular relationship between Yahweh and Israel embodies the essence of the concept of ownership and expresses the spiritual dimension of such a concept. Despite this special relationship with the nation as a whole, there existed a further hierarchy of ownership; that of the Levitical caste and also of the firstborn.[36] Here, the concept of ownership by Yahweh is not based on a polarised model. Instead, divine ownership is portrayed as a covenantal relationship and finds material expression in land ownership by the tribes of Israel. The land was given as an inheritance from Yahweh. Land ownership was thus

[35] There are artificial organs made but these are functional models of the organs and powered by artificial means. I am referring here in my thesis to a replica human body part.
[36] Anon., 'Own, Owner' in Leland Ryken, James C. Wilhoit, Tremper Longman (eds.), *Dictionary of Biblical Imagery* (Leicester: IVP, 1998), 618-620.

intimately associated with the covenantal relationship with Yahweh.[37] The analogous situation in the New Testament (NT) is that our covenantal relationship with God is sealed with the Holy Spirit given at Pentecost instead of with land. The basis of this covenantal relationship remains unchanged but fulfilled through the death of Christ and the coming of the Holy Spirit. Though both the Old Testament (OT) and NT talk of ownership, it is referring to this covenantal relationship. The primary feature of such a relationship is that he is our God and we are his people; this is formed out of love on his part and duty on ours. Such a relationship is not ownership by either party because the concept of ownership is based on rights and not love or duty. By its intrinsic nature, a covenantal relationship cannot mean exclusive ownership of one by the other. Exclusive ownership by the creator God is thus mis-informed theology at best.

Furthermore, I question Mitchell's idea of being 'pre-owned' by God. Though he does not explicitly state it, the arguments that he constructs based on this assumes that 'preownership' by God implies exclusive ownership by him also. This is at once problematic because even if the concept of preownership was a valid one, it did not thwart the ownership of human beings as slaves in both OT and NT times. Slavery was deemed immoral and outlawed later in history on the basis of other issues not on the basis of preownership by God. The concept of preownership is thus not deemed incompatible with human ownership. Another example where this concept does not hold relates to

[37] Albert W. –T., Miao, 'The Concept of Holiness in Ezekiel' (PhD Thesis, University of Cambridge, 1998). In Miao's thesis, he argues that in Ezekiel's exilic setting, though Yahweh's election of the people involved a promise of land, this promise could not yet be fulfilled because of the people's being defiled. Miao goes on to explore the theme of the "mythic mountain", whereby mountain imagery is employed to signify the land. He suggests that three concepts underlie Ezekiel's use of this metaphor: the mythic mountain represents the land of Israel; the land as Yahweh's sanctuary; and the land as the place of Israel's inheritance. The mountain thus symbolizes the hope of the ideal future in which Yahweh, the people and the land are again brought together.

land. By the same argument that God was the source of all creation, he is also therefore the owner of the whole earth.[38] There is no moral dilemma concerning the human ownership of land per se, except perhaps with regards to its care and use. This suggests that exclusive ownership by God is not necessarily a useful argument against gene patenting.

Humankind as Stewards of God's Gifts

The third issue concerning biopatents raised by religious leaders and theological ethicists pertains to the concept that humans are stewards of God's creation. This insight follows from the first issue of God's ownership of all his creation. To address this, in addition to understanding ownership by God from the covenantal angle, as outlined in the previous section, it is also vital to address the theme of ownership from a practical angle. I shall do this by combining the models of stewardship and parenthood. A common theme in eco-theology is that humans are stewards of God's creation. In the original context, this sub-branch of theology is concerned with the preservation and care of our planet. Humans down from Adam were given the use of God's creation both for enjoyment and sustenance. God allows his creation to be used for both leisure and survival. The paradigm of stewardship means that we have responsibilities for that which has been given us for our use. Chapman elaborates, "The stewardship tradition, which is rooted in scripture, characterizes the vocation of humanity as a servant who has been given the responsibility for the management and service of something belonging to another, in this case the Creator."[39] However, she also notes that the classical notion of stewardship,

[38] Psalms 24:1, "The earth is the Lord's and the fullness thereof; the world, and they that dwell therein."
[39] Chapman, *Unprcedented Choices, Religious Ethics at the Frontier of Genetic Science*, 42.

being formulated before the discovery of evolution, assumes a static, finished and hierarchical universal in which stewardship implies respecting the natural order and not seeking to change it.[40] She thus brings to attention the need to update and reinterpret the model for it to be relevant.

The proponents of the stewardship model of understanding our roles advocate responsible utilization of resources, including nature, given to us. This, in effect, imposes a very restrictive view of stewardship for it implies that humans as stewards of God's creations are called merely to be caretakers. In so doing, it does not attempt to view our role in conjunction with other gifts that Christians have been given such as creativity and intellect. Nor does it seek to balance it with other biblical principles for living such as making the best use of our talents for its multiplication as apparently espoused in the parable of the talents in the gospels. The stewardship model presupposes that creation as accounted in Genesis was completed in six days as a one time frame event and does not grant that creation on-going.[41] The strength of the stewardship model is that it recognises God's role as creator-owner but its weakness lies in its not taking into consideration that humans too, as the epitome of God's earthly creations and endowed with creativity, have a role in the unfolding story of creation. Thus, arguing that God is sole owner because he is sole creator is inaccurate since humans too participate in that creation process that is still unfolding. But this input, on humankind's part, does not necessarily amount to the

[40] Ibid.

[41] I am not necessarily arguing here for biological evolution. In saying that creation is an on-going process I mean that new creations are made on the basis of existing ones, such as a new plant hybrid as created by a plant breeder. I do not mean the evolving of one species into another.

inventive clause which is required for patentability of biological life forms and certainly not that of the human genome in whatever form either.

The Sanctity and Sacredness of Human life

The fourth concern voiced by religious leaders is that allowing the patenting of human DNA violates the sacredness of human life. There is little tension with regards to the acceptance of the notion of sacredness of human life. This is reflected in the severe sentence for both the intentional taking of a human life, murder, and also the unintentional taking of the same, manslaughter. The law at the moment, except for the exception of one country in Europe, does not make an exception for this even in the controversial context of euthanasia. The sacredness of human life is indeed the single most important precept in society from Abel to modern day that even the execution of convicted murderers is open to objections in some quarters of society.

Although most accept the notion of sacredness of human life, the basis for this agreement is often very different. From a Christian perspective, John Breck, the Orthodox theologian, posits that the conferment upon human existence of its sacredness is by virtue of the human vocation. Regarding the rationale for this vocation and its substance he writes:

> Created in the divine image and called to assume the divine 'likeness' by becoming 'perfect' as our heavenly Father is perfect, Christian believers assume, as an inescapable aspect of their life and calling, an arduous, ascetic struggle against demonic powers of sin, death and corruption.

> Bearing the cross of Christ daily, they embark on an inward pilgrimage that leads, through continual repentance, from death to life and from 'glory to glory', to attain at the end everlasting communion with God. This is their God-given vocation, just as it is their unique source of meaning and personal value.[42]

Though the words 'sanctity' and 'sacredness' are sometimes used synonymously they do not always refer to the same thing. Breck defines 'sacredness' as that by virtue of its created nature that embodies and gives expression to the divine 'image'. Human life is thus sacred as it is created by God with the purpose of participating in his own holiness, and possesses the capacity to reflect the presence and glory of God, which, as reflected in that quoted above, is humankind's God-given vocation. On the other hand, he says that 'sanctity' refers to the personal or 'hypostatic' qualities that one attains through struggle against temptation and sin, as well as through the acquisition of virtue.[43] By this definition, sacredness is a function of nature and sanctity a function of the individual person. Also, since sanctity is the grace-inspired growth in holiness of the creature which bears the image of the creator, to speak of 'sanctity of life' then is to refer to an intrinsic worth of life by virtue of the creature's relationship with the creator.

However, to cite this as a reason for opposing the patenting of human DNA is to ascribe undue status to it for two related reasons; first, it implies that DNA is sacred; second, it

[42] John Breck, 'The Sacredness and Sanctity of Human life' in Neil Messer (ed.), *Theological Issues in Bioethics: An Introduction with Readings* (London: Darton, Longman and Todd, 2002), 45-49.
[43] Ibid.

implies that DNA is life. Both of these implications are contentious and I shall attempt to unlink the two. I hold that DNA has special ontological status and shall develop this notion in chapter four of this dissertation. However, I do not hold that DNA in itself is sacred, though human life invariably is. DNA is the biological code for the manufacture of a set of molecules that direct biochemical reactions which drive the essential metabolic processes of the body. These processes constitute the mechanism for physical or biological life. Yet, metabolic activities in themselves do not constitute life but are indications of being biologically alive. This criterion of judging is not straightforward: philosophical bioethicists and physicians alike have debated on the definition of being alive and some of them seem to prefer to employ a 'quality-of-life' approach, which uses as the criterion of judging the ability for the realization of human freedom.[44] It is quite easy to accept the premise that being biologically alive is not necessarily to possess a satisfactory quality of life, even though biological life, with or without quality is sacred. DNA provides the information, in a chemical form, to make life, which is sacred, possible even though it is not in itself sacred. To claim that DNA is life requires an unjustified and enormous leap of imagination.

The view that I synthesize from the argument presented above is that although DNA is essential for life, it is not in itself life. I may not agree for other reasons that DNA should be subjected to patenting laws for protection but since DNA is not life, patenting genes is therefore not patenting life. The theologizing of human biological life is not the subject of this thesis but it should be reiterated that it possesses sacredness. The bedrock of this

[44] Such as Kautzky, as quoted in McCormick, Richard, 'The Quality of Life, The Sanctity of Life' in Neil Messer (ed.), *Theological Issues in Bioethics, An Introduction with Readings* (London: Darton, Longman and Todd, 2002).

sacredness of human life is this: that we have been created by God in his image. Its implications relate to the dignity and worth of the human life and body.

Imago Dei as the Basis for Ascribing Dignity and Worth

The fifth main theological issue relating to gene patenting is that the patenting of DNA and tissue is demeaning to the dignity and worth of human life and body.[45] Though this issue has also been raised in secular bioethical discussion regarding gene patenting, the main reason cited for it is completely different. In the Christian theological approach, issues concerning the human body and human life inevitably raise the concept of *imago dei* to support its viewpoint. This concept is somewhat malleable to withstand the exploitation. Indeed, opponents of the patenting of human DNA within the Christian community cite this as the theological basis of their stand as it affirms the difference between the human species from the other creatures. From here, the idea is developed that the value of humans is lodged in their bearing the image of God, and that they are worthy of respect on that count alone.[46]

The idea and the use of the phrase 'image of God' is rare in the Bible and is in fact limited in the OT to three accounts, all in the book of Genesis and of which two are used in reference to the creation account (Gen. 1:26-27; 5:1-3; 9:5-6). Ruth Page points out rightly that its importance to theological anthropology has been out of all proportion to its occurrence.[47] However, though this idea has few biblical sources, it has nonetheless

[45] Chapman, *Unprecedented Choices: Religious Ethics at the Frontier of Genetic,* 149.
[46] Ruth Page, 'The Human Genome and the Image of God' in Celia Deane-Drummond (ed.), *Brave New World? Theology, Ethics and the Human Genome* (London: T&T Clark International, 2003), 68-85.
[47] Ibid, 71-72.

developed as a result of a rich theological tradition.[48] Partly due to this, its meaning has varied so much during the course of Christian history that today an ambiguity has arisen over its meaning because it seems to mean what people want it to mean.[49] Page attempts to reinterpret the concept for the present age by engaging with it in relation to the human genome. She notes that the coming of the genetic age has blurred the line of absolute distinction between humans and non-humans. This is so because humans share almost all their genes with other primates but also many with unlikely creatures such as insects and weeds. Page herself does not seem to have an answer to what constitutes the image of God in humankind; she writes with regards to this, "As the term has had multiple meanings in its ambiguous history no one authoritative answer may be given. It has changed with changing circumstances and values. The best that can be said of it is that it does connect humans with God, so that God is not left out of the argument. But how humans are connected with God and God with humans remains diverse and often partial in conception."[50] She correctly makes the point that it is clear that the phrase is not sufficiently self-explanatory to use in a debate as shorthand and without definition, and therefore its effects are more emotive than rational and may simply alienate scientists.[51] But she does admit to the lack of ambiguity in Christian belief as something that will only occur in the eschaton.

[48] Deane-Drummond, *Biology and Theology Today*, 113.
[49] Ibid. Page lists four sections in the history of its use: first, as the original priestly meaning; second, the ontological difference between humans and the rest of creation; third, the kind of relation desired between humans and all the rest of creation; fourth, an inclusiveness among humans pervading much of its contemporary expression.
[50] Ibid, 76-77.
[51] Ibid, 77.

I shall attempt to explain what I, as a Christian scientist, mean when I cite it as one of my intrinsic beliefs in my arguments, and also trace the development of how I came to hold this perspective. In the creation account recorded in the first chapter of Genesis, after having created the physical world and filled it with all manners of living creatures, 'God said, "Let us make man in our image, after our likeness", So God created man in his own image, in the image of God created He him; male and female created He them' (Gen. 1:26-27). It is true that the understanding of what it means to be made in God's image has evolved with time: at some junctures it was understood as humans possessing a characteristic of God including physical image, moral image or spiritual image; at other times it was understood as a state that humans are in or a capacity he has, for example the ability to reflect God's deity as manifested by His glory.

David Atkinson holds that to be made in the image of God is a matter of the relationship to Himself which God confers on us.[52] This opinion adopts a covenantal definition and is also in harmony with the notion of divine ownership. In both, bearing God's image and being owned by him are essences of being because of who we are as later revealed in the light of Christ's incarnation. Douglas John Hall adds a slight variation to this view: for him, he regards the image not as inherent in humans, but as coming about when people respond to God in a deeper way as when people respond to all creation and when God responds to all creation.[53] Instead of using the noun 'image' he chooses to use the verb form 'imaging' in order to argue that it is only when humans are actively imaging God in

[52] David Atkinson, 'Some Theological Perspectives on the Human Embryo' in N.M.d.S. Cameron (ed.), *Ethics and Embryos: The Warnock Report in Debate* (Edinburgh: Rutherford House Books, 1987), 43-57, as quoted in Scott B. Rae and Paul M. Cox, *Bioethics: A Christian Approach in a Pluralistic Age* (Cambridge: William B. Eerdmans Publishing Company, 1999).
[53] Douglas J. Hall, *Imaging God: Dominion as Stewardship* (Grand Rapids: Eerdmans, 1986).

our actions to any part of creation is the use of the phrase justified. His definition utilises 'relationship' as the basis of the concept. However, taking these positions somewhat reduces the importance of the physicality of human existence because while it may affirm the value of human life, it apparently views the human body as secondary to it. The human life and human body, as espoused in the doctrine of bodily resurrection, may best be reflected upon as two separate dimensions of the same substance, i.e, as a bi-elemental non-duality'. I shall adopt this approach of theologizing in chapter four but here move on to explore the idea of how humans at the same time bear God's image and are God's image.

Except for the visitation of the three angels, which is symbolic of the visit of God the Father, Son and Holy Spirit, to Abraham as recorded in Genesis, the Trinity has never been explicitly recorded to be bodily present at the same time and place.[54] Understandably, this is because God is spirit; he is neither anthropomorphic nor visible. Of the three persons in the trinity, only Jesus Christ the son is recorded as having been incarnated in human form. He was God but took on the bodily form of a human. The verse Col.1:15 describes Jesus as 'the image of the invisible God'.[55] This of course does not refer to Jesus being the visual representation of a non-anthropomorphic spirit-being but that he bore the likeness of essence that is God. There are potentially two ways of reading Col 1:15: first, that he was the image of the invisible God because he was God;

[54] In the NT, at Jesus' baptism, all three members of the Trinity are present though the spirit was in the form of a dove, the Father in a voice and only the son in a human body.
[55] The Orthodox tradition cites this as the justification and value of Iconography. I fully appreciate the value of icons in worship but nonetheless am of the opinion that the 'image of God' in Christ does not necessarily refer to the visual representation of God in an icon by depicting Jesus Christ. However, the religious art form has always tried to reflect a sense of God's majesty and hence glory by its use of colours and inverse perspectives.

second, that he was the image of the invisible God because he was man. The former reasoning appears fair and does not seem troublesome. The latter is also equally valid since man was made in God's image and therefore the incarnated Christ in the human form bore the image of the invisible God. Perhaps both are true because the mystery of the incarnation is that although he became fully man he remained fully God where in one he *bore* the image of God and in the other he *was* the image of God. Through this lens then is how we could view ourselves as bearing God's image.

In Christ we see our own humanity while at the same time seeing deity. The bare image, i.e., that which he reflects, and the image as a symbol, i.e., that which he is, are the contrast: the image without meaning and the image as meaning. The contrast we see in the image of Christ is thus that which carries the finitude of a created being and the infinitude of the creator, the former without meaning and the latter as meaning. Though not in the same sense of being fully God as Christ was, humans too bear this image of God while being fully human. Thus *imago Dei* confers a duality of existence on humans which consists of us being fully human, as exemplified by our finitude, while possessing the substance of the creator, as exemplified by the restoration of infinitude in the eschatological future. That the present human condition is in a state of flux is due to sin which entered into the equation after God's decision to make humankind in his own image. Salvation through Christ paved the way for restoration of that image in humankind but the full and final restoration of it is yet to be.

The concept and affirmation of humanity as bearing *imago dei* is often cited as being incompatible with the patenting of human DNA because allowing it would threaten the dignity and worth of the human life and the human body. The reasoning of this stands that God's image pervades to all parts of the human body and that the right to own any of these parts must not be transferred from the creator to the creature.[56] The image of God, in which humankind was created, as seen through the incarnation of Christ refers to us being human yet possessing the spiritual substance of God, as has already been discussed. By virtue of this, humankind possesses dignity which can be defined as being of noble character and worthy of respect.

I appropriate the Lutheran doctrine of forensic justification to support my argument: as created beings we do not possess inherent dignity or intrinsic worth; at creation, God elects human from among all that he had created to be the epitome of his handiwork and clothes us in his own dignity and worth which derives from his being the creator. This is given us through grace which is a prominent motif in his style of giving to be seen again later in redemption history in justification by faith. It is an act of grace because it is not deserved or earned by us. Just as the result of the gift of righteousness justifies us and is referred to as forensic justification, the result of the gift of his image dignifies us and may be referred to as forensic dignity.

[56] Richard Land and C. Ben Mitchell, 'Brave New Biopatents' in *First Things: A Monthly Journal of Religion and Public Life*: 21 (1996).

Helmut Thielicke, the German theologian expresses a similar idea in his theologizing where he refers to this dignity as being 'alien dignity'.[57] However in arguing that the incommensurable, incalculable worth of human life is due to our being created *and* redeemed by God, Thielicke also introduces the redemption factor into the worth-of-human-life equation even though it was at the creation of Adam that God decided to elect humankind and make us in his own image. *Imago Dei* is thus the basis of human dignity. Love-driven redemption on God's part was imperative because the creature that had fallen was the one that bore God's image. It was not that the worth of humans was imputed by the redemptive act of Christ.

Nonetheless, Thielicke's doctrine of alien dignity provides an excellent handle for the reflection of human dignity. He relies on the argument that it is the image of God in us that bestows upon us an alien dignity. This is given in and for the relationship between human and God and rests on the act of remembrance in love. Because God created us, called us and redeemed us, all in love, love thus created the image of God in us and gave us dignity and worth. Thus, he, like Hall and Luther, too posits that the image of God is relational.

It is not completely clear to me why opponents to gene patenting state that the practice is incompatible with affirming the dignity and worth of human life and the human body on the basis of *imago Dei*.[58] Nonetheless, the dignity and worth of the human body and human life is of infinite worth as it bears the image of the creator God, understood in the

[57] Helmut Thielicke, 'The Doctor as Judge of Who Shall Live and Who Shall Die' in Kenneth Vaux (ed.), *Who Shall Live? Medicine, Technology, Ethics* (Philadelphia: Fortress Press, 1970).
[58] The concept of *imago dei* is almost always stated as the argument and not as a principle for the argument.

context of a relational dimension. As this worth is rooted in divine love, it is robust and should be resistant to valuation in mere material terms.

Commodification of the Human Body

Living in an economics-driven society, we have developed the tendency to view objects from the perspective of their worth translated in largely economic terms alone. As discussed in the last section, human life and the human body has intrinsic worth by virtue of humans having been made in the image of God. Gene patents, it is argued, will have the effect of reducing genes to their potential economic worth alone.[59] This idea extends to the concept of commodification of the human body.

Commodities, according to Mark Hanson, are goods valued in economic terms within a relationship of exchange.[60] Margaret Radin defines this relationship of exchange, called commodification, as the social process where something which was previously valued in non-economic terms comes to be viewed as a commodity that is amenable to free market transaction including trade in sex, children and human body parts.[61] Such processes evolve to be complex and admit to degrees depending on the social context which determines its understanding. In this regard, Radin suggests that commodification can be either complete or incomplete.[62] Complete commodification refers to the worth of the object in question being view in its entirety solely in market terms whereas in incomplete

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[59] Bishop Kenneth Carder, "Statement on Patenting of Genes", quoted in Chapman, *Unprecedented Choices: Religious Ethics at the Frontier of Genetic,* 151.
[60] Mark J. Hanson, 'Biotechnology and Commodification within Health Care' *Journal of medicine and Philosophy* 24, no. 3 (1999), 268.
[61] Margaret J. Radin, *Contested Commodities: The Trouble with Trade in Sex, Children, Body Parts, and Others Things* (London: Harvard University Press, 1996).
[62] Ibid, 102-103.

commodification market and 'nonmarket' understanding coexist, for example when only one half of parties involved in the social process understands the object in question as a commodity. In addition to this concession, Radin also differentiates commodification as being narrow or broad.[63] The former refers to the literal trading of the commodity in the marketplace but the later only uses market value as a term of reference without the actual transaction actually taking place.

Employing Radin's definition and theory of commodification, human DNA if patented is potentially in danger of becoming a commodity, which opponents argue is immoral since it undermines human worth which has been argued to be by virtue of *imago dei.* This may, at first glance, appear to be a superficial line of reasoning. In both the OT and NT, the owning of human slaves was condoned. For example, in the epistle to Philemon, Paul appeals for mercy on behalf of the bondservant who ran away from Philemon's household and whom Paul now sends back to his master. The very nature of slavery reduces the humanity in a slave to a market value that was used in market transaction. It may be true that if the slave, as a Christian, does not see himself as such but as being free in Christ, the commodification can be deemed incomplete by Radin's modern definition. Indeed, while Radin's account could be claimed to be exactly what Paul was trying to argue for, such theories are recent and their explanation of the culture and contribution to the understanding of first century Palestine must be judicious. Therefore, justification of slavery on these theories may be somewhat extraneous. It remains that *imago dei* was not deemed incompatible with the owning of slaves. Nonetheless, while not condoning the ownership of humans as slaves in postmodernity for different reasons, it warrants

[63] Ibid, 112.

pointing out that in biblical times commodification of humans as slaves was not seen as being incompatible with the law in OT times or grace and freedom in NT times.

Notwithstanding, I find Radin's classification of complete and incomplete commodification somewhat too accommodating to the issue at hand for though in theory it may allow the coexistence of market worth and non-market worth, in practice this is inevitably at an unequal weighting. Market worth usually translates in economic terms while non-market worth is usually much harder to quantify. This imbalance results in the inequality of valuation and has the tendency to be skewed in favour of market worth simply because this is easier to assess based on the econometric criteria of supply and demand. Such a skewing may be inconsequential in broad commodification but is of fundamental concern in narrow commodification. I thus hold a more conservative position: that though in theory commodification should have both tangible and intangible value, in practice it is framed solely in economic terms because that is usually the objective of human ownership.

Though I oppose the patenting of human DNA, it is not for the reason that allowing it reduces the worth of that DNA to market value alone; I am not fully convinced that allowing gene patents actually results in the commodification of the human body. Undoubtedly, DNA is indeed a vital component of the human body. However, a gene patent does not allow the patent holder unregulated use of the genetic information. Therefore, it does not necessarily have the power to commodify the DNA completely. The concept of a commodity is that it may be subjected to transaction either because of its value or to enhance its value. A gene patent does not confer the licence for such unrestricted transactions; that falls under higher moral laws which, unfortunately, is not enshrined in an explicit written code. The value of the patent is dependent on what is known about the genetic material which is the subject of the patent. It is dependent on other criteria such as other scientific knowledge. Since a gene patent does not grant the absolute freedom of a relationship of exchange, it does not commodify human DNA in the vernacular sense that say an object is commodified on the basis of its monetary worth alone. No doubt human DNA is closely intertwined with human individuality and personhood even as it is with the common human identity.

Freedom

In view of what human DNA symbolises when it is referred to as a common heritage of humanity, it is a natural progression to question if allowing it to be subjected to patent laws is tantamount to placing restrictions upon that which is symbolised. Framed using highly-charged rhetoric, the implications of patenting of human DNA has been described as the 'marketing of human life' and subsequently labelled as 'genetic slavery' where instead of whole persons being marched in shackles to the market block, biological material, including gene sequences are labelled, patented and sold to the highest bidder.[64] The metaphoric and emotive use of language by such opponents is aimed at stirring popular support by employing shock tactics when a sizable proportion of the population of America, where the outburst originated, were descendents of slaves. Informed discussion must not resort to this as it is not only unhelpful and non-informative but clouds the important issues at the centre of the debate. The aim of this section is to

[64] Richard Land, see Ted Peters 'Should We Patent God's Creation?' Dialog 35 (1996), 117.

examine the theology of freedom so as to provide a biblical understanding of the validity of using this principle in our reflection on the patenting of human genetic material.

In the OT, the concept of freedom was usually employed in describing liberty from bonded labour or slavery, e.g. Lev. 19:20, Jer. 34:8, Eze. 46:17. The proclamation of Isaiah (or Deutero-Isaiah) in the Servant Songs is foundational to our understanding of the task of the servant: "The spirit of the Sovereign Lord is on me, because the Lord has anointed me to preach good news to the poor. He has sent me to bind up the broken-hearted, to proclaim *freedom* for the captives and release from darkness for the prisoners" (Isa. 61:1). The importance of the proclamation of liberty to the captives was reflected in it being a primary ministry for the servant of the Lord. This implies that having freedom is an ideal of the Kingdom, one which the spirit of God aims to accomplish through human agents. Jesus read from this same text when he was at a synagogue. He caused some commotion when he added, "This day is this scripture fulfilled in your ears" (Luke 4:18-21). The freedom mentioned in Jesus' reading of the prophet and that source in the OT specifically referred to freedom for the captives but not that which these individuals were captive of.

The Bible speaks of freedom in two contexts: that in relation to indentured labour and that with regards to sin. The former was more prominent in the OT while the latter overtook it in the NT. However, the gospel of John presents a fusion of the two ideas that sin is a source of slavery. It continues that true freedom is achieved by being set free by the son of God (John 8:34-37). Since this is attributed to Jesus' own words and in view of his reading from Isaiah 61 in the synagogue, it reasons that in referring to freedom, he had the freedom from sin-induced slavery in mind. This was probably a hard concept for that audience to grasp because at that time sin was absolved by the observation of the law, the performing of stipulated purification rituals and the offering of appropriate sacrifice. Paul thereafter likewise referred to freedom as liberty from slavery albeit with a reformed understanding of the sources of slavery. These sources include sin, the law, the principalities and powers. Nonetheless he recognised that the agent of freedom is the same.[65] Paul's doctrine of freedom is coupled to that of the grace of God made possible by the redemptive death of Jesus. Its emphasis is the responsibilities of this gained freedom, e.g. 1 Cor. 7:21, 1 Cor. 10:23, and the caution not to loose it through callousness, e.g. Gal. 5:1. Though bond labour was still practiced then, Paul did not labour on this aspect of slavery but rather focused on freedom from punishment of sin and the restrictive Jewish law.

There is a need to review briefly the doctrine of freedom and understand it in the light of modern theological thought before assessing if patenting human DNA indeed compromises our freedom. The starting point of our reflection should perhaps be the opinion that "anything that is not in its entirety the undetermined act of the agent is, to the extent that it is not, a denial of the agent's integrity", and which is the core of the Kantian principle of autonomy.[66] The relationship between divine action and human freedom is a stumbling block in modern day thought. Christianity in conceiving God as creator, reconciler and perfector of all things has been susceptible to presenting God in such a

[65] Colin Gunton, *God and Freedom: Essays in Historical and Systematic Theology* (Edinburgh: T & T Clark, 1995), 2.
[66] Ibid, 1.

way so as to appear to override human moral agency.[67] The two poles of the theories of freedom are these: that of absolute freedom as exemplified by Nietzsche's void theory and Hegel's theory of unhappy consciousness, which denies our rootedness in the material universe; and that of absolute determinism as exemplified by the theory of the mechanistic universe and the thinking of scientism, which denies our personal transcendence. Between these two idealised extremes, Colin Gunton, in an attempt to reconcile divine action and human freedom, develops the concept of mediated freedom.[68] He posits that true human freedom is never absolute or unmediated. He refers to this as 'mediated freedom' as there are prior mediating factors which operate on two levels: in relation, first to God and second to our fellow humans. The weight and nature of these two relationships contribute to each individual's particularity which in turn informs one's freedom of choice or autonomy.

Using the lens of the NT concept of freedom, the patenting of human DNA does not compromise human freedom as freedom is approached from the perspective of liberty from slavery from sin, the law, the principalities and powers of darkness. This is also true when using the lens of Gunton's theory of mediated freedom as freedom here is recognised to be informed by external agents and not practiced in a vacuum. This approach for reaching a theological understanding of freedom is obviously different from a secular/philosophical approach and it does not appear to me to be in conflict with human gene patents.

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[67] Ibid, 5.

[68] Colin E. Gunton, 'God, Grace and Freedom' in Colin E. Gunton (ed.) *God and Freedom: Essays in Historical and Systematic Theology* (Edinburgh: T & T Clark, 1995).

Conclusion

This chapter traced briefly the history of how IP law came to be used in biology in the form of biopatents. It discussed some general responses to patenting human genetic material and also the common church responses to this. In the process, I examined the meaning and validity of some concepts with regards to human DNA patents. These included God's ownership of his creation, sanctity and sacredness as well as dignity and worth of human life and human body components, the commodification of the human body, and freedom. In all these issues, I argued that human gene patenting does not compromise our status as the epitome of God's earthly creation and ones made in his image at that. Neither does it infringe on God's sovereignty or his status as God.

Chapter Two

Legal Issues and Regulatory Provisions Relating to Gene Patenting

Introduction

Although the aim of this dissertation is to attend to the practice of gene patenting from a Christian theological perspective, it is nonetheless imperative to consider the legal issues and regulatory provisions that pertain to it so as to be able to engage with the moral-ethical aspects of what is permitted in intellectual property law. This chapter will thus discuss the criteria for granting patents in general and examine the arguments from a legal standpoint why opinions differ as to whether human DNA can fulfil the criteria for qualifying as subject-matters of patents. It will also consider briefly whether intellectual property law is best suited for the task of protection of the ownership rights associated with human DNA. Unless specifically indicated, the arguments cited in this chapter are made by those from within the legal fraternity and are selected to represent the diverse views within that community.

Intellectual Property Law and Its Nature

According to the World Intellectual Property Organisation (WIPO), intellectual property refers to 'products of the mind: inventions, literary and artistic works, symbols, names, images, and designs used in commerce.'[69] In a similar vein, the World Trade Organisation (WTO) cites intellectual property rights as those 'given to people over the creation of their minds…to prevent others from using their inventions, designs or other creations'.[70] David Vaver says it this way, "Those who sowed had to be protected from those who wanted to reap without sowing".[71] In the above two general definitions and

[69] WIPO, 'About Intellectual Property', http://www.wipo.int/about-ip/en/ (09 Feb 2005).
[70] WTO, 'Intellectual Property: Protection and Enforcement', http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm7_e.htm (15 Feb 2005).
[71] David Vaver, Intellectual Property Law: Copyright, Patents, Trade-Marks (Ontario: Irwin Law, 1997), 2.

also echoed in Vaver's perspective, a value seems to be accorded to the labours or fruits of one's mind implying that one's thoughts can potentially have as much worth as one's actual creation of a tangible article. Indeed, it is the idea that has the potential of being realised that intellectual property law seeks to protect and not the actual article or creation which may be produced as a result of that idea. In other words, what is protected is intangible or abstract for it does not necessarily need to have a material existence.

Nonetheless, like real estate, the concept of property is extended to intellectual property which is as such accorded rights. These rights come into existence at the point that the intellectual property is legally recognised.[72] The process of formal recognition takes the form of the granting of a patent, copyright or registered trademark. For the most part, these rights dictate that the intellectual property can be assigned, bequeathed, and if 'trespassed' upon, can be the subject of compensation, etc.[73]

The concept of according legal protection to an abstract entity is not altogether without controversy. Implicit in this practice is the acknowledgement that 'products of the mind' exist. This presumably refers to human knowledge or more specifically the novel application of this knowledge in an invention. Secondly, of concern also is the nature of the legal protection of rights. Of these two issues, only the second is of direct relevance to this dissertation and will be addressed here. The first is nonetheless an important issue because it sets the boundaries of what can be protected under current intellectual property law.

[72] Jennifer Davis, *Intellectual Property Law* (London: Butterworths, 2001), 2.
[73] Ibid, 2-3.

The nature of intellectual property rights is two-fold: economic and moral.[74] Since intellectual property is usually perceived as providing monetary benefit, most of the law pertaining to intellectual property is concerned with protecting the rights of the owner to derive monetary advantage out of one's intellectual property. This can be either by marketing the intellectual property by the owner, in the case of licensing, or by being awarded pecuniary compensation for one's potential loss should one's rights be infringed. So, while on the one hand intellectual property legislation frequently describes the owner's rights as the exclusive right to do certain things with his intellectual property, the corollary to this is the owner's right to stop anyone else from doing these things.[75]

Seen in this light, intellectual property rights are primarily economic rights where the main benefit is to derive economic gains. To be sure, this benefit may also be a primary advantage of holding property rights to real property. However, in the latter, besides economic benefits, one can derive pleasure from the actual use of the property which may not be possible if one's rights over that property were lost. This is not so as far as intellectual property is concerned. Due to the abstract nature of intellectual property, the owner's enjoyment of his idea is not diminished by another party enjoying it also except in economic terms alone.

The second nature of intellectual property rights is that these are moral rights.[76] Such rights relate principally, for example, to the justified claim of authorship in the case of a

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[74] Paul Marett, *Intellectual Property Law* (London: Sweet and Maxwell, 1996), 8-10. In this context, moral rights refer to intrinsic rights associated with integrity and identity rather than ethical rights concerning morality.

[75] Ibid, 8-9.

[76] Ibid, 9-10.

novel, as being the composer in the case of a musical composition, as being the inventor in the case of a new gadget, and as being the artist in the case of a painting. In itself, the novel, musical composition, gadget and painting represents more than what it does by its sole economic value if it has any at all. The moral rights in these cases have to do with being recognised as the originator, and by logical implication, the owner of the article in question. Arguably, ownership, regardless of the economic value of that which is owned, contributes to one's standing in society which in turn can be translated into a competitive advantage. Therefore while not of direct economic consequence, moral rights have the potential to be the basis of being interpreted in economic terms. This is perceivably a prime benefit of moral rights.

Indeed, that the commercial importance of intellectual property right is significant to a country's economy is reflected by the existence of the international Trade-Related Intellectual Property Rights accord (TRIPS). This was part of the settlement reached after long and tortuous negotiations to revise the General Agreement on Tariffs and Trade (GATT) which eventually resulted in the establishment of the World Trade Organisation (WTO).[77] The purpose of TRIPS was to reiterate the principles of international intellectual property in the various conventions to date but with the added machinery of imposing trade sanctions against recalcitrant non-conforming signatory countries.[78] This importance is also supported by the situation here in the UK where the patent office is under the control of the government Department for Trade and Industry (DTI), and is

[77] Marett, *Intellectual Property Law,* 20.
[78] Ibid. These conventions included The Paris Convention for Protection of Intellectual Property (1883), and the Berne Copyright Convention (1886).

headed by the Comptroller-General of Patents, Designs, and Trade Marks.[79] The Comptroller-General has recourse to the Patent Court, which has the function of hearing appeals on patent matters, and is part of the Chancery Division of the High Court.[80] The existence of the large corpus of legal issues and regulatory provisions that concerns intellectual property and the existences of offices and courts to deal with intellectual property in general, and patents in particular, is clear evidence of the importance that countries place on intellectual property, especially patents.

In view of the nature of intellectual property, as outlined above, which interprets rights largely in economic terms, it is not contentious that intellectual property when commercialised can be a powerful tool for economic development and wealth creation.[81] In citing the cases of countries that recognise the importance to its economy of intellectual property, both as a national resource and in attracting foreign talent to work in that country, Kamil Idris, in a WIPO publication, argues that knowledge and innovation play an important part in a country's economic growth.[82] He supports this by pointing out the correlation between the wealth of a country and the quantity of intellectual property it holds.[83] In other words, intellectual property rights including patents, when commercialised, can increase the competitive edge of the nation leading to economic growth. A study by accounting firm Ernst and Young strongly indicated that the biotech industry is expected to become one of the three industrial areas crucial for the economic

[79] David Walker, *The Oxford Companion to Law* (Oxford: Clarendon Press, 1980), 934.
[80] Ibid.
[81] Kamil Idris, *Intellectual Property: A Power Tool for Economic Growth* (Geneva: World Intellectual Property Organisation, 2003).
[82] Ibid, 34.
[83] Ibid.

future of Europe.[84] It is therefore no wonder that there exists a large corpus of legal bodies and regulatory provisions to protect intellectual property.

Denis Schertenleib draws attention to the potential tension between competition and protection. He writes, "One of the principal aims of patents is to promote competition and scientific progress through the commercialisation of technologies. Nevertheless, patents are fundamentally anti-competitive and great care is needed for an acceptable balance to be found between the promotion of competition and the protection of intellectual property rights."[85] In a sense, he suggests that patents are unfair as they give an advantage of monopoly to the patent holder and are therefore anti-competitive. While this may be true, it is but one aspect of patents.

In summary, the objective of intellectual property law, which encompasses copyright, patents and trade-marks, is to protect the ownership rights of the originator of the object in question. This protection is usually interpreted in economic terms. Such protection is on the whole perceived as desirable as it contributes to the country's economic strength even though it is essentially anti-competitive. Within the breadth of intellectual property law, only the legal issues and regulatory provisions that pertain to patents are of relevance to human genetic material because it is possible to file for a gene patent but not to register gene sequences as trade marks, trade secrets or subject of copyright claims. Hence, the next section will examine the objectives of patents alone.

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[84] See Arthur Rogers and Denis Durand de Bousingen, *Bioethics in Europe* (Strasbourg: Council of Europe Press, 1995), 91.

[85] Denis Schertenleib, 'The Patentability and Protection of DNA-based Inventions in the EPO and the European Union.' *European Intellectual Property Review* 3 (2003), 125.

The Objective of Patent Law

Patents are but one area of intellectual property law. Within IP law, only the regulatory provisions of patents relate to gene sequences. Traditionally, this concerned the protection of industrial inventions.[86] The basic theory of the patent system is that the inventor submits a patent application to the patent office which assesses whether it fulfils the criteria required for patenting. Within the UK, there are three possible routes for this: first, applying for a UK patent; second, subject to clearing national security requirements, filing for a European patent under the European Patent Convention (EPC); third, also subject to national security clearance, filing for an international patent under the Patent Cooperation Treaty (PCT). Applying for a UK patent involves five steps: application; publication; preliminary examination; substantive examination; and grant. [87] The basis of a UK patent application is two-part document referred to as a *Claim* and a *Specification.* The former defines the inventions that patentees claim to be exclusively their own (s. 14(5)(a) of the PA 1977) and the latter contains a description of the invention, a claim or claims and any drawing referred to in the description or any claim (s. 14(2)(b) of the PA 1977).[88] Together, the *claim* and *specification* must enable another person skilled in the art to reproduce the invention when the patent expires. Such a document requires technical and legal skills to prepare as it must contain a full description of the invention.[89] This includes a detailed description of the invention, the method by which it is to be performed, and also the best method of performing the invention known to the

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[86] Ibid, 2-3.
[87] Catherine Colston, *Principles of Intellectual Property Law* (London: Cavendish Publishing Limited, 1999), 44-45.
[88] Ibid, 45-46.
[89] A sample form can be found at http://www.patent.gov.uk/patent/howtoapply/form177.htm (accessed 15 Feb 2005)

applicant.[90] In practice, it must specify a claim of utility and define the scope of the invention that the inventor soughts a patent.[91]

The application is scrutinised in detail by a patent examiner who is a government official with professional qualifications in patent examination. If the invention fulfils the three necessary criteria of novelty, non-obviousness, and industrial application; and if no patent for the same has already been filed, the Crown, under the seal of the Patent office, grants the inventor an exclusive monopoly for a limited time for use of one's own new invention in return for the inventor's full disclosure of it at the time of the drafting of the Specification.[92] It will not be granted, however, if the invention has been anticipated by prior publication of another patent specification or if knowledge of the invention is already in the public domain, for example through disclosure in a public trade conference. The length of protection for a patent is normally twenty years from the time of filing.[93]

In such an agreement, the public benefits by having full knowledge of how the invention is made and how it works thereby enabling people to exploit the invention once the patent expires. On the part of the inventors, the disclosure has earned them protective rights, backed by the law, to decide who can and cannot use that invention during the life of the

[90] Walker, *The Oxford Companion to Law,* 934.

[91] This specification is of the invention 'claimed' as it is not necessary to provide a working prototype at any stage of the patent application.

[92] Brian C. Reid, *A Practical Guide to Patent Law* (London: Sweet and Maxwell, 3rd ed. 1999), Section 1.6, 3.

[93] The 'actual' length of protection may be less as this twenty years is backdated to the time of the filing which can be up to three years prior to the actual award of the patent to allow time for the Patent Office to conduct a full and thorough examination of the invention fulfilling the criteria for patenting. Nonetheless a status of 'patent pending' is accorded when this is taking place.

patent. Full disclosure of the invention also stimulates other inventors to find a better way of achieving the same goal without infringing the patent, which thereby contributes to progress. After being granted, a patent can still be challenged as invalid if it was not a patent for an invention within the meaning of the Patent Act, or the invention was proved by a third party to be not new, or obvious, or unclear, or that the claims of the specification were ambiguous or not explicit.[94] Alternatively, the Patent Court may revoke a patent on a petition or on a counter claim in an action for infringement.

In all this, the underpinning benefit for all three parties involved, inventor, State and public, is, as has been highlighted by the nature of protection of all intellectual property, usually an economic one. The inventors would normally want to exploit their invention for monetary gains without competition from someone else cashing in on their intellectual abilities and inventive efforts; the State would often wish to build up industry for the growth of the country and by ensuring its economic stability; and the public would wish to benefit from both the improvement to their quality of life from the invention and also from that of a economically stable country.

Three broad justifications are generally cited to defend the patent system.[95] First, a patent is argued to be a form of justice for the inventor as it rewards for investments, in inputs of monetary, effort and time. David Bainbridge refers to this justification as the 'reward theory'.[96] However, it should be noted that in practice real justice may be somewhat elusive as a patent is granted, if it is at all, to the first who files the patent not the first

[94] Walker, *The Oxford Companion to Law,* 934.
[95] Davis, *Intellectual Property Law,* 22-23.
[96] David Bainbridge, *Intellectual Property* (London: Pearson Education Limited, 5th ed. 2002), 315.

inventor.[97] Morally, one would expect that the first to invent should have prior claim of rights.

The second justification for the patent system is that it encourages investment in industry. While there are private inventors, most of the inventions take place in industry or in academic institutions. In the case of industry, the duty of the directors of companies is to the shareholders and investors. In the biotechnology industry, intellectual property rights can be important as many of the companies are small ones and lack financial capital.[98] If the company was to hold the patent rights to ideas that have immense industrial application, it is likely that more people will want to invest in that company in anticipation of good returns. Patents are thus valuable assets to companies and industry. Bainbridge calls this the 'incentive theory'.[99]

Patent filing is not limited to industry; academic institutions and research bodies are also filing patents on behalf of their staff and for ideas generated as a result of the research they fund. The purpose of this is to be able to exploit the patent commercially, either by themselves or to licence its use. This is usually carried out in collaboration with industry which funds further research, including studentships, at the university. Thus for both industry and academia, having patent rights serves to encourage investments.

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[97] W.R. Cornish, *Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights* (London: Sweet and Maxwell, 4th ed. 1999), 129. In the US, the patent goes to the first to invent rather than the first to file. This seems just but outside the US, the patent goes to the first to file. The principle of justice is not served if the patent holder is not actually the first inventor though this point is moot if the inventions were totally independent of the other and each party had worked in absolute secret without intellectual exchange between them.

[98] Rogers and de Bousingen, *Bioethics in Europe,* 92.

[99] Bainbridge, *Intellectual Property,* 315.

The third justification of a patents system is that in exchange for patent rights of monopoly for a limited time, the public is given full disclosure of the invention or idea.[100] As inventions are very rarely *de novo* but usually arise out of pre-existing ideas, having full disclosure is thus instrumental in the future development of another invention. This arguably leads to human flourishing. Jennifer Davis writes, "[Patents carry a] fundamental importance as disseminator of information [as] may be seen in the courts' insistence that a valid patent application must contain an 'enabling disclosure', which enables the reader to reproduce which is its subject (as in *Asahi Kasei Kogyo Application* (1991) per Lord Oliver)."[101] The premise of this justification is that without the incentive of the monopoly, inventors will be reluctant to make a full disclosure of their inventions. A monopoly on a patent is therefore a 'trade-off' or 'necessary evil' in exchange for knowledge. This Bainbridge terms the 'contract theory'.[102]

Criteria for the Granting of Patents

The regulatory provisions in modern English law relating to patenting is the Patent Act of England of 1977 (PA 1977). This act was passed in order for domestic laws to be in accord with the provisions of the European Patent Convention of 1973.[103] The recent

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[100] Davis, *Intellectual Property Law,* 22.
[101] Ibid, 22-23.
[102] Bainbridge, *Intellectual Property,* 315.
[103] Secondary to the 1977 act is The Patents Rules 1995 (SI 1995 No. 2093) which sets out the procedural aspects of all dealings with the Patent Office, including details associated with making a patent application. The Rules have subsequently been amended by nine pieces of legislation, namely: 1) The patent (Amendment) Rules1999 (SI 1999 No. 1092); 2) The Patent and Trade Marks (World Trade Organisation) Regulations 1999 (SI 1999 No. 1899); 3) The Patents (Amendment) (No. 2) Rules 1999 (SI 1999 No. 3197); 4) The Patents (Amendments) Rules 2001 (SI 2001 No. 1412); 5) The Patents (Amendments) Rules 2002 (SI 2002 No. 529); 6) The Patents (Electronic Communications) (Amendments) Rules 2003 (SI 2003 No. 513); 7) The patents Act 2004 (Commencement No. 1 and Consequential and Transitional Provision) Order 2004 (SI 2004 No. 2177); 8) The Patents (Amendments) Rules (SI 2004 No. 2358); 9) The Patent Act 2004 (Commencement No. 2 and Consequential, etc. and Transitional Provisions) Order 2004 (SI 2004 No. 3205). See http://www.patent.gov.uk/patent/legal/patrules.htm (accessed 09 Feb 2005).

Patents Act 2004 made significant changes to the Patents Act 1977 by the addition of Schedule A2 on biotechnological inventions to implement the European council directive on the subject.[104] The 2004 Act received Royal Assent on 22nd July 2004, although none of its provisions came into force on that date. Instead, the provisions have been brought into force by commencement orders, of which there have now been two. Commencement Order No. 1 brought some minor provisions into force on 22 September 2004. Commencement Order No. 2 brought some of the major provisions of the 2004 Act into force on 1st January 2005.[105] The new act aims to bring UK legislation more in line with that of the European Patent Convention (EPC) but the basic criteria for patenting remain unchanged. In the terms of section 1 of the 1977 Act, for a given item of new technology to be patentable it must meet four conditions:

a) the invention is new;
b) the invention involves an inventive step;
c) the invention is capable of industrial application; and which is
d) not otherwise excluded by the statutory exception to grant.

The 1977 Act, passed just at the dawn of the age of molecular biology in the medical sciences, allows the patenting of genetic material if it, like all inventions which inventors are seeking to be patented, truly does fulfil the four criteria of novelty, inventiveness, utility and non-exclusion. I turn to examine each of these criteria individually before proceeding to analyse if genes truly meet them.

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[104] Andrew Christie and Stephen Gare, *Statutes on Intellectual Property* (Oxford: Oxford University Press, 7th ed. 2005), 16.
[105] UKPTO, http://www.patent.gov.uk/about/ippd/issues/patsact/index.htm (accessed 09 Feb 2005)

Novelty

This criterion implies that the object of the patent be relatively new when compared to what is known in that art at the claim date. Section 2(2) of the 1977 Act defines the state of the art in the following way:

> The state of the art in the case of an invention shall be taken to comprise all matters (whether a product, a process, information about either, or anything else) which has at any time before the priority date of that invention been made available to the public (whether in the United Kingdom or elsewhere) by written or oral description, by use or in any other way.

The criterion stipulating that the invention must be new is interpreted to mean that it must not already be available in the public domain. This implies that there must be no prior disclosure of matters pertaining to the invention.[106] Novelty is applied only as being relative since it is impossible to prove or disprove absolute novelty.

Inventiveness (Non-Obviousness)

The criterion that the subject of a patent must have an inventive step in the making of it, is so as to demonstrate non-obviousness to someone skilled in the art. This criteria arises only when novelty is indeed present and is normally the most difficult, and important, issue as regards the validity of a patent.[107] As implied in the European guidelines, the

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[106] In practice, this condition of non-prior disclosure is given a grace period of six months in Europe though there are restrictions on the context of the disclosure. This grace period refers to the maximum time lapse between the time information regarding the invention is available to the public, e.g. when it is announced by the inventor at a conference, or a prototype presented without a contractual agreement for maintaining secrecy, and the time of the filing.

[107] Reid, *A Practical Guide to Patent Law,* 42.

inventiveness step must go beyond present technical knowledge. But since such knowledge is constantly changing, this in effect sets up a moving goalpost when considering if the patent is obvious or not. The fact that the subject of a patent is usually referred to as an 'invention' indicates that it involves ingenuity on the part of the inventor and it is for this that one is rewarded with the granting of a patent to enjoy the benefits accrued from the fruits of one's own labour, or as has been mentioned, of one's mind.

Utility (Industrial Application)

An invention must have a practical application or usefulness to be granted a patent. This implies that in practice, ideas, notions and discoveries are not patentable. This criterion is a double-edged sword because on one hand it prevents basic facts from being patented and hence hindering the development of practical applications of them, on the other it does not take into consideration the moral consequences of that use. It has been argued that having a patent on an invention does not give the patent holder the right to actually make the invention. Though this is of special importance if the invention is deemed to be detrimental to public morality, there is little safeguard as to who sits in judgement of this good other than public outcry. In such a case, the patent filed merely has to describe the anticipated utility of the invention.

Non-exclusion

The fourth clause of assessing patentability is based on exclusion on grounds of morality. This is a unique feature of European patent law and not a requirement of American or

Japanese patent laws. There are seven categories of excepted subject-matter from patenting as codified in the 1977 Act. These are:

I. A method of treatment of the human or animal body by surgery or therapy or of diagnosis practised on the human or animal body;

II. A discovery, scientific theory or mathematical method;

III. A literary, dramatic, musical or artistic work or any other aesthetic creation whatsoever;

IV. A scheme, rule or method for performing a mental act, playing a game or doing business, or a program for a computer;

V. The presentation of information;

VI. Any invention the publication or exploitation of which would be generally expected to encourage offensive, immoral or anti-social behaviour;

VII. Any variety of animal or plant or any biological process for the production of animals or plants, not being a microbiological process or the product of such a process.[108]

The rationale for these exclusions are for I, that there is no industrial application (section 4(2)); for II, III, IV, V, that these are not inventions (section 1(2)); for VI and VII, no specific reasons cited (section 1(3)). With regards to the subject of gene patenting, exclusions I, II, V, VI and VII are of consequence and are discussed below when considering why genes do not meet the legal requirements to be patented.

[108] Reid, *A Practical Guide to Patent Law,* 11.

The Issue of Patents of Gene Sequences within Patent Legislation

The research leading up to the stage that a gene sequence can be patented is expensive both in terms of money and labour. Western Europe, the United States of America, and Japan are the key players in this sort of research, and have well-established patent offices: the European Patent Office (EPO), the United States Patent and Trademark Office (USPTO), and the Japan Patent Office (JPO). The three offices have undertaken trilateral projects in an attempt to clarify their respective doctrines.[109] In general the criteria used by these three offices are similar. In addition to filing patents at any one of these offices, it is also possible to file for an international patent rather than one each at the individual patent office of each country. This dissertation will attempt to treat the subject of gene patents as a general subject rather than focusing on the specific patent laws set by each of the three offices. Therefore, unless specified, reference made to any principle will be taken to refer to all.

The English Patent Act of 1977 does not directly address patenting of DNA. Among other changes, Schedule A2 on legal protection of biotechnological inventions was added to that Act in order to implement European Council Directive 98/44 (Biotechnology Directive), to give rise to the amended Patent Act of 2004. This new Act provided legislation for the patenting of genes. The basic principle for this is laid down in Article 3 of the Schedule A2 which states:

> (a) The human body, at the various stages of its formation and development, and the simple discovery of one of its elements, including

[109] Schertenleib, 'The Patentability and Protection of DNA-based Inventions in the EPO and the European Union', 125.

the sequence or partial sequence of a gene, cannot constitute patentable inventions.

(b) An element isolated from the human body or otherwise produced by means of a technical process, including the sequence or partial sequence of a gene, may constitute a patentable invention, even if the structure of that element is identical to that of a natural element.

(c) The industrial application of a sequence or partial sequence of a gene must be disclosed in a patent application.[110]

Sven Bostyn, writing in 1999, notes that there are three major points of relevance to DNA patenting in the Article 5 provision of the directive (i.e., Article 3 of Schedule A2).[111] First, the human body, at the various stages of its formation and development, and the simple discovery of one of its elements including the sequence or partial sequence of a gene, cannot constitute patentable inventions. This point distinguishes between what is a real invention and what is only a discovery. In practice, given the state of science, there are now various ways to elucidate a gene sequence, automated or otherwise.[112] In the light of this, it seems that the sequences obtained from some of these protocols are patentable. Partial gene sequences fall within this category as they are generated by artificial means that classify them as inventions because these sequences are synthesized *in vitro* though using what is naturally occurring in the cells as a template. It is also

[110] Article 5(1)(2)(3), EC Directive 98/44/EC; or Article 3(a)(b)(c), Schedule A2, PA 2004.
[111] Sven J.R. Bostyn, 'The Patentability of Genetic Information Carriers' *Intellectual Property Quarterly* 1 (1999).
[112] The method of sequencing is usually dependent on the facilities and resources available to the lab. Often, the actual sequencing is outsourced to specialized labs which provide such sequencing as a service. The result is almost always compared to those available on the databases such as those managed by the Human Genome project at the Sanger Centre, Cambridge.

possible to merely use the sequence information of the naturally-occurring DNA and build up in a stepwise fashion a significant length of functional nucleic acid.[113] That too would qualify as being patentable.

Second, an element isolated from the human body or produced otherwise by means of a technical process and including the sequence or partial sequence of a gene, may constitute a patentable invention, even if the structure of that element is identical to that of a natural element. Thus, isolated and purified DNA sequences are patentable. This is consistent with the patentability of isolated and purified chemical products that exist in nature only in an impure state, or complexed with another substance, and which require human intervention to make them available in a new form that serves human purposes.[114] This means that if a synthetic strand of DNA was produced artificially by a technical process using the naturally-occurring DNA as a template it counts as an invention and not a discovery. And if this synthetic DNA were to be sequenced, it is patentable.

Third, the industrial application of a sequence or a partial sequence of a human gene must be disclosed in the patent application. Article 5(3) of the Biotechnology Directive stipulates that utility must be defined in terms of industrial application. This may mean that for an EST to be patented, its utility must be more than a mere 'research tool' which its application is usually cited as being because this in fact fails to define a specific utility. An industrial application in this case would need to be specific and based on

[113] For the Oxford anti-HIV DNA vaccine, scientists synthesized short bits of amino acid polypeptides and gradually linked these together. This was eventually cloned into a bacterial vector to generate multiple copies of the sequence for use as a candidate vaccine to elicit immune response in vaccinated individuals.
[114] Rebecca S. Eisenberg, 'How Can You Patent Genes?' in Magnus, D., Caplan, A., McGee, G (eds.), *Who Owns Life?* (Amherst: Prometheus Books, 2002), 117-134.

knowledge of the gene function. In practice, such applications are usually speculative because patents are filed very early on in the research to protect interests.

The ever-progressing state of science is such that it is possible to clone and sequence genes using techniques that do not disqualify their patentability. On this basis, patents on human gene sequences have been and still are being granted as they can be presented in a patent specification in such a way that they appear to meet the four stipulated criteria of English Patent Law, especially the three criteria of Article 3 of Schedule 2.

Arguments Why Genes Do Not Meet the Legal Requirements to be Patented

The arguments as to why genes meet the legal requirements for patenting are based on the technical aspects of English patent law in PA 2004. The arguments that they do not are often based on interpretation of the legal requirements as informed by specialised scientific knowledge. These latter arguments primarily challenge the fulfilment of the four pre-requisites of novelty, application, inventiveness, and non-exclusion, and each will be discussed in turn. The opinions summarised in this section, and which are concerned with legal technicality, are largely, though not exclusively, those of members of the legal fraternity that oppose gene patenting; they are presented here to provide a legal perspective of opposition to gene patenting as a supplement to the theological one presented in the previous chapter. In addition, some of the themes discussed here will be taken up again later in this dissertation.

First, what constitutes novelty can be subjected to different interpretations: for example, at the present time, a human DNA sequence may be the subject of a patent if it fulfils the other criteria besides being 'novel'. One could argue that human DNA is not at all novel as it is as old as the oldest human being. Rogers and de Bousingen write, "National laws within western European countries that look for evidence of 'invention' tend to dismiss the idea that rights can be granted to gene sequences dating back millions of years, on the grounds that you cannot invent something which has always existed."[115] However, what may indeed be novel could be the knowledge that it may be the genetic basis of a disease or that it could form the basis of a therapy. Therefore, arguably the patent may be said to be novel on the basis of that new knowledge of it application. Notwithstanding, the gene sequence for which the patent is sought is not novel and therefore DNA per se fails the criteria of novelty. At the present, gene patents do not have to fail on grounds of novelty if the inventor can demonstrate that a novel way was invented to elucidate the gene sequence. Besides novelty, the issue of application was also implicated.

Second, stating an industrial application or utility in a patent application is often a matter of conjecture. To safeguard interest, laboratories tend to file for a patent on a gene sequence when the scientists working on it either have located it within a mapped gene of known function or from their own experiments have obtained a preliminary indication of the gene function. The utility of the sequence is then extrapolated to be the potential therapy or therapeutic tool to correct gene defects of that particular gene in individuals with an abnormal or mutated sequence. This may sound logical but it is not nearly the full picture because the complex interactions among intracellular components usually

[115] Rogers and de Bousingen, *Bioethics in Europe,* 91.

preclude such straightforward utility. Furthermore, so as to be able to reap as great a protection as possible, patent agents tend to try to draft as broad a claim as possible. Such a practice may have the result of rewarding patent holders for utility discoveries that were not the subject of their research but arising from the efforts of others working on that gene sequence.

Third, it might be argued that human DNA in itself also fails the criteria of inventiveness because gene sequencing, the technique of elucidating the sequence of bases of DNA, is by all definition old science. Furthermore, the entire human genome is already in the public domain.[116] Some genes are known to be present in more than one copy in the genome. These may be expressed at different developmental stages of the person or may be tissue-specific. If a specific mutation within the sequence of that gene has been linked to a predisposition to a disease, it is quite obvious that the same type of mutation in the other homologues is likely to have the same effect. This was the case of the BRCA genes, yet the BRCA-2 patent was awarded based on the *not* non-obvious knowledge of BRCA-1.[117]

One of the major arguments against allowing human genes to be patented is that human genes are not inventions but discoveries and hence do not fulfil the criteria of requiring an inventive step in its manufacture. In the early days of gene patenting before the publication of the human genome, scientists got around this by claiming that the gene sequence was elucidated by producing a complementary DNA (cDNA) molecule *in vitro*.

[116] The ethos of the Sanger Centre which undertook the HGP was to put all the sequence data in the public domain through the internet as soon as the DNA was sequenced.
[117] The BRCA gene family is discussed in detail in chapter five.

This was claimed as the inventive step. Though this claim is still implicit in patent applications now because almost always a synthetic DNA copy is generated, that it is an inventive step should no longer be valid as such an argument can only be used the first time and once only unless a new method to produce the said cDNA is invented.

In addition, there is a fourth argument, other than that they do fulfil the pre-requisites discussed above, as to why genes do not meet the legal requirements to be patented. Exclusions I, II, V and VI of the list of non-patentable material under European patent law relate to DNA. Exclusion I is in references to medical treatment. It directly relates to the patenting of human genes because one of the major aims of holding the patent rights to a gene or gene sequence is to exploit it in the development of medical treatments. The promise of earlier molecular biology is yet unfulfilled in being the answer for the treatment of genetic disorders such as severe combined immunodeficiency disorder (SCID) by the development of gene replacement therapy. This is still not a routine procedure but it is felt that molecular biology possesses the necessary tools to make such treatments possible in the future. Process patents, which may in themselves be medical treatments, fall under this category of prohibitions although this has not hindered the granting of patents.[118]

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[118] See Reid, *A Practical Guide to Patent Law,* 12-13. These include a method of personal defence by injecting an irritant into an attacker (Palmer's Application; [1970] R.P.C. 597); a method of hormonal contraception (Schering's Application; [1971] R.P.C. 337); a method of testing for disease by means of radioactive tagged substances operating on cell samples (Bio-digital Science's Application; [1973]; R.P.C. 668); a method of making a wound dressing by polymerizing in situ (Nolan's Application; [1977]; F.S.R. 425); a method of controlling ectoparasites or their ova by applying to a substrate (which might include human skin) a given chemical compound (Stafford-Millar's Application; [1984] F.S.R. 258).

That scientific theories and mathematical methods are excepted from patenting as espoused in exclusion II is understandable and logical. This underscores the precept that patents protect tangible or material matter and not ideas even though the two are the same; that theories and methods are the embodiment of ideas. Exclusion II is also in reference to the non-eligibility of discoveries to be patented. Traditionally, discoveries are understood to be things that occur in nature whose potential use human beings have come to realise and hence value, such as elements of the periodic table. This exclusion does not pay any attention to how the discovery was made nor if there were any steps taken to obtain it in a purified form. The implication is that discoveries, however made, are not inventions and as such do not qualify for patenting.

Though exclusion V of the E.U. Biotechnology Directive prohibits the patenting of the presentation of information, this has not impeded the patenting of DNA which has a dual nature of being both chemical and information. I discuss this in further detail in my critique of applying patenting law to DNA below.

Exclusion VI of the E.U. Biotechnology Directive prohibits the patenting of any invention the publication or exploitation of which would be generally expected to encourage offensive, immoral or anti-social behaviour. I shall argue in chapter five that the patenting of human DNA potentially encourages an immoral social context as it sets up an impediment to the full exploitation of the human genome for the common good. Ethical considerations, if taken into account, must surely tip the scales of justice.

A recent important case heard by the patent court supports the views of opponents to gene patenting in the legal fraternity, which have just been discussed above. The decision in case GB 0002665.8, concerning the patent rights of a human protein, named Npt2B, and the corresponding nucleic acid that encoded it, owned by F. Hoffmann-La Roche AG was delivered on 23 June 2004 and deemed not to satisfy legislation as laid down in PA 1977 Sections 1(1)(a), 1(1)(b) and 14(5)(c).[119]

First, claims to the nucleic acid were held to lack novelty on the ground that the nucleic acid had been made available to the public before the priority date of the application, as an isolated sample in a DNA library.[120] Second, all of the claims were held to lack inventiveness over the prior art, as disclosed in two documents. The first document disclosed a human gene and protein, also identified as a phosphate transporter protein, with a near-identical sequence, while the second document disclosed a mouse gene encoding a phosphate transporter protein with a similar sequence.[121] Third, it was held that the description did not wholly support the claims to the protein or nucleic acid for use in therapy, and to the use of the protein or nucleic acid in the production of a medicament for treating a range of conditions associated with either abnormally high or low phosphate transporter activity. In particular, there was no support for the therapeutic use of the protein isolated from the cell. There was also no support for the use of the protein or nucleic acid in the treatment of disorders associated with high phosphate transporter activity.[122]

[119] UKPTO, http://www.patent.gov.uk/patent/legal/summaries/2004/o17904.htm (15 Feb 2005)
[120] Case summary 0/179/04, Patent Office, UK
[121] Ibid.
[122] Ibid.

Though this case was important in the development of patent practice, it has not had an effect on the status of previously granted gene patents to date nor has it limited new gene patent application. What it has done is merely define more clearly how the specification and claim must be drafted by the patent agents for a successful application. As a result of the Npt2B case, patents on genes in their natural state are unequivocally understood to be unlikely to be granted if the criteria of novelty, inventiveness and utility are not truly met. This is however true only in the EU and not necessarily so in the US. However if one were to go to a sequence database such as the National Center for Biotechnology Information (NCBI) and carried out a search using the phrase 'human gene patent' there would be 14,816 hits.[123] For a patent to be granted, the majority of these would claim to be gene-based inventions, i.e., forms of DNA that could be identical in sequence to DNA in its natural state if it has been synthesized artificially and meets the four criteria.[124] The majority of these patents, pending or granted, originate in the United States where, as we have seen, interpretation of the four criteria are less rigorous.

A Critique of the Practice of Applying the Patent System to DNA

In this last section of the chapter, based on what has already been discussed, I intend to critique the practice of applying the patent law to DNA. In this critique, I shall be, in part, confirming what the legal critics are saying against the patentability of genes on purely

[123] NCBI, http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=Nucleotide (accessed 15 Feb 2005)

[124] That of novelty, was inventive, has an industrial utility, and not excluded. This was made clear in a joint statement by the EPO, USPTO and JPO, as reported in *Biotechnology Law Review* (1998), 159-193; see Schertenleib, 'The Patentability and Protection of DNA-based Inventions in the EPO and the European Union', 126. The three patent offices concluded that cDNA and the corresponding protein it encodes could satisfy the four criteria.

legal ground, and in part drawing on arguments that I shall present more fully later in this dissertation.

First, the principles of modern patent legislation were formulated for an industrial age where inventions could usually be engendered in a functional mechanical prototype. Though the objectives of the patent system are still very much valid now, I feel that there is tension between direct application of the patent pre-requisites and the nature of DNA and genes. No doubt, there are regulatory provisions within the PA of 2004 but these are still less than satisfactory for ensuring justice, which must be the purpose of any judicial code. The main reason for this is that basis of patent law was formulated for an age of mechanical inventions was adapted and interpreted for an entity whose nature was intrinsically different. This not only gave rise to the inability of patent law to justify unequivocally the patenting of DNA but also fuelled a debate between the opponents and proponents.

Second, in the patent office and law courts, DNA is deemed a natural-occurring chemical technically and its patentability is based on the human inventive step required to isolate and purify it. EPO guidelines for examination of patents for natural products state:

> ...if a substance found in nature has first to be isolated from its surroundings and a process for obtaining it is developed, that process is patentable. Moreover, if the substance can be properly characterized either by its structure, by the process by which is it or by other parameters... and it is "new" in the absolute sense of

having no previously recognized existence, then the substance per se may be patentable.[125]

To be sure, for DNA, the inventive step is taken as the process used to generate an identical copy by artificial means. Nonetheless, a gene patent is not a process patent but one for the product itself. To treat DNA as a mere chemical suggests that DNA's application stems directly from its chemical composition and property. This may not be the full nature of DNA. DNA is in fact information that is encoded in a chemical medium. This is transcribed by a cell's machinery into amino acid polypeptides which in turn form proteins which are also an information medium for a cell's optimal function. Furthermore, just as the ones and zeros of the binary number system code for electronic information in computer systems, the As, Ts, Cs, and Gs of DNA are a coding system for cellular systems. A DNA sequence is thus shorthand for that which cannot be tangibly represented but which exists in nature. As such, DNA even if isolated and purified should not be treated as a chemical product like chemical-based drugs.

The information that DNA encodes is without debate of extreme importance and value. But in issuing product patents, the law is in fact attempting to protect only the chemical nature of the DNA and not the value of the information that it encodes. I am of the opinion that the protection of information and its value may be just as important as its chemical nature. However, I do not hold that patents can effectively serve this purpose. Rebecca Eisenberg cites three reasons why patents, as a form of intellectual property

[125] European Patent Office, Guidelines for Examination in the European Patent office, Munich: EPO, at Part C-IV, 2.3.

rights, are particularly ill-suited to the protection of information; first, because there are so few safety valves built into the patent system to constrain the rights of patent holders in favour of the competing interest of the public; second, that unlike copyright, patent law has no fair-use defense that permits socially valuable uses to go forward without a license; third, that unlike trade-secret law, independent creation is not a defense to the patent.[126] I concur with Eisenberg that patent law is inadequate to protect the value of the information carried in DNA though my concerns are more for the ontological value of it, as I shall be arguing more fully in chapter four. Furthermore, I hold that this has too high and too important a value that it should not be subjected to the confines and limitations of patent issues.

Conclusion

In this chapter, I have shown that the Patent Act of 1977, and of late that of 2004, in Schedule 2A, allows the patenting of isolated and purified human DNA sequences if the patent describes an application, on the basis that it fulfills the conditions of novelty, inventiveness and utility. Patents are a form of intellectual property rights granted to an individual, institution or company. A patent confers exclusive rights for a limited period of time in exchange for full disclosure of the invention. The monopoly enables the patent holder to license rights to use the invention or idea. Objections over the non-patentability of DNA are generally on the grounds of non-fulfillment of these conditions as interpreted from a perspective involving specialised scientific knowledge. Over and above these opinions, the legal issues and regulatory provisions of the current patent system do not

[126] Eisenberg, 'How Can You Patent Genes?', 127.

provide a satisfactory framework to assess the moral considerations of DNA patent issues because there is little explicit guidelines to what is morally acceptable and what is not.

Chapter Three

A Theological Perspective of Property

Introduction

As has been argued earlier in this dissertation, gene sequences are deemed intellectual property in the eyes of the law for the purpose of protection of the rights of those who claim ownership. In this chapter, I turn to address patents from a theological perspective. Because patents are a form of property, the nature of property and its ownership in the Bible and Christian tradition is an appropriate entry point for reflection as it is the fundamental theological issue that concerns patenting in general. In addition, the nature of the human body and its components is the second major fundamental theological issue pertaining to human gene patenting in particular and will be considered in the next chapter of this dissertation. The aim of this chapter is to address the first issue in order to derive a theological perspective on property which could inform an ethic on gene patenting.

The Understanding of Property in the Bible

The principles derived from the Christian scripture are one of sources for the contribution of a theological voice to the debate on patenting human genes. Though the Bible has no specific word concerning the science and laws of the twenty-first century, it can nonetheless still serve as the basis of theological reflection by providing paradigms and models. However, it only is a hermeneutically-justified interpretation coupled with a consideration of other factors, such as the experience of tradition, understanding of cultural and historical distinctions, and knowledge of limitations of these, that can yield a fruitful outcome to the task at hand and not the mere literal appeal to a Bible verse.

Property, by definition, can be both tangible and intangible. While land, precious metals and naturally-occurring elements are tangible and material, an idea, such as that described in a patent, or shares in a public-listed company are examples of intangible property. These two forms of property are both the subject of claims of entitlement or rights and represent the physical and metaphysical divisions of ownership claims. Property is almost always the subject of ownership. The two are inextricably linked: for the concept of property to have meaning, it must either be privately owned, whether by individuals or corporate institutions, or held in common. Therefore, property and possessions can refer to the same thing but are not in themselves synonymous; for to own property may be to have dominion over it, whereas having possession of property does not infer dominion. Specifically, possession refers to actual holding or occupancy with or without rightful ownership but dominium implies rights of ownership also. These notions will be further discussed later in this chapter.

Property in the Old Testament

Individual ownership of property, as opposed to communal ownership, is a familiar theme in the OT. This is an extension of the premise that Yahweh's blessings are often material in nature. For example, Job, whom the Lord himself describes as perfect and upright, fearing God and eschewing evil, has his labours blessed by God. This resulted in material riches as represented by his owning seven thousand sheep, three thousand camels, five hundred yoke of oxen, five hundred 'she-asses', in addition to a very great household including seven sons and three daughters (Job 1:1-3). The livestock and family may be argued to represent material blessing as well as that of the more intangible category respectively. After the testing as instigated by Satan, and having been found guiltless by Yahweh, Job's material possession was increased two-fold (Job 42:10). It seems from this and other OT accounts that the blessings of Yahweh usually incorporated material blessing as represented by property and possessions. Perhaps it can then be argued that those who are righteous in God's eyes are entitled to property. However, this type of theology immediately runs into trouble because it assumes that those who do not own material possessions are unrighteous and also that all who indeed do so are by default righteous. Though material possessions can be an expression of the blessing of Yahweh, it is by no means the sole criterion of judging this.

In the OT, land, as given by Yahweh to the twelve tribes of Israel, is a peculiar form of property. In this regard, land ownership was a dominant feature of the covenantal relationship between Yahweh and the nation of Israel in the OT. The land promise was made to the patriarch Abraham. The fulfilment of it was an important indication of Yahweh's dependability. The promised land of Canaan was divided among the tribes of Israel as an inheritance. This signified, on a material level, the covenantal relationship as well as the implications and duties of it between Yahweh and Israel.[127] The material element in this relationship was in effect a tangible expression of both Israel's dependence and Yahweh's dependability.[128] Israel was dependent on Yahweh to provide from Abraham, who was given a promise which included land and set out in faith to claim it, downwards through the generations. The land they possessed in Canaan was

[127] Christopher J.H. Wright, *Old Testament Ethics for The People of God* (Leicester: IVP, 2004), 88. Wright examines the land from a theological angle, a social angle and an economic angle.
[128] Ibid, 85-87.

solely on the basis of that promise.[129] This points to Yahweh's dependability as one who kept his promise.

Through the land, Yahweh provided resources for the fulfilment of the other aspects of his promise. The produce of the cultivated land would provide sustenance which was a basic need for the flourishing of the people so that Abraham's posterity would be indeed be as numerous as Yahweh had promised to him, a childless man at that time. This, as Wright points out, was recognised by the farmer bringing the first fruits of his harvest to the sanctuary and making a 'creedal statement' recognising Yahweh's dependability as provider.[130]

For each tribe, possession and ownership of the land was a concrete representation of their share in the inheritance of Israel as a nation; not to have land was to lack a share in the covenantal blessing of Israel.[131] This was so because land did not just represent material inheritance but was a symbolic material representation of the sanctity of the relationship between Yahweh and Israel.[132] Furthermore, the land, for Israel, was a matter of central theological and ethical importance.[133] It functioned as proof of the relationship between God and Israel.[134] It also recognises Yahweh as the source of blessings.

[129] Ibid.
[130] Ibid, 87. The creedal statement refers to Deut. 26:5-10.
[131] Albert W. –T. Miao, 'The Concept of Holiness in Ezekiel' (PhD Thesis, University of Cambridge, 1998).
[132] Wright, *Old Testament Ethics for The People of God*, 76.
[133] Ibid.
[134] Ibid, 88-89.

In the light of what the land signified, the land inheritance and ownership was subjected to conditions set by Yahweh. First, it could not be sold permanently because it still belonged to Yahweh (Lev 25:23); the land was given as an inheritance but Yahweh still claimed ultimate ownership but awarded tenancy to Israel. Second, each tribe must retain its own inheritance and not move the ownership rights from one tribe to another (Num 36:9); this last condition seems at first sight a curious condition indeed for such practice would still place the land ownership within the control of Israel, albeit within another tribe. Such a shift of ownership rights of the land would not in effect put the land out of the control of Israel. Nonetheless, that it was not permitted prevented the development of the view that the land-inheritance was a commodity that could be subjected to 'market economics' as interpreted in the cultural context of that time and place. Land and its use was part and parcel of ethical living which was formed in response to God's grace.[135] It anchored concretely the life of faith on the map in a way that is apparently absent in the NT.[136] Among other factors, this pertained to where specifically Yahweh was to be worshipped: on Mount Gerizim and in Jerusalem.[137] In sum, the land inheritance from Yahweh was not to be visualised by Israel as mere material inheritance because of what it symbolised in the faith of Israel. These conditions on OT land ownership may potentially serve as useful paradigms for present day understanding of the concept of property especially with regards to its management and use though the application of it has to be

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[135] Waldemar Janzen, *Old Testament Ethics: A Paradigmatic Approach* (Louisville, Westminster / John Knox Press, 1994), 205-206.
[136] Ibid, 205. In the NT, faith is anchored in a person, that of Christ, and not a geographical place or physical land.
[137] Whereas in the NT, it is not the locality of worship but the manner ("...in spirit and in truth", John 4:19-24) that is important.

done within the confines of hermeneutical interpretation for an age distinct from that of the OT.

Having been given land by lot, there were strict laws governing the inheritance by the subsequent generations of children of Israel as seen in Num 36:1-13. For one thing, the land inheritance was not to be moved from tribe to tribe with inter-tribal marriages. There was thus an apparent distinction made between who had rights to which particular parcel of land suggesting that the identity of each tribe was intertwined with the land given them. Therefore, while the land was symbolic of covenantal blessing of the whole of Israel, particular inheritance was to be held as a common heritage of each tribe. Entitlement to land in this instance was therefore determined by virtue of being members of a particular tribe of Israel. In other words, birthright alone was sufficient for land entitlement. Because of this, the only theoretically legal way of acquiring land was inheriting family or ancestral land.[138] This is likely to have been a safeguard of the family-oriented sociological structure in which inheritance was an important aspect.

The law also had a further safeguard against the abuse of the theological significance of the land: that in the year of Jubilee, once every fifty years after seven cycles of Sabbath years, land that had passed into possession to another other than the original holder reverted back to the possession of the latter. It is evident that the Torah forbade the irrevocable transfer of land ownership, though disposal of movable property within a

[138] Christopher J.H. Wright, *God's People in God's Land: Family, Land and Property in the Old Testament* (Grand Rapids, Paternoster Press, 1990), 58. Also, in 1 Kings 21, Naboth was not able to sell or exchange his vineyard as King Ahab had demanded as it was ancestral land. Ahab's (and Jezebel's) subsequent actions to acquire that property was wicked in the eyes of the Lord not just because it involved killing and theft but also that the object of theft was the aforementioned ancestral land.

tribe was permitted.[139] This practice further signified, as did the prohibition of the transfer of land ownership between tribes, that the inheritance from Yahweh was not to be visualised by Israel as a mere material inheritance. William O'Neill also suggests that in this way, traditional tribal and familial holdings would be preserved in perpetuity so that no Israelite was denied the blessings of the land.[140] Land, as property, thus had especial significance beyond material blessing, in the culture of Israel. For this reason alone, exile from the land and the land being conquered by a foreign power were arguably the most bitter type of events in the history of the nation. This incurred the loss of the land which metaphorically represented losing the status of being Yahweh's chosen nation because of the connection between the land and the self-identity of the nation.

Land in the context just discussed was a unique form of property. This model nonetheless cannot be directly transcribed for present day application because though material, land signified more in view of the history of Israel. It represented three things: first, the faithfulness of Yahweh who had brought to pass a promise he had made to the patriarch Abraham; second, the forgiveness of Yahweh who delivered his people out of slavery in Egypt and sustained them despite their disobedience which resulted in their forty years of desert wandering; third, the generosity of Yahweh to the children of Israel in the giving of a land flowing with milk and honey. In short, the Promised Land was not 'about' Israel or 'about' Yahweh alone, it was 'about' Israel *in* Yahweh; it represented on a material level the covenantal relationship between Israel and Yahweh. This may also account for the many conditions attached to the possession of the land.

[139] William O'Neill, SJ, 'Private Property' in Judith A. Dwyer (ed.), *The New Dictionary of Catholic Social Thought* (Collegeville, Minnesota: The Liturgical Press, 1994), 785.
[140] Ibid.

Walter Brueggemann argues that in possessing the land, the nature of Israel also changed from that of landless sojourners to land possessors.[141] This can be seen as the status of humankind coming a full circle: in Genesis, due to humankind's disobedience, they were driven from the Garden of Eden and becomes landless 'sojourners', while in Exodus Yahweh for a second time gives humankind land. Also, for a second time, there are conditions for possessing the land just as in Eden humankind was told explicitly not to eat the fruits of the tree of the knowledge of good and evil. Brueggemann considers these under the heading of 'land as task' where guidelines pertaining to land management, broadly defined, are set out in the Torah.[142] These include the non-defilement by other foreign gods, the keeping of the Sabbath and Jubilee (Exod 21:1-11; Deut 15:12-18; Lev 25; Deut 15:1-11), the care of the vulnerable (the poor [Exod 23:6; Deut 15:7-11]; the stranger (Exod 21:21-24; 23:9]; the sojourner [Deut 10:19]; the widow and orphan [Deut 24:19-22]; the landless Levite [Deut 14:27]). These instructions were of course to be carried out using the yields and resources of the land that Yahweh had given. Thus, though the model of the promised land as 'property' cannot be transcribed directly for present day application because though material it signified more in view of the history and faith of Israel, the distilled principles derived from a broader hermenutical reading may nonetheless still be applicable today. These principles include stewardship and justice as derived from the instruction of care for the vulnerable using the yields and resources of the land.

141 Walter Brueggemann, *The Land: Place as Gift, Promise, and Challenge in Biblical Faith*, (Minneapolis: Fortress Press, 2nd ed. 2002).
142 Ibid, 56-62.

The debate regarding whether the OT can serve as a resource for Christian ethical reflection in today's society is ongoing. In this present theological reflection, the question is whether the theology of land in a different era can at all yield any useful lessons for addressing the issue of biological intellectual property. This specific question cannot be adequately addressed in a short dissertation such as this other than to state briefly and in general terms some of the assumptions that will be made regarding this. The contention is largely over the laws laid down for one faith (Judaism), as recorded in the OT, applying to another (Christianity). John Barton points out that the OT is a collection of writings spanning perhaps a millennium and that the texts that deal with ethical issues often operate with categories that simply do not make sense with the moral universe most of us inhabit.[143] OT ethics, he contends, is largely time-bound in its historical and social context where its 'rootedness' is in a patriarchal society.[144] It cannot therefore be taken literally for they reflect a situation radically different from our own.[145] In the OT, ethical vision is expressed not only through laws, rules and precepts but through narratives or stories.[146] Thus taking into account the entire narrative of the OT as the context for specific ethics would be a more faithful way in interpreting OT ethics for today's society. For the remainder of this dissertation, when I discuss the concept of property in the OT as a source of ethics, I shall adopt the stance that the moral laws of the OT are relevant though not the ceremonial as these have been fulfilled in Christ. On the subject of judicial and civil laws of the OT, these are of relevance to us if they bear a moral dimension.

[143] John Barton, *Ethics and the Old Testament* (London: SCM Press, 2[nd] ed. 2002), 6.
[144] Ibid, 4.
[145] Ibid, 5.
[146] Ibid, 37.

Property in the New Testament

What was evident in the teaching of Jesus was that he taught a theology of wealth and possession that was contrary to the one accepted by society of the time. Justo L. Gonzáles writes that Jesus' preaching was one of the responses to the social tensions of the time.[147] The principles of the kingdom preached by Jesus were radical. In it, it was the poor in spirit who were blessed for theirs was the kingdom of heaven (Matt 5:3) and not those who had great material wealth. He also taught that for it was easier for a camel to go through the eye of a needle than for a rich man to enter the kingdom of God (Mark 10:24), and that the poor beggar Lazarus had more right to be carried by angels to Abraham's bosom than the rich man (Luke 16:19-31). The socio-economic context of these teachings was the agrarian-driven economy of first-century Palestine, then a part of the Roman Empire and ruled by ruthless and corrupt agents of Rome.[148] There was a social stratification into two groups: the wealthy, such as the rich landholders and the political rulers, as well as the poor, such as the peasants and labourers.[149] The content of Jesus' teachings in his sermons and parables appealed to the latter group as what he taught largely empathised with their lot.

Though it did not seem from his preaching that Jesus was against wealth per se, nonetheless, superficially the rich in the accounts cited above were at a disadvantage compared with the poor. But this may not be the message of these parables because neither private property nor wealth was explicitly condemned. Rather, it was the attitude

[147] Justo L. Gonzáles, *Faith and Wealth: A History of Early Christian Ideas on the Origin, Significance, and Use of Money* (San Francisco: Harper & Row, 1990), 74.
[148] Ibid, 72.
[149] Ibid, 73.

of those who possess such property that was in question. For it was evident in these accounts that it was the behaviour of those who had the means to but did not use their property for the common good of their fellow humans that was not condoned. The rich young ruler found it hard to follow Christ as master because his wealth was his master. Jesus understood this as he himself had said, "No one can serve two masters...You cannot serve God and mammon," (Matt 6:24). Jesus obviously knew the negative power of property for he used an Aramaic-Phoenician word for possession and property which had a negative connotation.[150] Property in itself was not evil. However, if allowed, it can exert a power over the owner that hinders just acts.

Jesus also demonstrated a free attitude to property and attempted to impart this to his disciples.[151] When he sent out his disciples to preach the kingdom of God and to heal the sick, he forbade them to take any property for their journey, not food, not money, not extra clothes, but to depend on the charity of those who would receive them (Luke 9:5). Likewise, he availed himself to the kindness and hospitality of some of his followers, such as the well-to-do women (Luke 8:2), and Peter's mother-in-law (Mark 1:29). Despite this, property itself was not condemned: the group had a treasurer, Judas. Also, Zacchaeus was not required to give up all his possessions as he was ready to compensate fourfold those that he had cheated (Luke 10:8). The general underlying principle to be gleaned from the actions and teachings of Jesus was that an overt attachment to property and the subsequent failure to use it for the common good was not condoned, not that property per se was condemned.

[150] Martin Hengel, *Property and Riches in the Early Church* (London: SCM Press, 1974), 24.
[151] The term 'free attitude' is used here to refer to a liberated ethos with regards to the object in question where the latter (in this context property) is not allowed to encumber the person.

However, the account of the rich young ruler in the gospel of Mark may be an exception. Jesus challenges him to "...sell what you own, and give the money to the poor, and you will have treasure in heaven; then come, follow me". This was in response to the man's enquiry of how he could inherit eternal life. Such an imperative was difficult for him as he had many possessions (Mark 10:17-22). Inherent in the message of the Jesus as recounted by the respective authors of the gospels are ideas about the economic imperatives of discipleship. These are addressed to a larger body, the Christian community as a whole. Therefore, this same community is the one from which use of property in a morally acceptable way should originate.

The post-Pentecost early Christian church at Jerusalem voluntarily practiced a pooling of resources from the selling of their possessions and goods as described in Acts 1:45. A couple in the Jerusalem church, Ananias and Sapphira, were deceitful in their actions in this matter. Ananias had sold a piece of land but had conspired with Sapphira to keep back a part of the proceeds for themselves instead of giving the entire amount over to the church. Both were eventually struck dead for their deceit (Acts 5:1-10). This account though relating to property and its disposal also does not condemn the owning of it. Ananias and Sapphira were not punished because they kept back a portion of the proceeds for themselves. Peter made the point that what belonged to them was theirs (Acts 5:4). But the problem, in Peter's words, was that they conspired together to deliberately and wilfully attempt to 'lie to the holy ghost' (Acts 5:3) and 'tempt the spirit of the Lord' (Acts 5:9). Sapphira's sin was spelt out as to 'agree to test the Spirit of the lord' (Acts 5:9).

Paul Gardner writing on Ananias, and with regards to the Christian privilege of having freedom from legalism says this:

> Peter and the early church were not creating some new binding law by which people might earn merit before God and the church, rather they were seeking to live lives that would reflect his love and grace seen in Jesus Christ. With such freedom, to work out what is right in individual lives by way of service, goes a great responsibility to be honest and open before the Lord and his people. The result of this sad episode in the early church was an increased understanding of and fear of the Lord's power and holiness.[152]

The duplicity of Ananias and Sapphira was such that they desired a part in the kingdom of God but still were bound by the power of property, the very same power that Jesus had consistently taught against in his earthly ministry. But it was not the fact of their wishing to keep their own property or money that was the problem but rather their lying and deception which arguably was a result of their not recognising the purpose of property as being not merely for personal benefit but for the common good.

The primacy of the great command of agape-love is cited as the inspiration for the practice of pooling resources by the early church.[153] Out of this communal resource the needs of the church, meaning its members, were met such that none in the church should be in want when there were those with surplus. Their motivation was rooted in the imminence of parousia, or so they interpreted the words of the two persons in white who

[152] Paul D. Gardner, 'Ananias' in Paul Gardner (ed.), *The Complete Who's Who in the Bible: An Exhaustive Listing of all the Characters in the Bible* (London: Marshall Pickering, 1995), 41-42.
[153] O'Neill, 'Private Property', 786.

told them that Jesus will return as they had seen him taken up into heaven (Acts 1:9-11). It has been suggested that this practice may have been unique to the Jerusalem church. Nonetheless, it seems that despite the practice of resource pooling, there was still private property held. Apparently, private property was not in itself discouraged but again rather that the attitude towards it as being a resource used ultimately for the common good be adopted.

In what has just been discussed, my interpretation of the stance of the NT on property is that attitude is what matters. Among other interpretations, there is another altogether more radical one on the subject. Richard Hays, in addressing NT ethics on the matter of sharing possession, conducts a cursory survey of the NT text in question. It is clear, he writes, that for gospel writers authentic discipleship entails using one's resources to help those in need (Matthew); that the refusal to share wealth would prove to be the hindrance to enter God's Kingdom (Mark); that it is a vision for the new community who shared all in common manifesting the power of the message of resurrection.[154] But more than this, Hays also adopts a radical reading and approach. He writes, "...while the particular mandates and forms of expression may vary, the New Testament witness speak loudly in chorus: the accumulation of wealth is antithetical to serving God's kingdom, and Jesus' disciples are called at least to share their goods generously with those in need, and perhaps even to give everything away in order to follow him more freely."[155] Hays lists three focal images that bring this together into a unified picture, namely, the community, where the imperative of sharing material goods is addressed to the community as a

[154] Richard Hays, *The Moral Vision of the New Testament: A Contemporary Introduction to New Testament Ethics* (Edinburgh: T&T Clark, 1996), 464.
[155] Ibid, 465-466.

whole; the cross, the way of which is linked closely with the relinquishment of material good; and new creation, where the practices of sharing are to be understood as eschatological signs since it demonstrates God's transformation of the old age.[156]

In his view, property, meaning material possessions, and the way it is used is thus a reflection of the authenticity of one's faith and obedience to the teaching of Christ. "Sharing", he writes, "is the minimal expression of conformity to Christ's example of self-emptying, which ought to lead the community to 'look not to [their] own interest, but to the interest of others' (Phil 2-4) and therefore to act sacrificially."[157] In material sharing by the community, we establish a direct link with the proclamation or implications of the resurrection. This is based correctly on his opinion that in the NT, our basic orientation towards money should be provided by the hermeneutical application of the narrative text in such a way that we see our communities in conjunction metaphorically with Acts 4.[158]

Property in Christian Tradition

While there is not a universally accepted interpretation of the scriptural doctrine of property in Christian tradition, the thoughts, theories and philosophies of figures such as Chrysostom, St Thomas Aquinas and St Francis of Assisi, amongst others, contributed to the development of Christian thought relating to this matter. In this section, I confine myself to sketching the theological thoughts relating to property of these three major

[156] Ibid ,466.
[157] Ibid, 465.
[158] Ibid, 468.

figures in the history of the church. It is intended that their opinions and practices represent a diversity of views in the different periods of Christendom.

John Chrysostom, the fourth century priest at Antioch and later patriarch, was a fervent champion of the poor throughout his ministry.[159] His Christian social criticism of wealth and extravagant possessions are evident in his discourses and sermons which are conspicuous for their repeated and tireless exhortation against wealth.[160] By positing that worldly goods (including money, houses, large tracts of land, herds of slaves, and scales full of silver and gold), though perishable and corruptible, are never possessed without labours and sweat, he in effect defends the viewpoint that possession of wealth is theft as it must have resulted from some act of injustice.[161] His primary supposition is therefore that wealth is not good. Chrysostom was very troubled by the concrete impact of economic injustice on the poor though his definition of and perspective on the poor was novel among the fourth-century Christian writers.[162] The poor were recognized as a sociological category of the polis and the proper object of philanthropy and concern. Furthermore, the status of the poor was also on the basis of economic grounds since they possessed genuine, spiritual commodities, which they have the power to trade with the rich on the open market.[163] Chrysostom's theology of property was concerned not with

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[159] Margaret M. Mitchell, 'Silver Chamber Pots and Other Goods Which are Not Good: John Chrysostom's Discourse against Wealth and Possessions' in William Schweiker and Charles Matthewes (eds.), *Having: Property and Possession in Religious Social Life*, (Grand Rapids & Cambridge: William B. Eerdmans Publishing Company, 2004), 88-121. Mitchell quotes an estimate that there are at least ninety to a hundred sermons on the rich and poor in Chrysostom's vast corpus of writings.
[160] Ibid, 89.
[161] Ibid, 91-92.
[162] Ibid, 99-100.
[163] Ibid, 101.

the material possessions that are the object of property but with the subject, i.e., those who did and did not own property, with social justice as the ethic.

Aquinas held that the institution of private property is legitimate and necessary for human life for three reasons. First, persons are more likely to care for what they possess themselves; second, human affairs are more efficiently organized if the proper care of each thing is an individual responsibility; third, that peace is better preserved if persons are content with their own property.[164] However, with regards the right to use, he held that one should not possess external things as one's own alone, but for the community, so that one is ready to share them with others in cases of necessity.[165] He further concedes that in cases of necessity everything is common property.[166] Aquinas based this view on an addition to the stipulations of natural law. For him, the juridical aspects of the question of property was rooted in the metaphysics of Greek, Roman and Patristic thought where material goods were taken to be means to a higher end for humans, to be used rather than enjoyed in their own right.[167] This represented a development from the ethos of the Jerusalem church where the pooled resources was common property as it was held in common, not just as necessity but as a general rule. The key condition that Aquinas lays down for property to be common is that there must be a necessity clause. Such a condition is hard to define for it implies that clear boundaries for adjudicating conditions as well as absolutes exist. Nonetheless, it recognized that private property is subordinate to common good, albeit only conditionally.

[164] Thomas Aquinas, *Summa Theologiae* II-II, q. 66, arts. 1,2,6; cf. q. 57,art. 3.
[165] Aquinas, ST II-II, q. 66, art. 2;cf.ST I-II, q. 94, art. 5, ST II-II, q.32, art. 5
[166] Ibid, ST II-II, q. 66, art.7
[167]Janet Coleman, 'Property and Poverty' in J.H. Burns (ed.), *The Cambridge History of Medieval Political Thought c.350-c.1450* (Cambridge: Cambridge University Press, 1988), 621-622.

Aquinas has been interpreted from many perspectives. Julio Silva Solar does so in what is considered a radical one.[168] From the liberation theology tradition, Solar argues that since Aquinas described property and slavery as additions to the natural law for human conveniences, and since slavery has been rejected, private property in the ownership of capital goods is also no longer defensible because of the contradictions which it has produced between the increasing concentration of ownership in the hands of the few and the collective character of modern economic production.[169] In this, Solar seems to have wrongly rejected Aquinas' position that private property is both legitimate and necessary for human life, as discussed above.

In contrast to Aquinas' view on private property, St Francis and the Franciscans developed a different doctrine of property. In their view, material poverty in itself was deemed a virtue. Francis and his followers rejected the notion of shame in begging and associated with the poor, feeble, vagabonds, beggars, labourers, unlettered, the powerless and the dispossessed. Their anti-possessions stance was so extreme that they even considered the knowledge of the educated as a commodity that should be evaluated in monetary terms.[170] Postulants on entering the order had to sell all possessions and give the money to the poor. If the friar had a trade, he could remain in it but not be paid in monetary returns, if without a trade, the friar had to seek alms. Furthermore, private

[168] Julio Silva Solar, 'St Thomas and Property – A View from the Christian Left in Chile' in Paul E. Sigmund (transl. & ed.), *St Thomas Aquinas on Politics and Ethics* (London: W W Norton and Company, 1988), 178- 180.
[169] Ibid, 178.
[170] John Finnis, *Aquinas: Moral, Political and Legal Theory* (Oxford: Oxford University Press, 1998), 631.

property, including land was strictly prohibited.[171] While the aim of this absolute renunciation of property was the avoidance of contact with money, Francis condemned the incorporation of common property of all as private property and also the principle of exclusion implied in private property rights.[172] To him, the issue was not just about property and its use but it formed part of a much bigger political issue.

Francis derived the Rule of his fraternity from a simple and literal understanding of the Bible and modelled this after the life of Christ and the disciples as depicted in the Gospel accounts.[173] His understanding of evangelical poverty was more radical than other lay pietistic movements of the time.[174] This is reflected in the words of the First Rule:

> The brothers shall appropriate nothing to themselves, neither a place nor anything, but as pilgrims and strangers in this world, serving God in poverty and humility, they shall with confidence go seeking alms. Nor need they be ashamed, for the Lord made himself poor for us in this world. This is that summit of most lofty poverty which has made you, my most beloved brothers, heirs and kings of the kingdom of heaven.[175]

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[171] St. Francis of Assisi, 'Regula Prima' (1221), in *Francis of Assisi, Writings and Early Biographies: English Omnibus of the Sources for the life of St Francis*, Marion A. Habig (ed.), Raphael Brown (transl.) (Chicago: Franciscan herald Press, 1973).

[172] Coleman, 'Property and Poverty', 632.

[173] C. H. Lawrence, *The Friars: The Impact of the Early Mendicant Movement on Western Society* (London & NewYork, Longman, 1994), 26-42. Lawrence cites from Life of St. Francis by Thomas of Celano that it was on the feast of St. Matthias in 1208 that Francis, on hearing the Gospel lesson of the day, Matt. 10:7-9, describing how Christ sent out his disciples, without material provisions but to work for their food, to preach that the kingdom of heaven was at hand, that he realized this was what he (Francis) seeked. As a result, Francis adopted this mode of apostolic life.

[174] Ibid, 33.

[175] As quoted in Ibid.

Lawrence writes that for Francis, this mystical destitution, the refusal to own houses, accept money or accumulate reserves, was not just a missionary expedient or an ascetical discipline; it was a literal imitation of the earthly life of Christ.[176]

Besides the disposal of personal property, Francis and his followers were also to forgo corporate property as well.[177] They were largely nomadic preachers who worked for their needs. Though the fraternity was socially egalitarian, it attracted many young people who had never experienced real want, from the more affluent classes and the clerical intelligentsia.[178] To them, the virtue was in eschewing their wealth to the extent of boasting in this.[179] Francis himself never wavered from his belief that the imitation of Christ involved an absolute poverty that excluded all possessions.[180] This included buildings and money which were both required for their ministry of preaching and administering the sacraments. After the death of Francis, and to reconcile his ideals of material poverty and the fraternity's practical needs, Pope Gregory, in his authoritative interpretation of the Rule, declared that they were permitted to appoint a 'spiritual friend' as a trustee with power to receive and hold money on behalf of the brethren, to whom they could apply to pay for necessities.[181] The possession of the buildings and goods of the Friar Minors were vested in the Apostolic See which allowed for the undisturbed use

[176] Ibid, 33.
[177] Ibid, 34.
[178] Ibid.
[179] For example, Salimbene, a second generation friar, writes of the secular clergy, "...there are many in both orders of friars who, if they had been in the world, would have possessed the prebends they hold, and perhaps much better, for they are just as nobly born, as rich, powerful and learned as they, and would have been priests, canons, archdeacons, bishops and archbishops, perhaps even cardinals and popes, like them. They should recognize that we have given up all these things to go begging." See ibid, 35.
[180] Ibid, 39.
[181] Ibid, 39-40.

of their houses and churches.[182] The homelessness of the pauper Christ that Francis desired for his fraternity could not provide the necessary conditions for a universal missionary enterprise.[183]

Entitlement to Property

In the above survey, it is evident that in view of the differing stance on property through the different ages of Christendom, it is difficult to categorically justify who is entitled to property and who not. However, material reward and hence property is listed as one of the blessings of obedience in Deuteronomy (28:11) whereas the curse of disobedience results in the withholding of such material reward (28: 17-18). This may possibly be cited as how Yahweh dispensed his blessings but it does not lay down the criteria of property entitlement. Indeed there seems to be no clear pattern in scripture that all who own property are entitled to it, an issue relating to justice, nor are there any paradigms that all who should be entitled to property actually own any, an issue relating to poverty.

In the Bible, the modes of acquisition of property include industry, as in the case of Jacob working for Laban, the fishermen Peter, James and John working in a trade, Paul supporting his own ministry as a tent-maker; and inheritance, as in the case of the two sons in the parable of the prodigal son (Luke 15:11-32). A more prominent mode however is through the actions of Yahweh, as in the cases of King Solomon's splendors, Joseph in Egypt, the restoration of property to Job and most conspicuously in the 12 tribes of Israel being given the Promised Land. All these modes may be classified as

[182] Ibid, 40.
[183] Ibid.

honest means and also seen as the blessings of Yahweh. Since the implement of material blessings is often used by Yahweh, it suggests that those blessed by him are entitled to property. There are of course exceptions to this but by and large it is a common motif in the Bible.

Another mode for the acquisition of property is through dishonest means. This basically involves theft in various forms, be it robbery, burglary or fraud. Theft is wrong and all such practices are clearly condemned in the Bible; for example, the eighth commandment of the Decalogue prohibits stealing. The motivation of theft (or stealing) is altogether a more complex issue. Possible causes include greed and need. The tenth commandment of the Decalogue addresses the former in that it explicitly forbids covetousness of material property, and implicitly the covetousness of intangible property. It is striking that the Decalogue which was meant to serve as a daily living guide for God's chosen people post-slavery devoted two commandments to one single subject, that of theft. I believe that this was so as theft was fundamentally an issue of injustice. Among other attributes of Yahweh, he was a just god. Thus his chosen people were called to reflect this aspect of his character in their daily living; what makes theft wrong is that it violates the image of God in us. Although there is an absence of an unequivocal biblical word on the entitlement to property, nonetheless it is in line with the principles of the Christian practice that besides those blessed by Yahweh as being entitled to property, those who acquired property through means other than theft may also be entitled to it.

The Nature of Property

Having explored the Christian scriptural approach to property as well as that of Chrysostom, Aquinas and Francis, I turn now to address four themes that relate to the nature of property including: justice with regards to property; the entitlement of property according to Roman law; the purpose of property; and the motif of stewardship with regards to property. It is hoped that these four related themes can provide insights to the nature of gene patents as a form of property.

Justice

Justice is one of the two main themes that will be used to argue against the patenting of human genetic material in chapter five. However, it is dealt with summarily in this section specifically in relation to the concept of property. In view of the fact that property is a sociological factor in that it relates to interpersonal negotiations within society, it is by default subjected to a deliberation from the perspective of justice. Indeed, theft is precisely such an issue. Robert Song argues that theft is wrong as it is injustice on two accounts: first, against goods, and second, with respect to fair dealing between people. He writes:

> "Theft is an injustice with regards to property: where there is no property there can be no theft, and what makes theft wrong is in part what makes property right. The institution of property in general should be understood as a means to stewardship of the natural world and the well-being of all people through their engagement with material things; conversely, at this broad level, theft may be understood as a wrong against these

> goods...Theft is an injustice with respect to fair dealings between people. It essentially involves dishonesty."[184]

He goes on to list the consequences associated with this dishonesty such as fear, hatred, unhappiness, desire for revenge, breakdown of trust and security, need for expenditure on law and order, and a general deterioration in the common welfare.[185] Song had earlier defined theft as 'dishonest appropriation of property belonging to another, with the intention of permanently depriving the owner of it, and against the owner's reasonable consent'. Theft or 'justified expropriation', he argues, is perhaps only justified when the owner's refusal to consent to the appropriation could not be regarded as reasonable. This is in line with the views espoused by Aquinas.

Entitlement of Property: Possessio & Dominium

In Roman law, there is a range of superior and inferior modes of ownership.[186] The notion of 'lordship' or *dominium* usually relates to the ownership of corporeal things.[187] The owner, the *dominus*, holds complete title to it and definitive right over their use including disposal. This concept is common in today's society: the purchaser of a house holds the title deed to it and can, subject to non-infringement of other laws, do with it as one proposes including letting it out to a third party for monetary returns. Though the sale of the house included the land on which the house is built on, the rights that one has to the land may not be absolute as the house is as it may be the object of leasehold. Thus

[184] Robert J. Song, 'Theft' in David J. Atkinson and David H. Field (eds.), *New Dictionary of Christian Ethics & Pastoral Theology* (Leicester: IVP, 1995), 841-842.
[185] Ibid, 841.
[186] The modes of ownership are: *usucapio, mancipatio, possession, dos, tutela, dominium bonitarum, occupation, tradition, bona fide possessor, usufruct.* In addition, there are further sub-classes under these modes. Coleman, 610-611.
[187] See ibid, 611.

though *dominium* may refer to complete disposal and title, the notion of absolute *dominium* is subordinate to legal requisites. Nonetheless, *dominium* implies ownership as one's own alone and carries with it rights of disposal.[188]

The notion of *possessio* relates to a right of use. While not having *dominium* over property, one may have legal entitlement to the use of the property. Again, the conditions of use may be subjected to legal requisites and also terms of contract with the *dominus*. Thus the right to use derives not just from the rights of ownership or '*dominium*', but also the rights to possess, or *'possessio'*. In the analogy of the landlord and the house, the tenants to which the property was rented to had rights of use but not rights to the disposal of the property. As has been highlighted previously, Aquinas, a Dominican, held that one should not possess external things as one's own alone, but for the community, so that one is ready to share them with others in cases of necessity and that in cases of necessity everything is common property. In effect, he seemed to have been against the concept of *dominium* and for the concept of *possessio*. There are three inherent principles in this view: first, the value of property in evaluated on the basis of its usefulness or ability to meet certain necessity; second, that property even though held by individuals is effectively common property; third, that common property is to be used for the common good. The Franciscans ethos of property though anti-*dominium* did not seem to be anti-*possessio* for as part of their daily living they certainly had to make use of property. They reconciled this by reasoning that they were not claiming ownership of property but

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[188] In contrast to the notion of *possessio*, which is discussed next, *dominium* is incompatible with the sense that property is finally common (a theme which Aquinas rightly draws from a profound understanding of the Biblical tradition on the theme); nor with the notion of stewardship (which suggests that one ought to look after one's property, which *dominium* does not).

merely making borrowed use of common property, which they also reasoned was for use towards the common good. This concept of the common good can perhaps be partly understood by examining the purpose of property.

The Motivation to Fulfill the Rightful Purpose of Property

It seems that in the Bible, the rich were usually the object of condemnation whereas the poor were usually those commended. But as has been argued earlier, Jesus was not against property but against the selfish hoarding of it. Thus the purpose of property is in its use, more specifically utilization in a manner that is just and ethical. The motivation for the acquisition, possession, utilization and disposal of property, while dependent on the significance one ascribes to it, is complex. While these actions are largely driven by a personal value system nurtured by an appreciation of ethics, it could also be the result of created human nature.

Luke T. Johnson seems to take the latter viewpoint. He argues that in a built-in ambiguity to our spiritual and somatic experience which is rooted in our being incarnate in that we *are* and *have* a body, we are inevitably by nature possessors.[189] Material possessions then, he posits, must be seen as lying within this 'continuum of being and having' and derive significance from the way they extend our bodies in the world and thereby symbolize and effect our response to reality.[190] In effect, the way we use, own, acquire, and disperse material things symbolizes and expresses our attitudes and responses to ourselves, the

[189] Luke T. Johnson, *Sharing Possessions: Mandate and Symbol of Faith* (Philadelphia: Fortress Press, 1981), 38-39.
[190] Ibid, 80.

world around us, other people, and, most of all, God.[191] Johnson tries to ascribe meaning to private property by appealing to metaphysical symbolism. Though abstract, he manages to tether this to human actions, how one gains property and what one does with it. He believes that our actions regarding material things are reflections of our standpoint towards ourselves, the other, and God. This is because our actions usually betray what we think: what we do or do not do with property, and how we do it, is dependent of our concept of the importance and worth of all parties concerned.

If we can recognize the importance and worth of human lives as being above that of property, then it is natural to view the purpose of property as being to serve the means of human living. In other words, property, private or otherwise, is a means to an end, which is the well-being of all, or the common good. Such a theory of property or wealth redistribution seems scandalous in a capitalist society where the law of the jungle is that only the strongest or fittest survive. If one subscribes to this, one misses the point of the commonality of the human community where by virtue of being human, we are one. In such a just community, no one has excess and no one is in want. Nonetheless, this may seem an unattainable utopia even as the collapse of the egalitarian communist ideology has shown. However, the difference between the two is stark. In communism, the motivation of the individual to cede control of all property over to the state for the benefit of the community is usually fear. Compulsion rather than voluntary action is the driving force. Furthermore, the power of control is in the hands of a few and thus susceptible to corruption. In a community that accepts the biblical theology of property, the institution of private property is still recognized. However, the owners of such properties also

[191] Ibid, 39-40.

recognize that private property is held for the common good and not merely for selfish ends, i.e., property is subordinate to common good and justice. The motivation of such a community is love and its actions are voluntary as these are driven by that love.

The sharing of possessions, Johnson posits, is both a mandate as well as a symbol of the Christian faith.[192] Because our attitude to property symbolizes our response to reality and because the response to God is the most fundamental of all human responses, therefore, sharing possessions represents our attitude to him. In practice, the situation is much more complex: for one, whether this sharing should be indiscriminate or conditional. As one who holds down a full-time job where it is often felt that the remunerations are below one's effort, resentment may be felt in the generous welfare the government provides for the unemployed who may be perceived as work-shy. It is beyond the scope of this thesis to address these issues but to subscribe in principle to the practice of sharing of property for the common good with equal emphasis on both 'common', i.e., for all, and 'good', i.e., just, scrupulous and ethical. The principles of this mode of property sharing are embodied in the biblical principle of stewardship.

Stewardship

The motif of stewardship relates to the role of the possessor of property. The principle is closely linked to the concept of grace where everything comes from God as a gift and is to be administered faithfully on his behalf.[193] Thus inherently stewardship concerns not just the use and disposal of property but also the means of its acquisition. This in turn

[192] Ibid, 79-116.
[193] Paul N. Helm, 'Stewardship' in David J. Atkinson and David H. Field (eds.), *New Dictionary of Christian Ethics and Pastoral Theology* (Leicester: IVP, 1995), 814-815.

realigns stewardship as a universal, as opposed to solely a Christian moral issue. And indeed because it is viewed from a broader perspective, stewardship relates not just to property but also to the finite resources of the earth. However, what is unique to Christian stewardship is that it also pertains to stewardship of the Gospel. Christian stewardship of property is actually an application of the principles of this stewardship.

Stewardship of the Gospel concerns more than the faithful handling of the Good News; it is arguably about how as a people of God, Christians live out the values of the kingdom of God as revealed by the life, death and resurrection, i.e., the Gospel, of Jesus Christ. The most significant examples of such values include love, joy, peace and justice. Stewardship of property, it follows, is how these values are lived in a Christian life using property as a medium of expression. At the level of daily living including, but not confined to, body life in a church context, this involves the giving of time, talent and treasure (the three 'T's, in the words of the Lutheran Layman's Movement).

The attitude adopted in this giving is fundamental to the concept of stewardship. First, giving with the primary aim of demonstrating philanthropy is not stewardship because it seeks to demonstrate one's own goodness. It also implies that that which is given is solely owned by oneself and fails to recognize that we are merely stewards called to administer faithfully everything that God has given to us, as a gift, on his behalf. Of course charitable philanthropic giving is good and should be encouraged but it must be a demonstration of God's goodness and not an act of human goodness. That which is given is an expression of God's goodness to the individual and not the individual's goodness to the cause he is giving to. Second, giving without making a connection on the human level with, say, a beggar or tramp is not stewardship because it may merely be a means to assuage one's guilt or discomfort when confronted with such a reality. The account in Acts 3 of Peter proclaiming healing, or physical wholeness, to the lame beggar at the Beautiful Gate of the temple in Jerusalem is an example of meeting human need that did not involve the use of money. Of course it is often necessary to give alms but it must be coupled with the acknowledgment of the humanness of the one to which it is given to as a recognition of the 'commonality of the human community' written about earlier. These two examples illustrate the biblical principles concerning stewardship as articulated by Paul Helm and as cited at the beginning of this section. Stewardship then is primarily a biblical practice that informs our relationship with property. As everyone, both rich and poor, has such relationships, albeit to varying extents, we are all, by default, stewards.

The gospel of Luke alone records the parable of the unjust steward (Luke 16:1-8). It is an account of how the steward of a rich man facing imminent dismissal ingratiates himself to those who were indebted to his master by reducing the size of their debts. For though this was arguably done through unjust means in as far as the master's estate was concerned, the steward was nonetheless praised by him for his wisdom! This parable is hermeneutically challenging. It seems to condone outrightly an action that is unjust and therefore not praiseworthy by praising the actions of the steward because the means to the end were ingenious. Dennis Ireland, in his exegesis of the parable, writes that Jesus in his telling of the parable was seeking to apply the lesson of the parable to the use of material possessions. True wisdom, Jesus says in effect, is to use worldly wealth for the benefit of others in need as such actions give evidence of genuine faith which have implications for one's eternal destiny.[194] In recognizing that God is the source of all property and that we are but stewards entrusted with the care of these, stewardship is recast as a spiritual discipline. If the thesis of Ireland is correct, then it implies that wisdom on the part of the steward is the key to this spiritual discipline.

In the context of the present day church, the paradigm of the tithe could possibly serve as a prism, among others, that we examine the motifs of being a steward and stewardship. A tithe is traditionally a tenth of the annual produce of land or labour taken as a tax for the support of the Church and those in the priesthood. Though long practiced within the Christian church, it had its roots more in custom and longevity rather than in explicit scriptural precepts. Indeed, the scriptural basis of the practice is not robust and this in the seventeenth century was highly contested.[195] The NT sources used by defenders of the practice, 1 Cor 9:9; Heb 7; Matt 22:21, did not address the issue directly but relied heavily on interpretation, while OT references treated tithes as the special property of God, or paid specifically to the tribe of Levi.[196] As a result of this, the practice of tithing rose and ebbed with the changing of the ecclesiastical tides. The practice of tithing can be said to have been 'reclaimed' by late nineteenth to early twentieth century American evangelical church practice.[197] Nonetheless, it is still viewed by opponents as lacking a

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[194] Dennis J. Ireland, *Stewardship and the Kingdom of God: An Historical, Exegetical , and Contextual Study of the Parable of the Unjust Steward in Luke 16:1-13*, Supplement to Novum Testamentum, vol. LXX (Leiden: E.J. Brill, 1992), 114-115.

[195] Laura Brace, *The Idea of Property in Seventeenth-Century England: Tithes and the Individual* (Manchester: Manchester University Press, 1998), 15-16.

[196] Ibid.

[197] John Reumann, *Stewardship and the Economy of God* (Michigan: William B. Eerdmans Publishing, 1992), 54. Reumann accounts how after the American civil war, a Chicago businessman, Thomas Kane in 1876 realised that he was the only one who was a tither, published pamphlets on the subject and found

theology. I am of the opinion that while this may arguably be so, nonetheless the principles which undergird the practice of tithing are undoubtedly biblical one and these are love and justice, both of which have already been discussed above in the consideration of the purpose of property. To tithe then is a tangible expression of the understanding of this purpose in the context of the Christian community.

Conclusion

In the OT and NT, the right to property was in principle subordinate to the obligation to care for the weaker members of society. This is seen in the regulations of the Torah, in prophetic literature and otherwise, which seek to protect the weak and under-privileged members of society such as the widows and the orphans. Yet there is not a well-defined scriptural doctrine of property rather one developed through Christian practice and informed by the thoughts, theories and philosophies of figures such as St Thomas Aquinas and St Francis of Assisi amongst others. Most striking in this reflection of property is the shift from community ethics in the OT and Jerusalem church to personal ethics in post-early church. Nonetheless, the pervading theme is that property was to be used in fulfillment of the common good in a just manner and motivated by love.

"The Layman Foundation" to continue the work. Other such movements began, including "The Tenth Legion" and "The Twentieth Century Tither's Association of America". Their scriptural model was that of "storehouse tithing" as espoused in Malachi 3:10-12. Reumann notes that it was in the period around the First World War that laity came into prominence in some churches for the first time, and that in connection with fund-raising campaigns. It can be thus argued that tithing was as much a matter of church politics as it is a scriptural precept.

Chapter Four

The Lived Human Body & Ontological Status of Human DNA

Introduction

Since human DNA is a component of the human body, a dissertation on the issue of human gene patenting could benefit from an attempt to understand the nature of the human body. Furthermore, to see human genes as entities out of the context of the human body may warrant criticisms of adopting a reductionist view of the human person. Thus, the first aim of this chapter is to address, from a theological perspective, the nature and meaning of the human body. Based on this, the chapter will then move on to derive a new understanding of the ontological status of human DNA, emphasizing why it is special. Finally, I shall try to present a 'science-informed theological anthropology' which will form the basis for one of my arguments in chapter five. The fundamental argument of this chapter will be that from a theological point of view human bodies count, not just human beings' capacity for agency. That this is true is because of human bodies' relationship to the body of Christ. Since human bodies count, the DNA which structures and informs them is therefore of particular significance.

To hold that the human person is both body and soul is not necessarily subscribing to dualism which views the physical and the non-material components of humans as two separate entities; a stance of bi-elemental body-soul non-dualism is not untenable. This is because the human person is in him or herself a mystery: on this side of death, the resurrection of the body, and the life everlasting, we are *both* body *and* soul as one entity but also as two fundamental elements at the same time. The aim of this chapter is threefold: first, to reflect on the meaning of embodiment; second, to examine how and why the theological perspective of the body should rightfully be positioned within the resurrection body and the body of Christ; and third, on the basis of the first two aims to attempt to articulate a science-informed theology of the body and theological anthropology.

The Meaning of Embodiment

I begin the task of this chapter by examining the approaches taken by three theologians with regards to the human body in order to present a broad survey of the diverse Christian theological understanding of the meaning of human embodiment.

Meaning in Human Relationships

Lisa Sowle Cahill, a theologian who usually writes from a feminist perspective, holds that the meaning of embodiment is found in human relationships. She notes that ethics always has to do with the body in one way or another. Furthermore, she argues, morality refers to human action and most of the subdisciplines of ethics can be named according to the way they impinge on the human body.[198] In her book, she suggests that there are currently two major approaches adopted in the reflection of human bodies: first, that it is an important factor in the constitution of personhood; and second, that it is deconstructed in the process of social discourse.

The former is the preferred approach among Christian writers although the location of the meaning of the body differs. A significant number of these derive the meaning of the body from its participation in a larger context, be this within a one-to-one closed

[198] Lisa Sowle Cahill, *Sex, Gender and Christian Ethics* (Cambridge: Cambridge University Press, 1996), 73.

relationship, a family unit, the community of believers, or entire humanity.[199] For example, Cahill's study, from a perspective that can inform the ethics of sex and gender, incorporates the trilateral relationship of body, personhood, and social institutions.[200] She notes that external cultural institutions engage with the internal physiological given of the human body, which remains invariant over space and time, to give form to a person's bodily experience and irreducible bodily existence. She uses this construct to situate the meaning of the body as evoked by issues such as body and gender, body and monogamy, body and sexual orientation, body and family. Her theology of the body is contextualized in human relationships but neglects the engagement with the significance of us actually *being* bodies.

Meaning in the Person of Christ

Mary Timothy Prokes, a Catholic theologian, holds that the meaning of embodiment is found in the person of Christ. She writes, "Our bodies locate and center our experience".[201] She supports this assertion by later quoting Vogel who wrote, "...body relations and extension of those relations are keys to knowing persons, e.g. the incarnated God". Every mystery of the Christian faith, Prokes says, bears a body dimension because humans are embodied beings and being such our perception of anything is foundational on contact being made with our bodies through its senses. She also goes on to say that even the core revelation concerning Trinitarian life bears a body dimension; these include the embodied presence of Christ in his incarnation and his real presence in the Catholic

[199] I shall be picking up this theme again in chapter five when I situate the concepts of common good and justice in the context of such communities; see pp. 134-136.
[200] Ibid, 79-83.
[201] Mary Timothy Prokes, FSE, *Towards a theology of the body*, (Edinburgh: T&T Clark, 1996).

Eucharist. And on these foundations, she constructs a theology of the body approaching it by reflecting upon a faith understanding of the lived body and the material universe.

Prokes begins her reflection by stating the premise that the living body and the spirit as a single entity is to be dealt with as a received mystery, i.e., it cannot be totally known even by careful analysis. Because she outrightly rejects dualism, I am of the opinion that Prokes' theology of the body rather developed into a theology of personhood and only on that does she base the question of the nature of the body. In her approach, the human body is not reflected on apart from its contribution to the concept of personhood and seems to me a conservative approach and an old wineskin especially when she attempts to engage with the new wine of science in discussing embryology and DNA. I beg to differ; I am of the opinion that Prokes' theology of the body may have been more relevant to the present context if she was willing to reflect for a moment on the material body as separate from the soul, commonly referred to as 'the anatomical body'. When God made human beings, he employed a two-step procedure: "And (first) the Lord God formed (the body of) Man of the dust of the ground, and (second) breathed into his nostrils the breath of life; and Man became a living soul" (Gen 2:7).[202] The metaphorical language used describes how human beings consisted of a material part, the dust of the ground, and an immaterial part, the breath of his creator. Together these two fractions became a whole human being, a 'living soul'. This last phrase seems somewhat redundant; for there could not be a 'dead soul' though a dead body is perfectly logical. I suggest that it was used metaphorically to describe the 'lived body' or the 'embodied soul'. I therefore argue that even though I hold a bi-elemental body-soul non-dualist

[202] NRSV translation. Addendum mine.

stance, a reflection on the anatomical body as a one separate aspect of a person may possibly yield interesting insights and possibly useful tools in understanding embodiment just as the reflection on the soul on its own does. Of course, the whole, i.e., the 'living soul' will be infinitely greater than the sum of the two aspects, the body and the soul.[203]

Notwithstanding, there are three main points to Prokes' theology of the body or what she terms a 'faith understanding of what it means to be expressed in a body'. First, the body has a vocation to *be* the image and likeness of God.[204] Further to this the Christian faith affirms that the meaning of the lived body derives from the creator, indicating that the human body is significant only in the context of fulfilling the intention of its creator. I disagree with the first part of this for it implies that our bearing of the image and likeness of God is *only* expressed in our physical body. I am unconvinced that it is expressed physically at all. Our being icons is not a literal but metaphorical term of expression as I have argued in chapter one.

Second, Prokes' theology of the body posits that the fulfillment of the meaning of bodily expression is found in the person of Jesus Christ.[205] I concur with this point entirely. For, as Prokes points out, Christ in being the 'Word made flesh' (John 1:14a) and subsequently through his life, teaching and redemptive self-gift made possible the entering anew the mystery of being the embodied image of God.[206] Prokes echoes

[203] The theory of bi-elemental body-soul non-dualism echoes the theory of aspect-dualism-but-substance-monism. There are numerous historical changes of meaning in soul-body language: for Aquinas the soul is the form of the body, rather than being rationality or consciousness; for the writer of Genesis, as argued above, it is the life and breath of the body, which is again different from modern conceptions.
[204] Ibid, 57-60.
[205] Ibid, 62-65.
[206] Ibid, 62.

Cipriano Vagaggini's thesis: that Christ in his incarnation mediated the restoration of humanity's vocation, a role that his resurrected and, hence, glorified body continues to do.[207] Though she goes on to identify very correctly that the hermeneutical interpretation of the meaning of Christ's incarnation is the crucial key to a better understanding of the whole subject matter of her book, she does not go on to attempt to do so as she claims that her's is merely an introduction to that particular understanding for which our faith seeks.

Third, Prokes' theology of the body posits that the meaning of bodily expression is illuminated by sacramentality and significance, both temporal and eschatological. The Eucharist, with the gathering of believers as a single corpus is a prime example of this. At the last supper, on which Holy Communion was subsequently modelled, the significance of divine inner life was fully revealed as Christ explicitly extended an invitation that we participate in it and to recognize ourselves as part of the greater body which is his. In other words, our relationship with each other as embodied beings is illuminated by our individual relationship to the body of Christ both within the current church on earth and the eschatological Church Triumphant.

Most significantly, Prokes binds the strands of her theology together in the interrelatedness in Christ by stating that it is our bodies that link us to Christ. I would have agreed entirely with this view if not for her premise that the living body and the spirit were strictly to be considered as a single entity and dealt with as a received mystery

[207] Cipriano Vagaggini, *The Flesh Instrument of Salvation: A Theology of the Human Body* (Staten Island: NY, 1969), 43; see ibid, 62.

which cannot be totally known even by careful analysis. Our bodies do indeed link us to Christ but by Prokes's premise, this link may be less strong upon bodily death since the body and soul are a single unity. I would have argued that if anything, our resurrection or glorified body-soul entity was the link.

Meaning in the Resurrection Body and the Body of Christ

Robert Song, writing with regards to genetic manipulation of humankind, holds that the meaning of embodiment can be found in the resurrection body and the body of Christ. In a recent article, he very rightly points out that in our ethical reflection on procedures that involve any enhancement or defect correction of the human body, be these by methods that employ science and new technologies such as genetic manipulation or those that use surgical means such as plastic surgery, it is imperative first to formulate a theological construal of the body from which to derive meaning for the human body.[208] Song's approach is to define the human body in the light of the body of Christ where the former derives its true meaning in terms of the latter which is the true body and the greater reality.[209] He grounds this opinion using Paul's theology in the apostle's first epistle to the Corinthians: that our bodies participate in Christ's body is evident in 1 Cor 6:15-20, and again in 1 Cor 15:12-22. In the former, Paul draws a parallel between bodily union of humans and the spiritual union between human beings and God as being analogous; in the latter, he asserts that believers will be raised at the parousia because Christ had himself risen. Such a corporate view of the Christian community however does not indicate the loss of individual identity just as it does not disparage the individual human

[208] Robert Song, 'Genetic Manipulation and the Resurrection Body', paper presented at Bioethics Conference at the Hong Kong Baptist University, 2004, 18-24.
[209] Ibid, 19.

body because as Song points out, 1 Cor 12:27 speaks of how within one body there are multiple members with a diversity of gifts. He argues that because Paul does not explicitly draw a parallel between this and the church, it suggests that Paul was making an ontological equation between Christ and the Christian community.[210] Even so, Paul does not dismiss the value of the individual human body but places that value as from within that community (1 Cor 11).

Therefore for Song, a theological construal of the body is primarily a NT theology of the body as articulated by Paul, which is informed by the body life of the church community. He writes, "Thinking about genetic manipulation is therefore not a matter of conjectures about the nature of the general resurrection, but of reflecting on the nature of the resurrection life that is to be exhibited by the church."[211] On this framework, he proposes that we can embark on building a modern self-identity which can inform the ethics of procedures concerned with enhancement or correction of the human body albeit with three caveats: first, that the actions do not lead to situations of social or economic injustice; second, that the actions do not buttress dualism; and third, that the actions do not deny human finitude and mortality, nor attempt to accelerate the eventual transformation of bodies from our present earthly ones to the final glorified ones.[212]

I concur completely with Song on his theological construal of the body for Christian bioethics reflection. In the light of recent scholarship by N.T. Wright on the resurrection, it may be opportune at this juncture to examine the nature of the eschatological glorified

[210] Ibid, 21.
[211] Ibid, 22.
[212] Ibid, 22-23.

resurrection body and its implications. Paul, in 1 Cor 15, based on his faith and from his knowledge of the nature of Christ with whom he had a personal encounter on the road to Damascus, speculated on the nature of our future bodies. According to him, the nature of these will be such that they are incorruptible (v 42), glorious (v 43), powerful (v 43), spiritual (v 44), bearing a heavenly image (v 48) and immortal (v 53). The way that our earthly bodies will acquire these traits is through transformation (vv 51-52). These traits seem to suggest that our resurrection bodies will not be the physical ones that we presently have. Regarding this, Wright argues that Paul's view of the resurrection body is one which can be referred to as being 'transphysical'.[213] Wright coins the word 'transphysical' to denote the notion of 'transformed' physicality which describes the early Christians' anticipation of a body that, while still physically robust, was different from the present one in that primarily it will not be a corruptible one, i.e., not merely this present physical body but not entirely different either.

The common basis of agreement of the three theologians just discussed as regards the meaning of the body are that the body and soul are inseparable and that the meaning is found in the context of the body's relation to another which for Cahill is in human relationships, for Johnson is in property, for Prokes is in the person of Christ, and for Song, is in the body of Christ. This, as we shall see, is a stark contrast with the views of three so-called 'scientist-theologians'. The works of these four theologians just discussed can be said to be a novel perspective on understanding the human body since works on

[213] N.T. Wright, *Resurrection of The Son of God* (London: SPCK, 2003), 477-478.

embodiment and the body traditionally tend to be works focusing on sexual ethics.[214] I suggest that this is a reflection that the rise of bioethics and new fields of science which are confronting us with new dilemmas that need new wisdom in discerning.

Towards a Science-informed Theology of the Body and Theological Anthropology

Science, Religion and Theological Anthropology

Philosophy and science together have often had the tendency to view the human person as consciousness (also known as 'the mental faculty') and physical body alone, which perishes and decays, respectively, after the bodily death of a human person. This view discounts the Christian understanding of the non-physical soul, which is the part of the embodied human which persists after bodily death. This is most clearly evident in 'secular' medicine where the objective is usually to restore to 'perfect' physical health, where suffering of the physical body does not ever have value, and where the language of demise is that of defeat as opposed to a Christian perspective where poor physical health is understood within the context of the broken nature of entire humanity,[215] where suffering though anomalous may have meaning,[216] and where death is not necessarily

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[214] For example, James B. Nelson, *Embodiment* (Minneapolis: Augsburg Publishing House, 1978) & Gareth Moore OP, *The Body in Context: Sex and Catholicism* (London: Continuum, 2001). Lisa Sowle Cahill too adopts the same framework in her essay '"Embodiment" and Moral Critique: A Christian Social Perspective' in Stephen E. Lammers and Allen Verhey (eds.), *On Moral Medicine: Theological Perspectives in Medical Ethics* (Grand Rapids and Cambridge: Wm. B. Eerdmans Publishing, 2nd ed. 1998), 401-412. In it, she posits that ethics, as discourse about human relations and practices, is always at some level about the body which in turn is always central in defining the self and its meaning and which also always reflects and augments social relationships including contexts of sexual and medical ethics.

[215] George Khushf, 'Illness, the Problem of Evil, and the Analogical Structure of Healing: on the difference Christianity makes in Bioethics' in Stephen E. Lammers and Allen Verhey (eds.) *On Moral Medicine: theological perspectives in medical ethics* (Grand Rapids and Cambridge: Wm. B. Eerdmans Publishing, 2nd ed. 1998), 30-41.

[216] Courtney S. Campbell, 'Religion and Moral Meaning in Bioethics' in Stephen E. Lammers and Allen Verhey (eds.) *On Moral Medicine: Theological Perspectives in Medical Ethics* (Grand Rapids and Cambridge: Wm. B. Eerdmans Publishing, 2nd ed. 1998), 22-30.

defeat.[217] These different understandings are all reflective of the dissimilar viewpoints of scientists and theologians and the significance that each ascribes to the body.

Ian Barbour, a physicist, Arthur Peacocke, a molecular biologist, and John Polkinghorne, a theoretical physicist, are three prominent 'scientist-theologians' who have contributed much to the dialogue between science and religion. They were all trained as scientists and only later entered holy orders. As such they approached theology as trained scientists and science as theologians. Each of them has explored the notion of embodied existence in their writings by addressing the issue of 'agency' or how God works in the world through human beings who are embodied souls

Meaning in Freewill

Barbour's derivation of meaning for the human body is found in the notion of freewill.[218] He develops 'process theology', which rejects the omnipotence and sovereignty of God and replaces this with the suggestion that he is one agent among many, able to effect outcomes albeit indirectly. Applying this to evolution, he posits that God attempts to influence the process for good but ultimately does not determine it. Physical bodies, whether still in the process of evolving or already at an evolutionary endpoint, would thus for Barbour represent a step in or an outcome of a process that God had no control over even though he offers persuasion for the sake of a good outcome. By this argument, human bodies, even if it is at the top of the evolution tree, may not necessarily be the best outcome that God had intended. Such a stance may appear to be in conflict with many

[217] 1 Cor. 15:55.
[218] Barbour's theology was originally expounded in I.G. Barbour *Issues in Science and Religion* (London: SCM Press, 1966) and updated in I.G. Barbour *Religion in an Age of Science* (London: SCM Press, 1990).

scriptural principles such as being 'fearfully and wonderfully made' (Ps 139:13-15) and being made in the image of God (Gen 1:26-27) even though it may be possible to see the body as being a wonderful thing despite it not being the chief end of creation.

Meaning in Cognitive Uniqueness

Peacocke's derivation of meaning for the human body is found in cognitive uniqueness. His works are attempts to respond to the challenges posed by the natural sciences in modernity. He posits that both science and religion formulate their own metaphorical language aimed at describing reality in terms of models, analogies and concepts. He developed a philosophy of science called 'critical realism', which holds that that language is necessary, partial, adequate but nonetheless revisable within the context of the continuous communities through the generations that generated them.[219] Peacocke draws a parallel between this and what he terms 'critical theological realism' where in reference to a causal nexus or agent assessed by application of the criteria of reasonableness as commonly in appraising models and theories, i.e., fit with data, internal coherence, comprehensiveness, fruitfulness and general cogency.[220] Science and religion are related by their use of metaphorical language in attempts to describe the realities that each reference as complete literal descriptives but which probably do not hold true for both disciplines simultaneously. In applying this to evolutionary biology, Peacocke points out that the physical human body is continuous with its evolutionary predecessors in anatomy, biochemistry and physiology.[221] In other words, what we commonly hold to be

[219] Arthur Peacocke, *Theology in a Scientific Age* (Oxford: Basil Blackwell, 1990), 11-19.
[220] Ibid, 15.
[221] Ibid, 73-80.

our uniqueness, that is the way our material bodies function as a result of evolution, is not the factor that makes us human though it no doubt contributes to human identity.

Our uniqueness, Peacocke says, is entirely cognitive. The unique characteristics of humans are that we are capable of abstract thought, possess self awareness, self knowledge, rationality, free will, and a sense of purpose. The mental activities are possible as a result of a discontinuity in the evolutionary process from that nearest to man in the evolutionary ladder, i.e., cognitive evolution took a big leap forward. By implication, it is predominantly the human brain that makes us human even though it may take other parts of the human body to effect our will. Bodies thus derive meaning from their cognitive abilities.[222]

Meaning in Orderedness

Polkinghorne's derivation of meaning for the human body is found in the notion orderedness. He established a firm place for natural theology in apologetics and theology.[223] He cites the delicate precision of the ordering of the world, disclosed by the physical sciences, and also the intricacy of its interconnected structure as matters that the natural sciences are incapable of explaining. He holds a general theistic approach on the basis of his Christian faith. On agency, he adopts a tacit metaphysical position as he is convinced that none of the classical positions on the relationship of mind over matter,

[222] Another reading of Peacocke is that he doesn't really give any significance to bodies, as such, since they are not unique.
[223] Alister E. McGrath, *Science and Religion: An Introduction* (Oxford: Blackwell Publishing, 1999), 219-221.

namely dualism, materialism and idealism, are tenable today.[224] He subscribes to 'dual-aspect monism', a metaphysic in which mind and matter are complementary aspects of one 'world stuff', perceived in the different phases of the material and the mental.[225] My interpretation of this is that he holds the human physical body and the soul are part of an inseparable whole, which I, for shorthand, term 'human'. Divine agency, according to Polkinghorne, can take two forms: the first, quasi-deistic in nature, is conceived in terms of God's timeless single act of holding world history in being; the other in contrast to a primary causality on the part of God, argues that his agency is at work omnipotently through his creatures without forcing them or competing with them.[226]

In these three scientist-theologians just sketched, it is seen that they do not explicitly reflect on the meaning of the lived human body but rather address embodied existence by considering the issue of agency. We see that each brings from his own particular scientific background a different perspective to that meaning. Nonetheless, collectively, their works articulate a theological anthropology that evaluates our being human not largely by our bodies but by own ability to live as free agents. This is in stark contrast to the general stance of the four theologians discussed above. Such a stance, if it is at all meant to be a modern theological one, since the proponents as has been mentioned are 'scientist-theologians' is indeed modern and non-confrontational in as far as other academic disciplines are concerned. However, I am of the opinion that it discounts too heavily the importance of the physical body and its components.

[224] John Polkinghorne, *Scientists as Theologians* (London: SPCK, 1996), 29.
[225] Ibid.
[226] Ibid, 30-41.

A Community with a Common Heritage

I have already confessed to holding the idea of the human person being a bi-elemental body-soul non-dualism with both the components being vital contributions to personhood. The soul perceives and subsequently acts only through the body and the body is nonliving if devoid of the soul. Thus, only the lived body has meaning which it derives from its equal contribution with the soul to personhood while the anatomical body is devoid of such meaning. Several writers in the field of philosophical theology have sought to find a way of reconciling reductionist monism, or reductionism, and substance dualism in a meaningful way. Nancey Murphy, a philosopher is one of these. In a recent paper, she suggests a way towards a Christian solution to the mind / body 'problem'.[227] She suggests a need for a concept of 'downward causation' which includes recognition of the existence of higher level systems with their capabilities to select among the lower-level causal processes upon which the system depends. I shall attempt to navigate a way that is neither deterministic nor reductionistic. In so doing, I am not sitting on the fence but am suggesting that the faith language of religion and the limitation of science are not adequate to rule out one or the other. Nonetheless, as a scientist, my views veer very slightly to a reductionist-type view in choosing to reflect on the body, apart from the soul.

The modern definition of being human is often spoken in the language of science where human bodies are defined structurally and functionally in physico-chemical terms not

[227] Nancey Murphy, 'The Problem of Mental Causation: How does Reason get its grip on the Brain', *Science & Christian Belief* 42, no.2 (2004), 143-157.

least due to the sequencing of the human genome.[228] The science of genetics has identified links between phenotype and gene sequences. A phenotype at its basic definition is the expressed feature of a particular stretch or stretches of DNA within the genome. These features could be visibly discerned, such as eye colour, or not, such as predisposition to susceptibility to certain types of cancer. However, strictly speaking it is not the DNA that directly causes this. The human genome as a whole can be perceived as a set of instructions for cells to synthesize certain types of proteins in very specific forms and also in precise amounts at the different stages of a human body's developmental process. Proteins by virtue of their particular steric structures are the workhorses of the cell and are implicated in every intracellular biochemical reaction therein. Similar cell types constitute a tissue type, similar tissue types form organs, and the specific assembly of various organs constitutes a body. The optimal functioning of the body is conditional on both the precise operation as well as proper sequential progress of all the biochemical reactions which constitute the metabolic activities of the body. These metabolic pathways in biological systems tend to be sequential multi-step reactions and these in turn interact with other metabolic processes to constitute a complex web of biochemical reactions. If, for any reason including a fault in the protein-coding DNA, the protein will not function optimally or in the proper way, the metabolic pathway which that protein is involved in breaks down and that in turn affects the web of reactions. On a whole body level this malfunction presents itself in clinical symptoms. Thus, the molecular mechanisms of diseases that have a genetic basis can often be said to be protein-mediated but DNA-

[228] R. David Cole, 'The Molecular Biology of Transcending the Gene' in W. Mark Richardson and Wesley J. Wildman (eds.), *Religion and Science: History, Method, Dialogue* (New York & London: Routledge, 1996), 343-350.

driven. The scientific data that support such mechanisms are overwhelming and as such these mechanisms are today accepted as scientific truths.

It is important to point out that much as DNA is responsible for phenotypes, it is wrong to cite this as genetic determinism. While genetic factors are undoubtedly important, epigenetic factors have also been shown to play a part. In many instances, genetic factors provide the potential for more than one possible outcome or phenotype, the finality of which epigenetic factors play a significant role. David Cole cites three ways of transcending the gene, so to speak. First, cells adapt either temporarily or for longer term to their environments by effecting metabolic changes in response to it.[229] On a molecular level, the expression pattern of proteins is changed either by the suppression or upregulation of the DNA to protein transcription and translation mechanisms. It is the protein levels that change, not the nature of the DNA or the genome. Nonetheless, it is the genome that predetermines the potential states and being for the organism though it does not predetermine the organism to any one particular state.[230] Second, though all cells within the human body have exactly the same genome, different cell types arise as determined by the expression of specific configurations of proteins. This leads to cellular differentiation and the development of higher organisms. The mechanism of this is yet unclear but there is scientific data to suggest that the microenvironments where specific cells are situated are important because cell-to-cell interaction is necessary for proper cellular differentiation. Thus, the so-called genetic predetermination is contingent on

[229] Ibid, 344-349.
[230] Ibid, 346.

normal conditions during development.[231] Third, experiments with animal models have shown that the brain develops after birth, in response to stimulus, with the addition of new, complex neural circuits to form neural networks which constitutes the basis of brain circuitry. If this is so, it has implications for learning as it suggests that the more stimuli a developing child receives, the more developed will be the child's mental capabilities.[232] Thus, assuming that nature endows one with the required potential, nurture must provide the stimuli for the fulfillment of those potentials.

In the above outline, I have sought to present a balanced opinion of the importance of DNA in the development of the human body so as not to tumble into the pitfall of advocating genetic determinism and hence adopt the reductionistic viewpoint. It is true that *who* we are (personhood) is more than our genes, but there is also no escaping the fact that *what* we have (physical bodies), and by Johnson's definition, what we are, to a very large extent is a result of our genes. As all members of the human race have the same basic body plan, we can be said to be identifiable and recognised as a species on the basis of this, though Peacocke may disagree. And that, as has been argued in this section, is a result of human DNA. Therefore, at the molecular or sub-cellular level, the commonality of the human race and subsequently the common heritage that we share is the human genome which is the collective set of genetic material that as a species, *Homo sapiens*, share.[233]

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[231] Ibid, 347.
[232] Ibid, 348.
[233] See Bryan Sykes, *The Seven Daughters of Eve* (London: Corgi, 2002). This book is written from a 'popular Science' angle. The primary data of this research has been publishes in a series of articles in the scientific journals but is best summarized in Bryan Sykes, 'The molecular genetics of European ancestry' in *Philosophical Transaction of the Royal Society* 354, no. 1379 (1999), 131-138. The conservation of

Ontological status of DNA

As has already been alluded to, DNA has a dual nature: it is a chemical but it also stores information. With regards to its chemical nature, all of its components are naturally occurring elements that are represented on a periodic table. On this basis alone, DNA is no different from other biological molecules that occur in the human body such as hormones. The present state of technology makes it possible not just to elucidate the sequence of DNA but also to synthesize an artificial copy of it, using either the original DNA as a template for copying or using the sequence directly to make short starting and ending point primers to assemble a wholly artificially-made DNA. Artificial DNA synthesized in this way is currently being used in several vaccine development initiatives. It is envisaged that in the future, synthesized DNA may be used in gene replacement therapy, genetic enhancement and human cloning.

However, DNA, unlike hormones, is more than just a natural-occurring biochemical. Hormones and other biochemicals are ends in themselves in that they are directly implicated in particular steps of a cascade of biochemical reactions within a cell. Unlike DNA, all the other biological molecules of the human body do not have an informational

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degree of similarity within the human genome may be far higher than we understand as demonstrated by Sykes who analysed mitochondrial DNA, which one inherits from the maternal egg alone, within human cells from tens of thousands of people. He found that the mitochondrial DNA mutation patterns of all his subjects fell into seven clusters. By tracing the time it takes for a new mutation arise spontaneously and in conjunction with other dating methods, he estimated how long ago the progenitor or 'clan mother' of each of the seven clusters lived. This work was contentious when it was first reported. See also the critique in L. Cavalli Sforza and M. Feldman, 'The Application of Molecular Genetic approaches to the study of Human Evolution' in *Nature Genetics* 33 (2000), 266-275.

Later, an Italian research group carried out similar type research but looking at genes in the Y chromosomes which men alone have and which they inherit from their fathers as women do not have a Y chromosome they found ten clusters instead of seven. See Underhill PA, Passarino G, Lin AA, Shen P, Mirazon Lahr M, Foley RA, Oefner PJ, Cavalli-Sforza LL. 'The Phylogeography of Y Chromosome Binary Haplotypes and the Origins of Modern Human Populations' in *Annual Review of Human Genetics* 65 (2000), 43-62.

aspect to their nature, though at times the language used to describe some of these gives the impression that they do. The example of the biomolecules that make up the signalling cascade of the neural system is a good case in point. These signalling molecules, called ions, because of their atomic constituents have a net electrical charge and are involved in electrophysiological processes where they are transmitted from receptor to brain. This is a multistep process which is sustained by multiple neurons over what can be relatively long distances. In the case of sight, light energy received by the retina is converted into an electrochemical neural signal which is conveyed to the brain and results in our being able to see the subject-matter.

But a closer examination of the biological process that is occurring reveals that the definition of the word 'information' is different from what is meant when DNA is described as being informational: while DNA codes for information that enables and sustains life, all other biomolecules implicated in signaling processes in the human body are these information, i.e., DNA is 'informational' in its nature but the others are 'information' in themselves. Employing the simple analogy of a vehicle being assembled in a manufacturing plan, DNA would be the master plan drawn up by the engineers and is informational in that it provides information, the biomolecules, such as ions, would be the assembled vehicles that will serve a purpose and are therefore the information themselves.

Besides DNA, the ones and zeros of computer coding software too may be considered informational as well as possessing another nature simultaneously. The ones and zeros are a means to indicate the presence or absence of an electronic pulse. The corpus of these pulses in any particular functional software program enables it to execute its function. In some ways, this is analogous to DNA in that they both have dual natures, one of which is informational and serves to enable a set of functions.

However, the prime difference between the two is that the human genome provides the information to potentially enable and sustain biological life whereas the information provided by computer circuits does not. That computer circuits and human DNA are similar ends there. The informational nature of computer software and human DNA are intrinsically different. The main issue is that one is informational for, what can only be at best, artificial intelligence, and the other being informational for genuine biological life. The difference in the intrinsic nature of these two ends is the main, and indeed sufficient, criterion that distinguishes them. Thus, though a piece of computer software is in some manners of speaking similar to the human genome, its ontological status is vastly different. On this basis, this does not give it a special moral claim on our attention.

DNA though a biochemical is not directly involved in cellular biochemistry. As has been discussed above, DNA codes for proteins which when made are the workhorses of the cells. DNA then is by definition informational as it provides the blue print of what proteins to make, either through the body's endogenous regulatory mechanism or through exogenous stimuli. Though DNA has two distinct natures, the importance of it as a molecule is only so in the combination of these inseparable natures. These are inseparable because the biochemical aspect requires the informational aspect to form new cells for its perpetuation and the informational aspect depends on the biochemical aspect for its synthesis. In nature, both these aspects are vital for the survival of species and the passing on of genes.

In view of the dual nature of DNA, biochemical and informational, I suggest that this is analogous to the bi-elemental body-soul non-dualism of the human person. And it is within this context that I both situate human DNA and derive meaning for it: that the biochemical nature of DNA finds meaning in the physical body as both are material; and the informational nature of DNA finds meaning in the soul as both are immaterial. In other words, human DNA can be understood in a way that parallels the understanding of the human person as being simultaneously of two distinct elements but yet of one entity.[234] Pressing this analogy yet further, the human person as having two natures simultaneously, may parallel the understanding of the person of Jesus Christ, God incarnate. A similar idea is referred to by St John of Damascus in his discourse concerning religious iconography. On the subject of the visit of the angels to Abraham and his subsequent hospitality, as accounted in Gen 18:1-3, he says, "Abraham did not see the divine nature, for no man has ever seen God, but he saw an image of God and fell down and worshipped".[235] In this a clear distinction is made between the fundamental difference between God's being (the immaterial essence) and his revealed form (the physical body).[236] In Jesus Christ, the same duality of nature is present: that of being fully

[234] While I am speaking here of the parallel between the 'bi-elemental non-dualistic' natures of DNA and the Christian understanding of the human as consisting a material body and an immaterial soul, this concept can also accommodate non-religious views which discounts the existence of a soul but admits to the human person as having a physical body and a mental faculty.
[235] St John of Damascus, *On the Divine Images* (New York: Saint Vladimir's Seminary press, 1987).
[236] Solrunn Nes, *The Mystical Language of Icons* (London: St Pauls Publishing, 2000).

God (the immaterial essence) and also fully human, as having an anthropomorphic body (the physical body).[237] This is reflective of a bi-elemental nature because for Jesus Christ, God the son, his deity was expressed in the physical form of human personhood to fulfill the redemption plan of God the father for humankind. In this, his deity and his humanity was non-seperable as each required the other aspect of that non-dualistic nature to do the father's will.

The ontological status of human DNA derives its understanding from the human body, which in turn finds meaning in the person of Christ and the resurrection body. By virtue of the material nature (the biochemical) and also because of what we have learnt from science regarding it being inherited from generation to generation, DNA is, reductionally-speaking, the most basic physical denominator that underlines the commonality of the human race. But this is only one aspect of the contribution to our personhood. The immaterial nature of DNA (the information), as analogous to the soul, is equally important. Just as a body without a soul can be said to be dead, DNA as a biochemical would be useless if it did not provide information because it is proteins that participate in cellular biochemistry not DNA. Therein we can derive the ontology of DNA: that while it reflects our own ontology as possessing a material aspect, our physico-chemical bodies, as represented by DNA's biochemical nature; it also reflects our possessing a less easily definable aspect, our immaterial souls, as represented by DNA's informational nature. In both the human person and human DNA, the two natures of each, body-soul and biochemical-informational, respectively, are inseparable and perceived as mystery: a so-called 'bi-elemental non-duality'.

[237] This analogy is *not* with the divine nature of Christ being his soul and the human nature his body.

Human DNA is Special

It is fairly uncontentious to state that the human person is special among all the other biological life forms.[238] This pervades all aspect of one's being, including the physical human body, and is recognised in our society by according human concepts such as 'dignity', 'worth', 'sacredness', etc, to it. Human DNA, by that same reasoning, must also be considered special since it provides the information to enable and sustain the physical aspects of being human. The dissertation does not take a view on patenting of non-human DNA and so far has been scrupulous in distinguishing DNA sequence originating in humans from homologous sequences originating in non-human species. However, in claiming that human DNA is special, it is necessary to examine briefly the nature of the DNA of non-human species.

No doubt, the human genome and that of the higher primates share very high degree of homology. Besides this, there are human genes that have analogues in other organisms include the nematode worm, *Caenorhabditis elegans*, and the thale cress weed, *Arabidopsis thaliana*. I do not hold, should the argument hinge on this point alone, that human DNA should be considered as no different from the DNA of other species. That human DNA is more important than the non-human DNA is because DNA must rightly be viewed in the context of the genomes from which it derives. So while the biochemical nature of DNA from the human, worm and weed genomes may be identical, the ontological status of the informational nature is definitely not. That is to say, the informational status of the human genome codes for a physical body of a creature that

[238] I appeal to the concept of *imago dei*, in the way I have described it in chapter one, to support this opinion.

bears the image of the creator God but the same cannot be said of that of non-human genomes. This dissertation will go on to argue, in chapter five, against the patenting of human DNA. Of the two reasons that will be discussed, only the first one, that of common good and justice, can be used apply to argue against the patenting of non-human DNA though it is emphasized again that that is not the objective of this dissertation.[239]

Community as Body and Body as Community

In the previous section, I argued that it is the human DNA in our cells, beside other factors as proposed by scientist-theologians amongst others, that binds all humankind together as being recognizably human, and that the idea of being so is rooted in the ontological status of DNA. A hierarchy of bodies is evident: our physical bodies are a representation of a larger body, the church, and this in turn is a representation of the body of Christ. I agree entirely with writers such as Prokes and Song whose thesis is that the meaning of the body ultimately derives from that of Christ. However, I propose that this is achieved through his present body, the church, and not just in the resurrection body or the final eschatological body.

The church as a community is Christ's body which presently gives meaning to individual human bodies. Paul uses the analogy of the physical body to situate each person within the body of Christ when he wrote, "For as the body is one, and hath many members, and all the members of that one body, being many, are one body; so also is Christ. For by one Spirit are we all baptized into one body......; and have been all made to drink into one

[239] For the record, though I have explicitly stated that the aim of this dissertation is to attend to the patenting of human DNA, I am also against product patents of non-human DNA.

Spirit" (I Cor 12:12-13). And, I suggest, that the notion that this body of Christ that Paul was writing about referred to the church (or Christian community at the time of Paul's writing), is drawn from the context of chapter 12 which was concerning spiritual gifts within the Corinthian church to whom the epistle was addressed. Paul was writing to a specific church; therefore what he wrote concerned issues that that particular church was confronted with. He again makes reference to this body in Ephesians 4. In the context of discussing gifts that Christ gives to his people, Paul says, "There is one body and one Spirit, just as you were called to the one hope of your calling, one Lord, one faith, one baptism, one God and father of all, who is above all and through all and in all", (vv. 4-6). That it is the church Paul had in mind is clear from verses 15-16: "......speaking the truth in love, we must grow up in every way unto him who is the head, into Christ, from which the whole body, joined and knit together by every ligament with which it is equipped, as each part is working properly, promotes the body's growth in building itself up in love." As Paul was speaking about the gifts that Christ gives to the church for the purpose of promoting the body's growth, this must infer that he had in mind the church community as the body of Christ.

The idea of the body as a community finds its praxis in the model of the French ecumenical monastic community of Taizé. Its late prior, Brother Roger, articulated a 'parable of communion'.[240] He wrote that the purpose of community and common life is not to be an efficient instrument or to be comfortable and happy together in itself, "the parable of communion," he said, "is a simple reflection of that unique communion which

[240] Schutz, Brother Roger of Taizé, *His Love is a Fire* (London: Geoffrey Chapman Mowbray, 1990).

is the Body of Christ, his Church, and through this, being also leaven in the human family."[241] The importance of the body as a community is further emphasized:

> "Anyone who draws near to the holiness of Christ in the mystery of communion which is his Body, the Church, is brought irresistibly, like one of the poor of God, to seek complete openness, the outlook of a child, a universal heart. Such a person becomes a leaven of reconciliation, and there can be no hope today of a vast awakening of Christians without reconciliation."[242]

In the Corinthian and Ephesian churches where the Christian community was depicted as a body and in the Taizé Community where the body of Christ, the church, is depicted as a community, we may derive a few insights that could inform our reflection on the meaning and purpose of the lived human body. First, that physical bodies derive meaning rightfully from that of the present body of Christ which is the church, not just from the resurrection body of Christ. Second, that the parable of communion, or of body life, is reflective of the mystery of the body of Christ in which God is the head. Third, and most important, that the individual components of physical bodies, including DNA, are all of equal importance in the context of the whole body just as individual members, with their particular gifts, within the body of Christ, which is the church, are of equal importance and significance. This is true since all, both physical body components and also individual members, function together for the purpose of promoting the body's growth.

[241] Ibid, 88-89.
[242] Ibid, 90.

Conclusion

The aim of this chapter was to address, from a theological perspective, the nature and meaning of the human body, to derive a new understanding of the special ontological status of human DNA and to present a 'science-informed theological anthropology' which will form the basis for one of my arguments in chapter five. Theologians hold that the body and soul are inseparable and that its meaning is found in the context of the body's relation to 'another', which for Cahill is human relationship; for Prokes, is the person of Christ; and for Song, is the body of Christ. On the other hand, scientist-theologians do not explicitly reflect on the meaning of the lived human body but rather address embodied existence by considering the issue of agency. Collectively, their works articulate a theological anthropology that evaluates our being human not largely by our bodies but by own ability to live as free agents. This approach suffers from the too heavy discounting of the importance of the physical body and its components.

In what I term a 'science-informed theology of the body', where I attempt to build a bridge between genetics and theology, I suggest that in view of the dual nature of DNA, biochemical and information, it is analogous to the body-soul nature of the whole person. I then situate human DNA and derive meaning for it within the context of the human person: that the biochemical nature of DNA finds meaning in the physical body as both are material; and the informational nature of DNA finds meaning in the soul as both are immaterial. This bi-elemental non-dualism is also echoed in the person of God incarnate in Christ in that while he was physically fully human, he was intrinsically still fully God.

Finally, to complete my reflection, I placed the human body within a universal situation and argued for the interrelatedness of the entire human race, on the basis of our common DNA, in order to construct a theology of the community which ultimately feeds back to inform my theology of the body. This approach of my reflection is capable of accommodating the doctrine of the triune God by ultimately allocating him the headship of the metaphorical body in which we participate.

In conclusion, the human body has in different ages of Christendom been either despised or revered. That it is so indicates our ambiguous attitude to it. Since humans both are and have bodies, and also because we live in a physical world with which we interact intimately, the physical nature of ourselves with regards to its contribution to the understanding of human personhood is fundamentally important. DNA, though a chemical, provides the information which ensures that human persons inherit human bodies and in so doing effect the commonality of the human species as one single corpus. This living body would then appropriately be understood from the perspective of its participation in the body of Christ.

Chapter Five

A Christian Theological Response to Patenting Human DNA

Introduction

In the preceding chapters, this dissertation has introduced and examined the general arguments cited by the church and from the secular arena for and against the patenting of biological organisms and human genes (chapter one); the current legal provisions governing the patenting of biological material, including life forms, in general, and DNA in particular (chapter two); the theological issues concerning property (chapter three); and the nature of the relation between human DNA and the human body as well as the ontological status of human DNA (chapter four). The aim of this final chapter is to draw upon these to give a theological argument why human DNA should not be the subject of patents.

For this task, I shall be adopting two separate lines of approach: first, I shall be examining the effect that the social construct of private property, as applied to human genetic material, has on the common good; second, I shall consider whether a science-informed theological anthropology can contribute to our understanding of Christian personhood. Based on these two strands of arguments, I shall finally move to suggest that present intellectual property laws should be applied so as to exclude patenting human genetic material. Though the theological arguments given in this chapter are different from the theological arguments discussed in chapter one, they are not meant to totally discount the latter but to supplement them.

The Nature of Common Good and How This Relates to Gene Patents

In this section, the main argument will be that human flourishing, both individual and communal, is the principal objective of the common good. There are very many factors that contribute to human flourishing; these include, but are not limited to, good education systems, good political institutions and good economic policies. Good health is also a pre-requisite for human flourishing. In turn, sound biomedical knowledge that is applied wisely is vital in maintaining good health (a prime objective of preventive medicine) and in illness to restore the patient to good health (a prime objective of therapeutic medicine). A part of this biomedical knowledge derives from genetic knowledge that is a result of the sequencing of the human genome. The first section of this chapter will ultimately address the question of whether gene patents constrict or assist the utilization of genetic knowledge for the purpose of contributing to human flourishing so as to achieve the common good. I shall begin this task by first identifying on whose shoulders these duties fall.

A Universal Community as the Context of Common Good

In chapter three of this thesis where the theological issues concerning property in general were addressed, it was pointed out that private property was justifiable if its ends were to serve the common good. For this argument to be valid on a universal level and not just at the church community level, the context within which the common good must be located must likewise be the universal community. Such a community refers not just to the many associations that form among people with shared interests but a unifying relationship among all people by virtue of their being members of the human race. John Finnis puts it like this:

> '...it is helpful to begin by thinking of community or association not as *a* community or *an* association (an 'entity' or 'substance' or 'thing' which 'exists', acts, etc.) but rather as community or association, an ongoing state of affairs, a sharing of life or of action or of interests, an associating or coming together. Community in this sense is a matter or relationship and interaction.'[243]

In this, Finnis states clearly that the nature of a community, in which I situate my concept of 'universal community' as the basis of common good, is found in the relationship and interaction between each component member rather than by other default factors. He stresses the importance of relationships and also the interactions that nourish and bond these. Inherent in this is the idea that each member of the community has a duty to work towards a shared objective, that of human flourishing, because all are part of the same community, one which I term universal, that is, all humankind together.

Finnis goes on to say that 'Whatever else it is, community is a form of unifying relationship between human beings', and suggests four sets of such relationships.[244] These are, firstly, a genetic unity of race, which is physical and biological in its nature; secondly, a unity of intelligence, which is cognitive in its nature; thirdly, a cultural unity, which is anthropological in its nature; and fourthly, a unity of common action, which is practical in its nature. Of these, Finnis holds that human community in practical

[243] John Finnis, *Natural Law and Natural Rights* (Oxford: Clarendon Press, 1980), 135.
[244] Ibid, 136-138.

reasonableness is primarily a matter for the fourth set of unifying relationships.[245] However, he admits to the other three being necessary to some degree if there is to be the community of joint action or of mutual commitment to the pursuit of some common good even though no degree of unity in them can substitute for co-operation and common commitment.[246]

This universal community is also a covenantal one in the sense that God relates to us not just as individuals but also as one, as is clear in the covenant he establishes with Noah after the flood (Gen 9:11-13). We should regard the whole human race as a 'universal covenantal community', and from such a community, actions, or in Finnis' words, 'a community of joint action or of mutual commitment to the pursuit of some common good' finds its motivation and context for expression.

The Nature of The Common Good

Having established the universal community as the context for moral ethical action, I turn to discuss the objectives of such a community and how these might be achieved. The concept of common good expresses the inherently social and interdependent nature of human living and therefore of moral obligations.[247] These moral obligations give rise to the immediate and inescapable positions of every human person both benefiting from and contributing to the good of others. According to John Langan, common good is that which is used in reference to the shared and public values and interest but which is not

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[245] Ibid, 138.
[246] Ibid.
[247] Julie Clague, 'Beyond Beneficence: The Emergence of Genomorality and the Common Good' in Celia Deane-Drummond (ed.), *Brave New World? Theology, Ethics and the Human Genome* (London & New York: T & T Clark International, 2003), 212.

merely the summation of individual interest. It is an active human cooperation for the achievement of a shared objective.[248]

In the pluralistic context of today's world, common objectives are exceptions rather than the norm due to the diverse philosophies and ethics of our multi-faith and multi-cultural society. Despite this, there seems to be one common theme: human flourishing. I draw on this phrase to refer to humankind's desire for a good life, which also includes the freedom to live in that way. Extending from the microcosm of the nuclear family, which is a nuclear community, to a wider context, which is the universal community, the common theme inflates to encompass the concept of the flourishing of the universal human community and the persons that constitute it. This is the ultimate objective of the universal common good. Human flourishing in the context of this dissertation is addressed from the angle of physical well-being though there are of course other dimensions to this flourishing. I limit the discussion to only physical well-being because a minimal standard of physical health is a pre-requisite for contributing to this flourishing as manifested in other forms of health. Clague refers to this as 'health as a human good to be promoted'.[249] As modern medicine moves rapidly into gene technology, in which understanding of the human genome is fundamental, this implies that all matters pertaining to the knowledge of human genome, including human gene patents, have implications for the common objective of optimal physical health for human flourishing and therefore the concept of common good in turn.

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[248] John Langan, S.J., 'Common Good' in James F. Childress and John Macquarrie (eds.), *A New Dictionary of Christian Ethics* (London: SCM Press, 1986), 102.
[249] Clague, 'Beyond Beneficence: The Emergence of Genomorality and the Common Good', 213.

In an earlier section, I have argued that universal community is one which consists of all humankind. The good of such a community is the universal common good. The objective of this common good is to facilitate human flourishing. Since health, both physical and mental, is an important pre-requisite for human flourishing, then that which contributes to optimal health also contributes largely to such flourishing. In the modern practice of medicine, in the age of molecular biology, genetic knowledge has emerged as an important tool in both diagnosis and the management of the malaise. Such knowledge has been advanced by the available information provided by the publication of the complete gene sequence of the entire human genome. Nonetheless, because of the way scientific research is presently funded, some of this information is under the control in the form of gene patents.[250] These patents may be in the control of private enterprises or public-funded research bodies. Regardless of which, they represent a form of control over genetic information in a way that is protected by the law.

The Common Good and Gene Patents

Song writes, with regards to private enterprise and new genetics, 'While there may be a role for private enterprise, this discussion suggests, it can never be separated from the requirements of the common good'.[251] More specifically concerning gene and genetic material patents, he writes that 'the fundamental issue is the relation of individual (or corporate) rights and the common good, though here there is also involved the nature of property rights'.[252] Here, Song holds that the main issues relate to the orientation of

[250] See chapter one.
[251] Robert Song, *Human Genetics: Fabricating the Future* (London: Darton, Longman and Todd, 2002), 101.
[252] Ibid.

property to the good of all. His definition of the common good thus refers to this 'good of all', meaning the benefit of everybody. In other words, the aim of private property is to serve the ends of common good, the objective of which I have argued is human flourishing. Therefore, if gene patents, which are one form of private property, do not serve the ends of the common good, then this legal provision is not a necessary or desirable one in our legal codes since the purpose of such codes above all is for the protection of human interest, common and shared or otherwise. But before examining if gene patents help or hinder the application of genetic knowledge for the purpose of serving the common good, it is opportune to first examine the concept of justice, which is the action for this common good being discussed here.

The Nature of Justice and How this Relates to Common Good

Love-inspired justice informs Christian social ethics.[253] It also informs other branches of Christian ethics, including that discussed in this dissertation.[254] Justice is a prominent theme in the Bible and God is clearly portrayed as working to establish justice.[255] Daniel

[253] Ronald H. Preston, *Confusions in Christian Social Ethics: Problems for Geneva and Rome* (Cambridge: William B. Eerdmans Publishing Company, 1994).

[254] In Christian social ethics, the type of love encountered is *agape* love, whereas in say commutative justice involving the rights between two individuals, it could be other forms including *philia* or *eros*. See Gene Outka, *Agape: An Ethical Analysis* (New Haven and London: Yale University Press, 1972), 75-92. Outka, from his survey of the thoughts of Anders Nygren, Reinhold Niebuhr, Emil Brunner, Gérard Gilleman and Joseph Fletcher, says that there are at least five ways of conceptualising the relationship between agape love and justice. First, that agape and justice are opposed because God's love, the prototype of human agape, is unmotivated since fellowship with humankind was established for no reason extrinsic to the love itself and therefore opposed to justice since it does not take into account thoughts of worthiness and merit.[254] Second in situations where interests are being pursued, agape as self-sacrifice acts only as an indispensable restraint so that justice does not degenerate into inordinate self-seeking.[254] Third, agape and justice may be contrasted relations where the former may sacrifice altruistically one's self interest where the latter does not but both actively promote the interests of the other when their welfare is at stake.[254] Fourth, the overlap of the conceptually distinct notions gives rise to situations where agape may require more but never less than justice does in both self-other and other-other relationships.[254] Fifth, that love and justice are the same in that justice is love distributed.[254]

[255] Daniel M. Bell, Jr., *Liberation Theology After the End of History: The Refusal to Cease Suffering* (London and New York: Routledge, 2001), 130-131.

Bell Jr. says that justice, in the Thomistic understanding of it as a general virtue, is that which coordinates the proper good or end of individual persons with the common good or end of the human community.[256] Justice is thus action for the common good.

Above, I situated common good within the universal community. And as justice can be conceived as that which is the basis of solidarity of a community, because it serves to direct all actions toward the common good, so then is justice, or the pursuit of it, the prime motivation of this universal community. Bell, writing from a liberation theology tradition, says that justice is the key concept for the Christian conscience of our day and the promotion of justice is the essential requirement of the Gospel message today.[257]

Finnis holds that the concept of justice embraces three elements and is applicable to all situations where these elements are found together.[258] First, justice relates to one's relations and dealings with others and is thus inter-subjective and interpersonal. Finnis terms this element 'other-directedness'. Second, 'duty' relates to what is owed or due to another and confined to specific types of relationships and dealings: those that are necessary or appropriate for the avoiding of a wrong. The third element of justice is termed 'equality' and pertains analogically to proportionality. Based on these three conceptual elements, Finnis draws out a theory of justice. He uses the theory of justice to argue for the pursuit of common good. On this, he writes:

> 'The requirements of justice, then, are the concrete implications of the basic requirement of practical reasonableness that one is to favour and foster the

[256] Ibid, 102.
[257] Ibid, 100.
[258] Finnis, *Natural Law and Natural Rights*, 161.

common good of one's communities. That principle is closely related both to the basic value of friendship and to the principle of practical reasonableness which excludes arbitrary self-preference in the pursuit of good...Justice, as a quality of character, is in its general sense always a practical willingness to favour and foster the common good of one's communities, and the theory of justice is, in all its parts, the theory of what in outline is required for that common good.'[259]

In this theory, Finnis, after the Thomistic tradition, divides the nature of justice into two branches which he terms as 'general' and 'particular'. General justice is viewed as an extension of Aristotle's 'legal justice' as it not only encompasses the fundamental notion of comprehensive virtue (or 'full practical reasonableness' in Finnis' words) in relation to other persons, but also the modern technical notions of the common good as well as the distinct and enumerable requirements of practical reasonableness.[260] He subdivides particular justice into 'distributive' and 'commutative'.[261] He holds that his classification is exhaustive and can accommodate all problems of justice.[262]

The notion of distributive justice is in reference to common resource and property, especially with regards to their management and distribution for the wellbeing of all members of the community, i.e. the common good. The theory of distributive justice, according to Finnis, outlines the range of reasonable responses to these problems.[263] To

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[259] Ibid, 164-165.
[260] Ibid,165.
[261] Ibid, 163-184.
[262] Though so, he admits to other classifications and sub-classifications. Nonetheless, he claims his to be 'academic in inspiration and philosophical in origin'; ibid, 166.
[263] Ibid, 165-177.

begin, he considers the situation where there are subject-matters that are essentially common but that need, for the sake of the common good, to be appropriated to individuals. Subject-matters are common in distributive justice if it is part of no individual person and has not been created by anybody, but is apt for use for the benefit of everyone or if it arises out of the willingness of individuals to collaborate to improve their position. Finnis draws a clear distinction between the subject-matter in each of these cases, calling that in the former 'natural resources' and that in the latter 'common stock'.[264]

Common stock arises out of collaboration which in itself involves deciding what is to be done, how this will be carried out, the responsibility of contributing the necessary resources, and the allocation of these resources. Nonetheless, the roles, responsibilities, offices and burdens (the 'communal enterprise'), in addition to the results (the 'common stock') are intrinsically common. Distributive justice considers the allocation of both the communal enterprise as well as the enjoyment of the common stock as both are intrinsically common and belong to the community from which it arises and must therefore benefit that community.

Whereas distributive justice is in reference to situations where one gives and puts into practice reasonable solutions to a problem, the notion of commutative justice is in reference to a response in which neither the requirements or incidence of communal enterprise nor distribution (whether by public or private owners) of a common stock are

[264] Ibid, 167.

directly at stake, but which nonetheless pertains to fairness.[265] Finnis builds this part of his justice theory broadly on those of Aristotle and Aquinas. However, of the former, he devalues the emphasis on correction and the remedying of the inequality which results when one party injures or appropriates from another, or when only one of the two parties fulfils their side of the bargain. From Aquinas, he adopts the more extensive theme of *commutatio.*[266]

Though he subdivides particular justice into distributive and commutative justice, Finnis holds that the distinction between these are no more than an analytical convenience or an aid to orderly consideration of problems. This is so since many actions are both distributively and commutatively just (or unjust) at the same time.[267] Nonetheless, as Finnis points out, distributive justice seeks to compensate all who suffer injury in the course of common life but commutative justice seeks to compensate only those who were injured by the act of one who failed to live up to his duties of care and respect for the well-being of others.[268] It is imperative to note that in both of these situations, justice exists within a contextual situation, that of common life within a community. In the words of Catholic ethical thought, as exemplified by the theology of Thomas Aquinas, justice is the most important moral virtue as it directs one's actions towards the good of fellow human beings.[269] In other words, justice is action for the common good.

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[265] Ibid, 177-178.
[266] Or 'change'
[267] Ibid, 179. For example, in the act of a judge giving a judgment, the subject-matter of his judgment may be a matter of distributive justice, or again the subject-matter for adjudication may be a matter of communitative justice, however, the act of adjudication itself is always matter for distributive justice.
[268] Ibid, 181.
[269] David Hollenbach, S.J., *The Common Good and Christian Ethics* (Cambridge: Cambridge University Press, 2002), 193.

Gene Patents Do Not Serve The Common Good

Private property, as we saw in chapter three, is justified if it serves the common good. This principle is also true for intellectual property, including gene patents. It is the aim of this section to examine critically if gene patents do indeed serve the common good; I shall do this by addressing various outcomes, theoretical and actual, of gene patents. I argue that gene patents lead to inequality; give rewards where reward is not due; impedes progress in medical science; burdens public healthcare resources. Though at first sight these may seem unrelated issue, as a whole, they will be seen to point to one clear effect: that gene patents do not serve justice and therefore do not promote the common good.

Gene Patents Lead to Injustice

Gene patents lead to injustice by conferring advantage that facilitates unfair competition. In 1991 and again in 1993, NIH, the largely public-funded research body in the US, applied for patents from the USPTO for the total of about five thousand short DNA segments (each called an 'expressed sequence tag' or 'EST' for short) that it sequenced in order to protect them for development that would be difficult if they were committed to the public domain.[270] They did so without knowing the functions of the genes of which the short DNA stretches were part. J. Craig Venter, then still of NIH, mentioned in passing at a congressional briefing on the HGP in summer 1991 that the NIH planned to file patents for a thousand such sequences a month.[271] The objective of owning patents on the sequences was "for the purpose of preserving NIH's options", as voiced by Lisa

[270] Jack Wilson, 'Patenting Organism: Intellectual Property Law meets Biology' in David Magnus, Arthur Caplan and Glenn McGee (eds.), *Who Owns Life?* (Amherst: Prometheus Books, 2002).
[271] Quoted in Ari Berkowitz and Daniel J. Kevles 'Patenting Human Genes: The Advent of Ethics in the Political Economy of Patent Law' in David Magnus, Arthur Caplan and Glenn McGee (eds.) *Who Owns Life?* (Amherst: Prometheus Books, 2002), 80.

Raines, vice president of the Industrial Biotechnology Association (IBA), which represented a hundred and twenty five larger companies, including eighty percent of US investment in biotechnology.[272] IBA together with the Association of Biotechnology Companies (ABC), which represented two hundred and eighty smaller companies and institutions, supported NIH's move to patent, presumably because it would have implications for their own attempts to patent similar material in the future.[273] As common practice, if these patents had been granted in the US, the next step would probably have been the attempt at filing similar patents with the EPO.

In 1992, a retaliative move against the NIH attempt to patent ESTs was announced by the then British minister of science, Alan Howarth, that the largely public-funded British research body, the Medical Research Council (MRC) would also seek patents on DNA sequences.[274] He is quoted as saying, "a decision by the UK MRC not to seek patents when researchers funded by public bodies in other countries in other countries have or may do so could place the UK at a relative disadvantage."[275] The stance that the MRC took was that though it opposed patenting of DNA sequences of unknown functions, it had to do so in order not to be at a disadvantage and also to gain a "seat at any table where the issue is discussed".[276] In other words, it was done so as to safeguard national interest in the international marketplace.

[272] Ibid.
[273] Ibid.
[274] Ibid., 81.
[275] Alan Howarth 'Patenting Complementary DNA' in *Science* 256:11.
[276] Berkowitz and Kevles, 'Patenting Human Genes: The Advent of Ethics in the Political Economy of Patent Law', 81.

The patents were, without doubt, tools of economic importance. For example, under the terms of the US Federal Technology Transfer Act of 1986, Venter and the co-filer of the NIH patents would personally be entitled to at least fifteen per cent of any royalties accrued from licensing of the patents, with the majority of such royalty income designated for funding of research in Venter's laboratory.[277] This is not in itself contentious because one of the objectives of patent law is to reward inventiveness, if there was indeed an invention. One could only hazard a guess that the decision of UK MRC did factor in an economic consideration and was not just to have a voice as was claimed. In a sense, if only companies and research institutions in the US patented DNA and those in the UK did not, then biotechnology in Britain would be at a disadvantage, not least because of the lack of a source of licensing fees for DNA sequence information use. This may translate to potential national economic implications. This, I think may have been instrumental in spurring the UK to join in the DNA patent 'arms race' at that point.

Fortunately, a full blown race of that nature was averted. In July 1992, Venter left the NIH to set up an independent research laboratory and also the director of NIH, Bernardine Healy, was succeeded in 1994 by Harold Varmus who effected a change of policy and withdrew all of NIH's patent applications for the ESTs.[278] The UK MRC soon followed suit and withdrew its own EST patent applications.[279] This episode, viewed as a whole, illustrates an important principle as described in a particular game theory of

[277] Ibid, 82.
[278] Ibid., 82-87.
[279] Christopher Anderson, 'NIH Drops Bid for Gene Patents' in *Science* 263 (2000), 909-910.

human behavioural studies.[280] In terms of patents, the total lack of any particular advantage for all the players concerned is not likely to be the cause of disadvantage for any one player in particular, whereas allowing an advantage to one player opens the floodgate to all the players seeking that advantage. In the end, since each of players is not disadvantaged by the other because they themselves possess the same advantage also, the players are really all back on a level playing field.

So, though claiming to be against patenting ESTs of unknown function, the UK's MRC filed for EST patents because the US NIH had done so to ensure that they would not be at a disadvantage in economic and scientific terms, but withdrew the applications when the other did as it perceived that the latter did not hold an advantage over it anymore. This may be reflective of what is happening between the companies in the biotechnology industry: that each company is filing as many gene patents as they can justify so as not be at a self-perceived disadvantage compared to other companies. Unfortunately, what may happen is that a gene may become the subject of multiple patents held by different companies with each holding the patent to a particular short stretch of the sequence. Each patent holder then has the power to block the others from working on the full protein-coding sequence. Instead of each having an advantage over the others, it can emerge that each is also disadvantaged because of the others. As a simplest possible outcome, research on the full gene sequence is hindered and the innovations promised by the

[280] One example described in game theory is where the audience at a performance or spectator sport event are seated in rows one behind another. If those seated in the front row decide to stand up in the mistaken idea that it would give them a better view, this causes the people seated in the next row behind to do the same as their view would be obstructed by the people in the first row standing up, and likewise for the next row behind. Eventually, people in every one of the rows would be standing as their view would be obstructed by those standing up in front of them. As a result, everyone would be subjected to the discomfort of standing but gaining nothing in terms of a better view than when everyone was seated.

industry undelivered. This is injustice since the potentially unfair actions of one party could hinder the subsequent actions of another.[281]

Second, gene patents can also lead to unfair competition because of a pre-existing global economic situation. Molecular biology techniques, which are required for DNA sequencing, are expensive because of the specialised equipment, costly chemicals and skilled personnel. A survey of global research productivity in the biological and medical sciences, as demonstrated by publication in scientific journals undoubtedly show that the US and Canada ranks the highest, followed by Western Europe.[282] The absolute and relative research output of developing regions of the world is very low. This means that inevitably, should gene patents become commonplace, these are likely to be held by the rich developed countries which have the resources to fund molecular biology research programmes and have had a head start of several decades in doing so. Such a situation can only lead to further disparity in wealth between the developed and developing countries. Furthermore, as quite a few diseases being investigated in molecular medicine are most predominant in the developing countries, it means that the therapies developed are targeted to those markets.[283] DNA patents, and the licensing of these for research and the development of therapies, are likely to drive up the cost of medicines and related healthcare products with the result that these become out of reach of the very people for which they were developed. Alternatively, such healthcare products may never be

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[281] This point also impedes science.

[282] Such a survey was done by entering 'Global research productivity' as search words in Pubmed, the search engine managed by the National Centre for Biotechnology Information and the National Library of Medicine, USA. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?DB=pubmed (29 May 2005).

[283] Examples of these diseases include HIV, malaria, dengue haemorraegic fever, etc.

developed because of the inability of the people who most need it to pay the high cost not least inflated by licensing fees.[284]

Gene Patents Rewards where Reward is Not Due

Passing mention has already been made of the BRCA family of related proteins.[285] Mutations within these genes increase the breast cancer susceptibility risk of people carrying them and are the subjects of gene patents by an American biotech spin-off company that was originally an academic laboratory in the University of Utah. BRCA genes produce tumour suppressor molecules which function to repair damaged DNA and thereby prevent the development of cancerous tumours. Therefore, these are not cancer-causing genes. However, if gene mutations occur at specific loci along the DNA sequence, a functional protein product may not be produced by the person and breast cancer tumours may develop. These gene mutations range in their hundreds and are inheritable from parents to children. BRCA-related breast cancer accounts for between five to ten per cent of all breast cancer.[286] It is estimated that twenty percent of women who carry BRCA-1 mutations will develop breast cancer by age forty, fifty-one percent by age fifty, and eighty-seven percent by age sixty.[287] In addition, women who carry mutations in BRCA-1 also have a greater risk of eventually developing ovarian cancer.

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[284] For example, of the thirteen clades of HIV, the pharmaceutical industry is focusing on developing a vaccine for the clade B, the clade predominant in North America and Western Europe presumably due to the perceived economic returns should a vaccine's efficacy be shown. On the other hand, HIV vaccines for other parts of the world, usually the poorer developing countries, such as clade A for sub-Saharan Africa, clade C for India, clade E for South East Asia, are largely funded by medical charities or as part of government aid initiatives.

[285] The BRCA genes and proteins are discussed here and in the next section as they are the most relevant points to support the arguments made in each respective section since these genes and proteins represent the most well-known cases of human gene patents with respect to each argument. The BRCA genes and proteins have been the subject of litigation in various countries.

[286] Imaginis Corporation, http://imaginis.com/breasthealth/genetic_risks.asp (14 May 2005).

[287] Ibid.

But because of the strong familial link discovered, testing of inherited gene mutations within high risk groups of families and specific ethnic populations with a high incidence of BRCA-related breast cancers may expand treatment options.[288]

Unfortunately, due to patents held on the gene mutations, a licensing fee in the region of approximately two thousand US dollars must be paid to Myriad Genetics, the US company which owns the patents should a diagnostic test for the gene mutations be carried out. In the US, where private health insurance is more common compared to here in the UK, the cost of testing may be covered by the insurance company. But even there, not everyone has the means to afford private health care and lose out in genetic testing if they lack the means to pay. More detrimentally, this may lead to a reduction in treatment options such as preventive medicine simply because one is unaware of the risks. The licensing fee to be paid is not for the cost of any diagnostic kits or any special reagents to be used in the tests. It is payable to Myriad on the basis of testing for mutations in BRCA genes for which the company holds the product patents. In this case, the effect of gene patents rewarding where reward is not due has the double effect of placing an additional burden on healthcare resources.

Gene Patents Impede Progress in Medical Science

Gene patents impede progress in medical science partly by restricting the exchange of scientific knowledge. The owners of gene patents tend to be private biotechnology companies rather than public- or charity- funded laboratories in academia. The private

[288] Two specific mutations in BRCA-1 and one in BRCA-2 has been found to be especially high in the population descended from Eastern and central European Askenazi Jewish Ancestry.

companies mentioned may be carrying out research on sequences of the genes the patent of which they own. In this case, the company generally will prohibit others from researching on the same sequences especially if these are rival companies for which the potential of developing an economically-valuable product based on the gene sequence may affect the economic success of the company who owns the gene patent. Such a situation impedes rapid development of products that has the potential to benefit humankind. In science, there are often numerous ways to achieve an end, each of which has its own advantages and disadvantages. Often companies and laboratories do not have the resources to work on all of these approaches at the same time and have to choose.

That gene patents are useful to companies that hold them as ownership of patents enabling them to eliminate competition. An example of this situation is the case of the Curie Institute of France with regards to gene mutation detection. The institute carries out public-funded cancer research involving the BRCA genes. Research carried out by the institute and published by its scientists in 2001 argued that the industrial method for direct gene sequencing, as proposed by the owners of the gene patents holder of the genes concerned, did not allow for the detection of the all the mutations within BRCA-1 gene. But because the BRCA-1 patents were drafted in such a way that the claims were very broad, all diagnostic methods were covered under it as long as it involved the detection of the mutations and gene sequences in any form. This effectively conferred unrestricted cover over all methods based on comparing a high risk individual's sequence to a known normal sequence. Thus, though the patent holder may not actually have developed any protocols for mutation diagnosis, they held the right to prevent others, such as the Curie Institute from doing do.[289]

But as the research by the Curie Institute was public knowledge, the patent holder would quite naturally be able to exploit this for its own benefit because in theory the patent conferred control of the application of the work by others simply because it concerned the BRCA-1 gene sequence. This case only refers to diagnostic methods for the detection of mutations of one gene. There is at present time no way to correct the mutations.[290] If, for example, such a gene therapy protocol of proven efficacy was developed by the clinician-scientists at the Curie Institute or elsewhere, technically speaking the patent owner would have a right to a licensing fee each time the procedure was carried out even though they probably played absolutely no part in the development of it. But it is highly unlikely that such a therapy will be developed because patents on the gene mutations are putting off clinician-scientists working towards such a goal. It may be that a protocol is indeed developed based on the gene mutations of other genetic diseases and the principle transferred between treatments of various diseases with the same type of origin. But this is unlikely as inevitably gene mutations of economic potential (and even those with yet unknown importance) will be subject to gene patents.

The second example of a human gene patent having the effect of impeding progress in medical science is seen in the case of CCR5. In this case, it relates to the scope of

[289] Institut Curie, http://www.curie.fr/upload/presse/myriadopposition6sept01_gb.pdf (14 May 2005)
[290] Women who are found to carry the gene mutation and have a family history of BRCA-related breast cancer can at best opt for a mastectomy as a preventive measure against developing the same cancer themselves.

application claimed. The difference between inventions that the patent laws were formulated for and gene patents for which existing patent laws were adapted for is that for the former, patents had to cite an industrial application for which the object of the patent was useful for, whereas in gene patents, an industrial application or scope of claim can be cited which is much broader. For example, in February 2000, Human Genome Science Inc. (HGS) filed and was granted the patent in the US for the gene sequence encoding a protein called CCR5, the application of which they cited as a 'cell surface receptor' for use in the development of anti-inflammatory therapies. Subsequently, other scientists showed that CCR5 served as the viral receptor for HIV, that is, it was the co-receptor protein that is involved in HIV infection of a cell. In other words, individuals with defective CCR5 proteins on the surface of their cells, especially a type of cell called CD4+ T-cells which the HIV virus has a high affinity for, would be to some extent resistant to HIV infection. More importantly CCR5 could be a potential target for anti-HIV vaccines. HGS thus, on the basis of other's discovery of utility, but by virtue of being the owners of a gene patent whose utility claim was very broad, came to be in the position to exploit the gene sequences for economic gain. Economic gain is not wrong in itself but must not be at the expense of justice and equality, that is, must not oppose that which fulfils the common good; nor should it be at the expense of progress in science.

Gene patents are arguably good for industry but it is not so for the common good because the speed of development of products, especially diagnostic kits for improved healthcare, will be impeded. It has long been an argument cited by supporters of gene patents that there are two economically-important features of patents: first that they stimulate invention and second that they promote the disclosure of inventions. While these features may be so for mechanical inventions, they are not necessarily true for gene patents. The existence of a single product, which is developed based on a gene sequence, in the market, limits consumer choice. This has the effect of a single company having the power to control market prices since there is no competing product. Also, as mentioned earlier, each science-based protocol has limitations. Therefore, the existence of a single product limits patient (or consumer) choice which is an important factor if efficacy is not absolute or detrimental side effects may occur in certain individuals.

No doubt, commercial companies and their shareholders will want to recover the investment cost that they have put in. This is fair in a capitalist economy. In such a situation, patents have a value because if there are no potential economic returns, there would be no incentives for investors to put their money at stake. This is especially true for high risk companies such as those from the pharmaceutical industry where the number of products under development that actually reach the market place is small and where cost is high due to specialised material and expensive labour. However, the question is on the subject matter whether patents should be allowed.

Beside the two cases of human gene patents highlighted above and the example of medical diagnostic kits, a fourth area of research in the medical sciences which may involve human gene patents is that of DNA-based therapies tailored for individual patients. Judging from the state of development of molecular medicine and the direction that this seems to be heading, it may be that medical treatment of the future will move towards specialised individual treatments based on individual genetic profile of patients. This is so because though all humans have the same genome, each individual has specific alleles.[291] It is a fact that in order for a drug to be marketed as cure for a disease, it must have been effective in a certain percentage of the controlled clinical trial subjects. This figure is almost without exception never a hundred percent. It has been postulated that taking into consideration allelic differences may hold the key to more effective treatments. As a result, the field of pharmacogenetics is a rapid developing branch of biopharmaceutical science based on genetics where therapies are nucleic acid-based and individual medication is tailored to the genotype of the patient. This is of course not yet a reality at the moment but there is research currently taking place in both academia and commercial companies which aims to make this a reality. In such a situation, the elucidation of individual genomic sequence will be as common place as blood-typing since sequence information is the key to efficacious treatments. Furthermore, it is likely that the 'drugs' may logically contain some form of sequence information. Indeed DNA-based therapies are already not a fantasy.[292] In the future when the state of technology enables the utilization of genetic information and if gene patents are continued to be allowed in law, we may reach a situation in the future to find that a company already holds the sequence via a gene patent and using it will incur a hefty licensing fee payable

[291] An allele is a form of a gene that codes for a variation of a phenotype. For example, different alleles are responsible for different eye colour. Nonetheless, the final form which the progeny possesses is as a result of the dependent on the alleles inherited from each of the parents.
[292] Though there is currently no routinely-used gene therapy, there had been trials in the past. These have not proved to be without side effects and complications. Nonetheless, scientists are continuing research in the field.

to the patent holder. This is not a rootless prediction as in some ways it is already a reality.[293] This impedes science as it sets up obstacles to research for better treatments.

One further concrete example of how gene patents can impede progress in medical science partly by restricting the exchange of scientific knowledge is illustrated in the field of clinical immunology. While in the past vaccines were in fact attenuated or killed strains of the pathogens, modern vaccinology is starting to develop vaccines that are DNA-based.[294] In this scientific field, the scientists who sequence the genes and file the patents tend to be microbiologists who have interest in specific pathogens and also molecular biologists that have the expertise to sequence genes as well as the technical knowledge to develop better and faster ways to do it. On the other hand, the scientists involved in drug and vaccine development tend to be the pharmacologists who have specialised knowledge of the mechanism of drug action and the immunologists who have specialised knowledge of how the immune system functions and thus how to stimulate it to fight infections. Perhaps this is what has very significantly contributed to the problem at hand: because scientific knowledge is so specialized, it is rare that only one group of scientists from a single academic institution or company follows through the entire process from gene isolation to sequence elucidation to mutation mapping to drug development to eventual clinical testing. The existence of gene patents held by any one group in the chain puts constrains on the whole chain.

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[293] The examples cited in this section concern patents pertaining to human DNA sequences and gene mutations therein, such as CCR5 and BRCA-1 & -2. Although it is the patents of human genes which is the focus of this dissertation, it is worth being aware that there are other examples of DNA sequences which are not of human genome origin that are subjected to patents and which have implications for the common good of the human race. These patents include those for Malaria merozoite surface protein (MSP-1) protein and also genes of the human immunodeficiency virus.

[294] A clade A HIV vaccine of this type was developed by a Medical Research Council team is currently in clinical trials in Oxford, London and Nairoibi, Kenya. Others in various stages of clinical trials in the UK include candidate vaccines for tuberculosis and malaria.

Gene Patents Burden Healthcare Resources

Gene patents burden both public and private healthcare resources. In the UK, the majority of healthcare is taxpayer-funded via the National Health Service. In such a system, financial considerations are all the more important because of the potentially unlimited needs but limited means. This effectively means that if the NHS were to provide BRCA mutation screening, a licensing fee would need to be paid to the patent holder, thereby reducing the budget that is available for other needs within the NHS. Because of this, BRCA mutation screening is not available on the NHS even for the high risk groups mentioned. Of course, such screening is available if one has the financial means to pay. This restricts access of the poor to genetic medicine. The European Patent Office, as supported by Belgium, Netherlands and France, recently revoked one of three patents that Myriad Genetics had filed on BRCA-1 rendering them legally non-binding in European Union countries.[295] It is anticipated that in view of this, BRCA mutation screening will be offered to those who need it regardless of their ability to pay.

In view of the last two points cited above to argue that gene patents do not serve the common good, i.e., that gene patents impede progress in medical science partly by restricting the exchange of scientific knowledge; and that gene patents burden both public and private healthcare resources, one further argument can be made. These two points in essence argue that gene patents hinder the unconditional usage of knowledge that derives out of the human genome for the end of health. Since health, as pointed out in the beginning of this chapter, is an objective of the common good because it is a pre-requisite

[295] http://bionews.org.uk/new.lasso?storyid=2426 (14 May 2005).

for human flourishing, it logically follows that gene patents do not serve the common good.

Gene Patents Do Not Serve The Common Good: Conclusion

The overall aim of the patent system is arguably twofold, i.e., to benefit both 'inventor' and the general public: to reward inventors in exchange for their full disclosure of the invention. To a lesser extent, patents are also supposed to spur on research for the benefit of humankind. Despite these seemingly commendable aims, I have argued in this section that gene patents do not serve the common good. Patent laws were formulated primarily for mechanical inventions. To apply these to human gene sequences is to fit the proverbial round peg into a square hole as they are of inherently different nature.[296]

Human gene patents, as can be seen clearly from the examples of the BRCA and CCR5 genes do not serve the public interest. In fact, they have the potential to lead to injustice as commonly manifested in disparity in distribution of a common resource that is subjected to private property claims. The disparity occurs because of the existence of an economic situation where the ability to pay is the determining factor of access to an increasing necessary and vital commodity in healthcare. In practical terms, it would means that it is the poor in our society with limited financial resources that are at a disadvantage. Even if there is a public-funded healthcare system, limited resources means that not all treatment options will be available on it. Furthermore, gene patents do not serve the common good because they have the potential to limit consumer choice because the patent owners have the prerogative of not licensing the gene sequences even if they do not carry out research on the sequences themselves.

[296] The value of the genome can be said to be largely in its information.

Ethical reflection from a Christian perspective is pivoted in principles that find roots in the person of Jesus Christ, in the Christian scripture and in Christian tradition. In all these, the concepts of justice and common good are definitely not alien ones but recurring themes. Therefore, because patenting of human genes does not contribute to common good and justice, a Christian theological response is to reject it.

The Nature of the Body and How This Relates to Gene Patents

In the second section of this chapter, I shall consider whether a science-informed theological anthropology can in any way contribute to the understanding of Christian personhood. I intend to argue that human DNA is symbolic of the human person and because of its nature, has the value of contributing to the understanding of the human person.

Human DNA, Human Body and Human Identity

I posited in chapter four that human DNA contributes to human identity because it is instrumental in endowing humankind with a physical human body as opposed to the body of any other creature. This is different from saying that human DNA is what makes us human; it does not. What it does, however, is endow humans with a unique and characteristic physical body.[297] And as our physical bodies, by virtue of these human characteristics, to a large extent contribute to our self-understanding as to what it means to be human, then human DNA, which is responsible for these characteristics of the human body, must have a role in that process of self-understanding. In other words,

[297] These unique characteristics include both morphological features as well as some cognitive abilities.

human DNA is somehow linked with human self-awareness. It does not make us human but because it gives rise to our physical form it contributes to our self-understanding that we *are* human or put in another way it contributes to a large extent to human identity.

Gene Patents and the Bi-elemental Non-duality of Human DNA

In chapter four, when exploring whether science can inform theological anthropology, I also posited that the dual nature (material and non-material) of human DNA (biochemical and informational) is a reflection of the dual nature of the human person (body and soul). Because each element cannot be separated from the other without the total change of the nature of the whole, I termed this as 'bi-elemental non-duality'. In a manner of speaking, human DNA holds a mirror to the human person. There are two reasons for this: first, that both, DNA and the human person, are bi-elemental; and second, that both, human DNA and the human person, are each a single entity and therefore 'non-dual'. Because of this human DNA can be said rightly to be a symbol of the human person, i.e., human DNA is an analogy of the human person.[298]

I shall address, via the issue of symbols and symbolism, the value, if any, such an analogy has. In particular, I shall attempt to argue that the Christian understanding of the human person is facilitated when viewed through the lens of human DNA for certain groups of people. Beside scientists, artists and sociologists also share a fascination for

[298] The use of analogies in Theology and in Science is a subject area addressed by Alister McGrath in his writings on Science and Religion, e.g. Alister McGrath, *The Foundations of Dialogues in Science and Religion* (Oxford: Blackwell Publishers, 1998) and Alister McGrath, *Science and Religion: An Introduction* (Oxford: Blackwell Publishers, 1998). In both Theology and Science, the formulation and validation of models, analogies and metaphors find value in their serving visualization and understanding of intrinsic nature of the subject that it seeks to describe.

DNA and have been known to refer to it as an 'icon': of design by the former and of culture by the latter.[299] They mean that the double helical structure of DNA is now easily recognised in daily life as not just a symbol of modern science but also of modern living. In a way they are right: human DNA is a symbol; and symbols are important in almost all fields of human knowledge, especially in science and religion.

In religion, symbols are used as means of representing something that is often beyond the finitude of human comprehension but which one still has need to accommodate or attempt to do so within one's limited understanding. The symbol may be material culture, as in a particular pictorial representation or a type of object, e.g. a cross or a crucifix; or a symbolic act, as in a ceremony or a ritual, e.g. the Eucharist or the Mass. F.W. Dillistone writes that in the religious life of mankind, symbolic forms and activities serve four purposes: to awaken reverence; to express continuity; to establish fellowship; to mediate grace.[300] Principally, he had the sacraments in mind when he wrote this. Sacraments are a special type of symbol in that they are 'outward signs of inward grace'.

Human DNA too can be considered a symbol. At the most basic level, it is a symbol of biology, the study of living systems, because this branch of the natural sciences deals with life and the perpetuation of it. One only has to be reminded of the phrase used quite commonly by zoologists to describe the purpose of sex in the animal kingdom, 'to pass

[299] See http://www.wellcome.ac.uk/en/genome/geneticsandsociety/hg004.html & http://www.wellcome.ac.uk/en/genome/geneticsandsociety/hg16f011.html (01 June 2005). Also, see Dorothy Nelkin and M. Susan Lindee, *The DNA Mystique: The Gene as a Cultural Icon* (New York: W.H. Freeman, 1995), which analyses how genetic images gained such a striking and ubiquitous presence in popular culture: in political discourses social debates, institutional decisions.
[300] F.W. Dillistone *Christianity and Symbolism* (London: Collins, 1955), 11-38.

on their genes', to grasp the truth that what is physically passed on from one generation to the next is DNA: the egg and the sperm are the vehicles that this process of 'passing on' of genetic material employ and sex the process for this final end. Indeed, the fusion of the germ cells nuclei, which houses the DNA, to allow for genetic recombination of the DNA therein, is one of the first intracellular events that occurs post-fertilization or conception. Only after that does the first cell division of embryogenesis take place to eventually give rise to a fully developed body. Before a human person can begin to develop, the human DNA that is responsible for the physical body of that person must first be formed by recombination of the parental DNA. Thus, in my opinion, human DNA can be interpreted not just as a symbol of life but also a symbol of the *continuity* of human life.

By extrapolation, it becomes a symbol of the faithfulness of God because it is through him that all things come into being and only in him that we live, move, and have our being. It is a symbol of the image of God in Jesus Christ the son who was incarnated in human bodily form. It is also a symbol of the omnipresence of God the Holy Spirit, especially of his presence in us. But most of all, DNA is a symbol of the creation of life and of human biological existence as well as the intrinsic role God played in this right from the beginning (Gen. 1: 26- 27; Gen. 2:7; Psalm 139:14-16).

A second possible framework to reflect on the nature of DNA is an altogether more christocentric one though its scriptural basis and framework is identical to the Trinitarian model outlined above, that is, based on the concept of *imago dei*. The argument would begin like this: human genes give rise to the human body. The incarnation of Christ was the event when the Word of God was made flesh, i.e., God took on the human body and all its inherent human characteristics such as hunger and fatigue. His was a full human experience involving being born as a baby and growing into a man through the medium of the human body. In that body, God and humanity meet[301] because Jesus was fully God and fully man. Referring to Christ as the 'sacramental word' David Brown and Ann Loades write, with regards to the gospel of John, that the first chapter can be seen as laying the foundation for all Christian sacramentalism in the idea of the incarnation as sacrament.[302] Further to this, John Inge points out that the recognition that Christians are called to see Christ in one another has led to the yet further extension of the notion of sacrament to individual human beings.[303] He supports this by citing von Balthasar who could write of 'the brother as sacrament'.[304] This approach establishes sacramentality as a concept that can be applied to the material world and not solely to sacramental acts.[305] By the common understanding that a sacrament is an 'outward and visible sign' is then to admit to the human body as being the place of the confluence of deity and humanity.[306]

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[301] C.K. Barrett, *The Gospel According to John* (London: SPCK, 1955), p. 167. Based on this and two other reasons, Reed makes three arguments or propositions and then moves to conclude that "The human body is an inappropriate place of trade because it dishonours what is rightly God's and abuses that which, in Christ, is properly dedicated to prayer" to form the framework of her argument against gene patenting See Esther D. Reed, 'Thinking Liturgically' in Celia Deane-Drummond (ed.), *Brave New World? Theology, Ethics and the Human Genome* (London: T&T Clark International, 2003), 283-284.
[302] David Brown and Ann Loades *Christ: The Sacramental Word* (London: SPCK, 1996), 75. This is so despite the term 'biblical sacraments' not being used in the NT.
[303] John Inge, *A Christian Theology of Place* (Aldershot, Hampshire: Ashgate Publishing, 2003), 61.
[304] H. U. von Balthasar, *Science, Religion and Christianity* (London: Burns and Oates, 1958), 142-55; see ibid.
[305] Inge, *A Christian Theology of Place,* 89.
[306] With regards to what is discussed in this section, I recognise that, on the grounds of Protestant doctrine, that Jesus on instituted two sacraments, the notion of 'the sacramental principle' may not be accepted by all Christians, let alone non-Christians. But despite this, the argument of the bi-elememtal non-duality nature of DNA and the person still stands.

In medieval times up to the present, places where the supernatural and humanity meet can come to be considered as holy places and can become places of pilgrimages.[307] So, if God meets humankind in a human body, perhaps we can consider that the human body has elements of the sacred about it because a 'sacramental encounter' occurs.[308] This again is not the same as saying that the human body is sacred even though it bears elements of that sacredness. On this basis, human genes too have elements of sacredness because of what it symbolizes, i.e., that which is responsible for the physicality of the meeting place of God and humankind, though DNA is not in itself sacred. To stretch the analogy of the human body as place may be a bridge too far but as a loose way of speaking, the physicality of the human body is the dwelling place of God by his Spirit. Such a doctrine is not in conflict with most Christian theology but it still remains to ascertain whether human DNA should be the subject of patents on the basis of this argument. I address this question in the next section by drawing upon concepts discussed earlier in this dissertation.

Regarding the framework of how the human body as the dwelling place of God by his spirit, should be perceived with regards to its sacredness, the land motif of the OT may serve as a model for reflection. Land, as discussed in chapter three, in the OT was a peculiar form of property. It was not in itself sacred but because of what it signified in the history and tradition of the Israelites, certain restrictions were put upon it with regards to

[307] E.g., in modern times, Lourdes in France and Fatima in Portugal have become precisely these sort of places because of the apparition of the Virgin Mary to humans at those places.
[308] Inge speaks of 'sacramental encounter' as the personal experience of an individual with God, e.g. Moses and the burning bush etc. See Inge, *A Christian Theology of Place,* 67-77.

it keeping and disposal.[309] It is the same with human DNA. Coming back to DNA and what it symbolises, it is clear that such an argument cannot hold for the genomes of other organisms even if humans and the higher primates share an extremely high degree of DNA sequence homology since the framework used is that of *imago dei* which only humans bear. It is out of the scope of this dissertation to address the patenting of non-human DNA as stated in chapter one. A different framework may be required for considering the patenting of non-human DNA but that is beyond the scope of this present work.

Where human DNA is concerned, though it is not necessarily sacred *per se,* it is a reflection of God's sacredness in addition to his faithfulness, his image, his omnipresence, when considered from a Trinitarian approach and that which gives rise to the meeting place of God and mankind, from a Christocentric approach. It is my opinion that because of these symbolisms and implications to Christians and our theology that human DNA needs to be accorded special status which includes prohibitions against patenting.

In this section, I have two main points. First, that human DNA is a symbol of the human person because of the bi-elemental non-dual nature of both. And second, that human DNA makes possible a human body which has a sacramental nature. Together, these two points find significance in their being a metonymy.[310] The argument goes as follows: human DNA gives rise to the human physical body; this physical body is the place where

[309] See chapter three of this dissertation.
[310] A trope where one entity, usually of a less complex nature, is used in place of, or to describe another which has a more complex intrinsic nature.

sacramental encounter between God and humanity occurs, first in Christ but now in all Christians because of the indwelling of the Holy Spirit; in such an encounter, a second level of bi-elemental non-duality is present: the physical human body is indwelt by a immaterial being which is the spirit of God. In all, human DNA can stand as a symbol of God's faithfulness because such faithfulness though immaterial is manifested in actions towards humankind.

Management of Human Genetic Material as a Common Heritage

In view of the two lines of arguments cited above that human DNA should not be the subject of patents, I move that existing patents on human genetic material should be rescinded. This is the most logical step of action in view of how the biotechnology industry has demonstrated that profit from patents, outranks the common good of society, as their prime concern.[311] To profit from the potential suffering of fellow human persons is morally questionable. An alternative and less radical move is to allow the patents that have already been issued to run its course but with no further legal provisions allowed. In my opinion, this is not ideal. Assuming that the human genes that are already subject to patent control, by virtue of their sequences having been patented, do indeed hold the key to genetic therapies for diseases and conditions, then patents only serve to impede the development of these potential therapies. Undoubtedly, the call in this dissertation to disallow patents on human genes besides meeting with much opposition, especially from the biotechnology industry, will also cause some practical problems. An effective way of

[311] This is not to say that profit from patents is definitely incompatible with the common good. After all, private property can still have the effect of serving the common good.

managing DNA as a common resource, such as the one suggested in the next section, must be implemented so as to safeguard it.

DNA as a Common Heritage and Resource of All People

In 1997, the Bioethics Subcommittee of the Law and Medicine Committee of the International Bar Association submitted a draft International Convention on the Human Genome to the United Nations. In it, they asserted that the human genome is part of the common heritage of humanity. Pilar Ossorio, who comes from both an academic science and legal backgrounds, theorizes that the common heritage concept usually recognises five general principles.[312] These, she lists as: (1) that the resource or territory in question cannot be appropriated by any one nation or private entity; (2) that all countries share in the system of management for the resource; (3) that benefits derived from exploration of the territory of its resource be actively shared among the nations; (4) that the area be used only for peaceful purposes; and (5) that all countries must share in preserving the unique or irreplaceable aspects of the resource for future generations. She argues in her critique that the designation of the human genome as common heritage of humanity does not necessarily rule out the patenting of human DNA.

In addition to the five non-theological principles stated above with regards to the concept of common heritage, there are also principles from a theological perspective. I propose that these are as follows: (1) that the resource in question must be recognised as a gift from God for all humankind just as the rest of the human body is; (2) that as God's

[312] Pilar Ossorio, 'Common Heritage Arguments Against Patenting Human DNA' in Audrey R. Chapman (ed.), *Perspectives in Genetic Patenting: Religion, Science, and Industry in Dialogue* (Washington D.C., American Association for the Advancement of Science: 1999), 92.

stewards of creation, we have a responsibility to manage the best for humankind as a whole; (3) that the resource be used only for purposes in line with biblical objectives; and (4) that all humankind must share in preserving the unique or irreplaceable aspects of the resource for future generations. The foundation of these principles is the recognition of God's role in the creation and history humankind. If we share a common heritage it is because that heritage originated from the same source. From a Christian viewpoint that source is God. The gospel according to St. John records "In the beginning was the Word, and the Word was with God, and the Word was God. The same was in the beginning with God. All things were made by him; and without him was not any thing made that was made. In Him was life; and the life was the light of men." (John 1:1-4) From this, it is evident that the source of human heritage is God, the *logos* that spoke all creation into existence. Since the foundation of our life's existence proceeded out the Word of God, then our human identity must surely be rooted in Christ as life was of him. Thus, a common heritage of humanity can not only be considered from a material perspective but also from a non-material angle, as was done in chapter four.

Regarding the holding in trust of a common human heritage, there is a biblical model that can be indirectly translated for application to the human genome. This again pertained to land ownership which was a dominant feature of the covenantal relationship between Yahweh and the nation of Israel in the OT. This has been discussed in chapter three but is reiterated here in conjunction with the notion of common human heritage of the human genome. The promised land of Canaan was divided among the tribes of Israel as an inheritance. This signified, on a material level, the covenantal relationship between

Yahweh and his people just as earlier in their history circumcision of males signified, on a physical level, that same relationship. For each tribe, possession and ownership of the land was a concrete representation of their share in the inheritance of Israel as a nation and not to have land was to lack a share in the covenantal blessing of Israel. This was so because land did not just represent material inheritance but was an ontological representation of the sanctity of the relationship between Yahweh and Israel. As such, the land inheritance and ownership was subjected to conditions set by Yahweh. First, it must not be sold permanently because it still belonged to Yahweh (Lev. 25:23); the land was given as an inheritance but Yahweh still claimed ultimate ownership but awards tenancy to Israel. Second, that each tribe must retain its own inheritance and not move the ownership rights from one tribe to another (Num. 36:9); this seems a curious condition indeed for such practice would still place the land ownership within the control of Israel, albeit within a another tribe. Such a shift of ownership rights of the land would not in effect put the land out of control of Israel. It was so to prevent the development of the view that the land-inheritance was a commodity that could be subjected to 'market economics' as interpreted in the cultural context of that time and place. The inheritance from Yahweh must not be visualised by Israel as a mere material inheritance. It symbolised much more than that.

There was apparently a distinction made between who had rights to which particular parcel of land suggesting that the identity of each tribe was intertwined with the land given them. Therefore, while the land was symbolic of covenantal blessing of the whole of Israel, particular inheritance was to be held as a common heritage of each tribe. Based on this argument, I posit that the identity of each tribe was reflected in its common heritage. I suggest that this same principle is applicable to our understanding of human DNA, that it is a common human heritage because it reflects our human identity, and as a Christian that means my 'humanness' before my creator. There are parallels between land and DNA as common human heritage, such as the material nature and the ontological status of both, but they are also very different on another level, that while land is external to the human body DNA is internal. This can be reconciled if we adopt the understanding that the concept of common heritage is but a symbolic form of speech or imagery used to express an infinite idea, that of the relationship between a finite creature and an infinite creator.

Christian Bioethics and Public Policy

In this chapter, I attempted to argue against patents for human genetic material, short DNA sequences or full length genes, for two reasons. First, that such patents do not serve justice and therefore do not promote the common good. Second, that in view of the science-informed theological anthropology I constructed in chapter four, human DNA has special ontological status with regards to the Christian understanding of the body and therefore has elements of sacredness that needs to be accorded different treatment from other artificially-synthesized or naturally-occurring chemicals in law.

Since patents are issues that concern civil law and thus public policy, a dissertation such as this would be incomplete without addressing how theological bioethics contribute to public policy, or at least has a voice in the discussion. Such a question was recognised as being an important one for the biotechnological age that we live in this period of the twenty-first century and was the theme of the annual meeting of the Society for the Study of Christian Ethics in Oxford in September 2004, which in the editorial of the issue of *Studies in Christian Ethics* in which the papers were subsequently published was cited as 'one of the largest to be held in recent years'.[313]

In a keynote paper, Baroness Mary Warnock, an eminent moral philosopher and Chair of the Enquiry into Human Fertilisation whose report in 1984 formed the basis of Britain's Human Fertilisation and Embryology Act of 1990, expressed the view that theology, and therefore by inference theological bioethics, or even religious principles shorn of theology, has no role in public policy-making even where the policy is concerned with matters that are agreed to be matters of morality.[314] This is despite such religious or theology-based belief being the foundation for private morality of many within society. She also holds the view that moral arguments with any connection to theological doctrine, while they may be listened to, should not carry much weight in that connection alone except in a theocratic state, of which we are not.[315] For Warnock, principles supplied by religion only have value in the secular arena if they are not 'exclusively' religious in their nature. This seems to me ironic since in western society many of our so-called 'secular principles' have their origins in western theological thought though they may have been reinterpreted through enlightenment thought.

[313] Susan Parsons, *Studies in Christian Ethics* 18, no. 1 (2005), 12.
[314] Mary Warnock, 'Public Policy in Bioethics and Inviolable Principles' in *Studies in Christian Ethics* 18, no. 1 (2005), 33-41.
[315] Ibid, 41.

Nonetheless, the first line of argument of this dissertation is an attempt to do theological ethics using the 'Warnock approach', i.e. instead of focusing on the most commonly-cited Christian theology-based objections such as violation of sacredness and dignity of life, usurpation of divine prerogatives, etc., the argument for objection to human gene patenting is based on a 'secular principle', that of infringement of justice and the common good. But as pointed out earlier, these principles are undoubtedly Christian notions and hence such an approach does not compromise the Christian theological standpoint. This should not cause tension with Warnock since justice and the common good should indeed be notions generally shared by all in society.

The second argument is an attempt to do theological ethics as a trained scientist who is also a Christian. When I speak of the special protection against patenting that should be imposed on human DNA, on the basis of its ontological status, I have refrained, as far as possible, from using terms of reference which notions do not have identical meaning to different social groups, for example, the religious, legal and scientific communities.[316] But such an approach as I have adopted is an attempt for me to remain true to the theological beliefs I hold, as a Christian, as informed by scripture, tradition, faith, society and experience, as well as the understanding of scientific knowledge I have acquired from my training as a molecular and cellular immunologist. It does not amount to a

316 These include terms such as 'sacredness', 'dignity of life', 'usurpation off divine prerogative' and 'commodification'. Such terms are ambiguous and are interpreted by people in different fields to mean different things. See Baruch A. Brody, 'Protecting Human Dignity and the Patenting of Human Genes'; Ronald Cole-Turner, 'Theological Perspectives on the Status of DNA'; Ben C. Mitchell, 'A Southern Baptist looks at Patenting life' in Audrey R. Chapman (ed.), *Perspectives on Genetic Patenting: Religion, Science and Industry in Dialogue* (Washington, DC: American Association for the Advancement of Science, 1999).

compromise of either, science or theology, but, I would like to believe, represent a small step in a personal journey of my Christian faith seeking scientific understanding.

Conclusion

The objective of this dissertation was to address the issue of patenting of human DNA from a Christian theological-ethical perspective. I began by tracing the developments in science that affected a reinterpretation of intellectual property law to accommodate the patenting of biological life forms and even DNA. I then introduced and examined the arguments cited in the theological-ethical arena against this. These objections fall broadly into four categories. First, that God is the creator of all life and therefore gene patents wrongly claim the credit due to the creator. Second, since God is the creator of all life, he is also consequently the owner of it; gene patents, as they are interpreted by some to be ownership deeds, are thus incompatible with this view. Third, since humans are made in God's image, all of the human body is sacred; patenting of any body part or component thereof violates this sacredness. Fourth, because humans have a special relationship with God, the sanctity and dignity of human life is second to no other biological entities; the patenting of human genes in any form is a threat to this.

In chapter two, I surveyed the current legal provisions governing the patenting of biological material, including life forms, in general, and DNA in particular. The US PTO allows the patenting of 'anything under the sun' as long as these fulfilled the criteria of inventiveness, non-obviousness and has industrial application, without taking into deliberate account moral considerations. UK patent law concerning DNA must conform to EU guidelines. The most significant difference between this and the US legislation is that the object of patent must not be contrary to *ordre public*. In practice, on the basis of how a patent is drafted, human DNA in the form of the full sequences of complete genes or short stretches are patentable in both the UK and the US.

Discussion then moved to the theological issues concerning patents in chapter three where the concept of property was cited as the main theological issue. Drawing upon biblical sources and also Christian tradition, it was argued that the purpose of property is in its just and ethical use. In the Bible, the right to property was in principle subordinate to the obligation to care for the weaker members of society. In other words, the concepts of justice and the common good must outrank the rights associated with and accorded to private property by legal provisions.

In chapter four, the nature of the relation between human DNA and the human body as well as the ontological status of human DNA was examined. The 'bi-elemental nondualistic' nature of human DNA and the human person means that both are material and non-material at the same time: DNA being biochemical and informational; the person being body and soul. The ontological status of human DNA derives its understanding from the human body, which in turn find meaning in the body of Christ and the resurrection body.

Finally, this chapter drew upon the issues of the previous chapters to argue from a theological approach why human DNA should not be the subject of patents. First, it was argued that patents on human DNA do not serve the principles of justice and common good because patents impede progress in research, drive up its cost, and leads to access based solely on financial capability. Second, it was argued that human DNA is a symbol that impinges on our identity in Christ and God's participation in humanity. On these two arguments, I move to propose that the human genome should not be subject to gene patents.

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