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# **THE METAPHYSICAL ETHICS OF HUMAN GENOME PROJECT AND ITS IMPACT ON RELIGION, SOCIETY AND CULTURE**

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## **Abstract**

In this article I address the ethical, philosophical, social, and legal issues of human genome sequencing and the religious response to it, assuming this is a Divine Category of Nature for Humanity. On-going evaluation and periodic risk assessment are the inevitable part of any technique. Prudence, vigilance, conscientious facilitation of human freedom in society and nation at large, and responsible execution of ways of facilitation of human freedom are the fundamental attitudes and routes to be followed, if humanity should exist and progress. The overarching principle behind this position is the Divine Category of Nature and Humanity; secondarily, supervenience from individuals upon Nature and Humanity may also play a role.

*Keywords:* DNA, ethical implications, religious response, dignity, holistic wholeness

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## **1. Introduction**

‘Genome’ denotes the entire DNA content present in a cell. The Human Genome Project (HGP) was one of the most ambitious and controversial biological projects in the last century. The project transformed the practice of medicine and continues to have substantial influence on religion, society, and the cultural aspects of human lives and their future. HGP has changed the way we think about ourselves and our history. Hence it has significant cultural relevance.

The human genome was sequenced in the year 2000 and much work remains to be done to understand how this instruction book for human biological processes carries out its myriad functions. The consequences of HGP for the practice of medicine are likely to be profound. Prediction of genes responsible for disorders and their responsiveness to drugs will reach the medical mainstream in the next several decades. Based on a genomic approach to targeting molecular pathways that are disrupted in disease, designer drugs can be developed [1]. Thus, it holds the promise of revolutionizing the diagnosis and

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treatment of many genetic disorders. However, the potential misuse of genetic information may lead to discrimination in society and should be dealt with swiftly and effectively [2]. An important consequence of this project is that it increases the gap between rich and poor families and countries in the quality of life and the level of treatment and health obtained [3]. The principal aims of HGP are specific mapping and sequencing of the human genome so as to improve the research infrastructure of human genetics.

## **2. Potential applications of HGP**

The blessings of the HGP include a vast increase in knowledge of human and comparative genome structure and organization, more accurate diagnostic tests, a deeper understanding of molecular evolution and clarification of the inheritance of many presently inadequately understood conditions [4]. But these advances may become a decidedly mixed blessing if they lead to genetic discrimination [5], an irrational eugenicization, or genetic fatalism of the population [6].

Through its sequencing of the DNA, HGP helps to identify mutations linked to different forms of cancer and enhancing the development of vaccines [7]. This technique is routinely used to make drugs such as insulin for diabetes [8]. Another important application of HGP is in organ transplantation. HGP provides necessary information to identify all the genes involved in this process and, thus, organ matching can be practiced perfectly before proceeding to organ transplantation [9].

The Human Genome Project and other allied efforts will benefit all areas of heart, lung, and blood research, from epidemiology and prevention to cellular and molecular studies, by coupling genomic technologies and resources with the biology and pathophysiology that define health and disease [10]. Once the contributing genes and their disease-predisposing variants are identified, diagnostic tests can be developed to predict future risk - but these tests are most effective when a preventive strategy is available to reduce the risk in persons found to be predisposed to a particular disease. However, the development of new gene therapies and drug therapies will generally require many more years of intensive research [11, 12].

## **3. Ethical, cultural and social implications**

HGP is rich with promises but also fraught with social, cultural, and ethical implications. We expect to learn the underlying causes of thousands of genetic diseases, including sickle cell anaemia, Huntington disease, myotonic dystrophy, cystic fibrosis, and many forms of cancer - and thus to predict the likelihood of their occurrence in any individual. The dangers of misuse and the potential threats to personal privacy are not to be taken lightly. These are not merely personal but social and anthropogenomic. Perhaps the most immediate of

critical social issues are the questions of privacy and fair use of genetic information.

Most observers agree that personal knowledge of genetic susceptibility can be expected to serve us well, opening the door to more accurate diagnoses, preventive intervention, intensified screening, lifestyle changes, and early and effective treatment [13]. But such knowledge has another side, too: the risk of anxiety, unwelcome changes in personal relationships, and the danger of stigmatization. HGP will also cause concerns over misuse by commercialization of the technology. The major concerns will most likely be over the patents and copyrights of the technology [13, p. 7].

Since the inception of HGP, concerns have been expressed about possible uses of the human genome sequence information. Policy issues were discussed relating to disclosure of personal genome sequence information to the public, and the storage and use of genome information for different purposes. In May 2008, US President Bush signed a bill called the Genetic Information Nondiscrimination Act, which states that insurance companies and employers should not use genetic tests to discriminate between people.

With the spectacular advancements made in genetic manipulation techniques, it is now possible to manipulate the genome of a person to rectify the mutated gene through somatic gene therapy, which is ethically acceptable. Also, genetic interventions can be made to enhance a particular trait which may be socially good or bad [13]. However, with respect to access to such facilities, care must be taken to prevent discrimination based on gender, wealth, and culture.

Considering the societal implications of HGP, five percent of the allocated fund was devoted for the social and ethical aspects of acquiring and understanding the human genome sequence [14]. With the powerful new tools of genomics, society needs to look carefully at the ethical, cultural, and social implications that may arise from HGP. How should this new genetic information be interpreted and used? How can people be protected from the harm that might result from its improper disclosure or use? Consideration of these issues will help to develop public policy options that include the consideration of the philosophical, theological, and ethical consequences of understanding our own DNA blueprint. We need a scientific attitude that respects the Holistic Category of Nature and Humanity. It is a Category or Axiom meant to direct holistically all ethical attitudes in Science, Philosophy, and Theology. This would render scientific research and its applications more holistic and humane; as a result it would enhance social and personal attitudes for the formation of a just society. The Category of the Value of Individuals is subservient to this Holistic Category.

#### **4. Human Genome Project and its impact on religion**

The religious aspect of the Holistic Category of Nature and Humanity is that counter-supervenience of qualities upon humans and the world is of divine origin, i.e. the whole human person as *Imago Dei*, whether the whole world is

created just once or as part of a continuous process. This fact guides the said Category in its essence as far as Theology is concerned. Philosophically, the Holistic Category is superior if 'Nature' is substituted by 'Reality'.

Many religious questions arise as a result of developments in HGP research. It touches on the basic tenets of the Christian faith regarding the role of God as creator and of humans as his creaturely co-creators: the sacredness of God and life, the view of nature, humans as the image of God [15], our right to decide on sickness, life and death, and our right to intervene to prevent diseases and physical defects. This raises new questions about the role of sin and human accountability in light of the fact that our social behaviour is genetically and environmentally determined. Is there a gene responsible for crime and, if there is such a thing as a crime gene [16], an alcoholism gene [16, p. 77], or a gene accountable for gender or sexual orientation [16, p. 97], what is the role of environmental factors, human freedom, and human accountability based on the fundamental counter-supervenience at origin as it is *inherited* by humans, namely the *Imago Dei*? Should we put more emphasis on mitigating circumstances if evidence for gene-level specifics of behaviour is available? Does it not pose a threat to religious pastoral ministry and intercession? [16, p. 127] Will it not replace human dependence on God with dependence on science and the financial forces that govern technology? [17]

The next question is whether the human gene, the blueprint of life, will not usurp God's place as well in the lives of an increasing number of humans. Peters cites three grounds for this: "Three qualities nominate our genome for sacredness: its soul-like quality, its potential for immortality, and its belonging to God's domain" [16, p. 54]. But the human gene is only one link in a long chain that makes life, particularly meaningful human life, possible. There are innumerable links in the chain of Reality that can be isolated as indispensable, but ultimately, we have to view everything holistically under the Holistic Category of Nature and Humans and that is what religion seeks to do.

Whether we like it or not, the fact is that the human genome displays basic religious features. According to Ronald [18], DNA, like the human soul, seems to manifest features of good and evil. This theory is reduction of the place of the origin of good and evil in conscience into the inner processes of DNA. DNA researches in the said manner raise questions about human freedom and predetermination, both of them major issues in Christian theology. It concerns eschatology, the doctrine of the end time and the promise of life free from death, pain and tears. And it touches on the doctrine that human beings will in fact be given new bodies [19] that reflect the whole person in all their positive and negative spiritual contributions and their promise of growth in divine qualities even after death. These qualities are being determined by HGP applications without recourse to the Holistic Category, if recklessness and independence from the Holistic Category of counter-supervenience were set aside by HGP researches.

Because of HGP, our ability to diagnose genetic diseases will far exceed our ability to treat them. No therapy exists for the overwhelming majority of the five thousand single gene disorders. When it is a question of the genetic health of the unborn, in most genetic diseases there are only two medical interventions: pregnancy prevention and pregnancy termination. In electing pregnancy prevention, couples at risk of transmitting a genetic disease forgo bearing offspring. Couples at risk who do not wish to forgo having offspring, and all other couples who are not screened, and who conceive offspring with a genetic defect, are left with the only remaining option: abortion. The question of abortion was a prevailing moral problem faced by parents. As the human genome is mapped and as prenatal screening and testing become increasingly widespread, more and more mothers and couples will have to confront this ethical issue of abortion.

The teaching of the Catholic Church on this question is an explicit condemnation. Genetic “diagnosis is gravely opposed to the moral law when it is done with the thought of possibly inducing an abortion depending upon the results: A diagnosis which shows the existence of a malformation or a hereditary illness must not be the equivalent of a death sentence. Thus, a woman would be committing a gravely illicit act if she were to request such a diagnosis with the deliberate intention of having an abortion should the results confirm the existence of a malformation or abnormality.” [20] However, there are additional considerations which we must include.

The first and most important consideration is the suffering of the unborn individual. Does God intend that life to exist in suffering or to exist only in the imagination of God and of the parents of a life that might have been, had it not been for this tragic defect of nature? Here again, the viewpoint of the Holistic Category permits valuing life in all its variety more than the choice of HGP-level techniques of alleviation of sufferings in situations where suffering is justifiable in favour of life. Of course, the same Divine Category is not against alleviating sufferings in ways in which the value of life will be enhanced [21].

Suffering, even if intense and constant, is only finite, while the value of a human life is infinite. The genes may be defective, but the image of God is whole if accompanied with the choice of suffering and divine life on Earth. Termination is therefore ideally not permissible in most cases. Others would conclude that the inevitability of suffering has already destroyed individual life beyond any minimal definition of humanity, and that the image of God is honoured by protecting its bearer from agony. Whether or not to terminate a pregnancy for genetic reasons may be the most complicated religious question anyone faces [12]. But the inevitable ideal of choice remains between growth in divinizing human life through divinely oriented joy in suffering and growth in life without divinization of the parents’ own and the offspring’s lives.

## **5. Human Genome Project - a philosophical approach**

Now we turn to our responsibility for what we inherit from our parents. We are not responsible for the genes we inherit, nor should we feel guilty for what we inherit, because personal responsibility begins from the moment we are what we are, and it grows to the extent we grow beyond it all. While this seems common sense to most today, it counters some historic expressions of the idea of original sin, according to which we inherit a depraved nature and are guilty for the tendency to its partial advancement through our own contribution [22], if after we have inherited it we do not conscientiously work against and beyond it. If we are not personally responsible for the genes we inherit, are we responsible when these genes express themselves in sickness or in our behaviour? In questions such as this, thinkers and believers tend alike to err imagining that our behaviour is sin. In fact, the attitudes in conscience, of not loving God and humans at the level of or unto blissfully accepted sacrifice for individuals, are the contributors of the element of sin to our behaviour. Hence, the inherited aspect of our behaviour is not the real part of personal sin in us. In the most familiar genetic disorders, the correlation between the defective gene and the illness is virtually 100%. For practical purposes let us consider that these diseases are explained entirely by their genes. A person with the genetic disorder is not ontologically or ethically responsible for the gene or for its expression in disease. Genes play a role in the development of the disease, but other factors (environment, diet, lifestyle and personal choices) have an equally important role. These other factors are at least partly under our conscious guidance, but this is after we have inherited the gene-level defects. We are therefore not responsible for the development of the disease. Perhaps the ancestors were, if their freely determined choices have caused the defects in the present generation. And what if our choice in favour of HGP technology determines the future defects of our progeny? [18].

It may be that by shedding light on the genetic factor, HGP will allow philosophers and theologians to reconsider the role of the non-genetic factors with a precision that was not available to Saint Paul or Saint Augustine. When the genetics is clear, the non-genetic should be more readily definable. When we think about the interplay between the genetic and the non-genetic, we must guard against the idea that we have a genetic and a non-genetic component of our being. Our whole being is influenced by our genes. But not everything about us is explained by our genes. Environment and personal responsibility play a role. Theology has a stake in maintaining that the role played by personal responsibility is genuine and significant. It is not epiphenomenal or illusory. In maintaining this position, especially as the full significance of HGP unfolds in the present century, Theology must be prepared to recognize two points.

First, our capacity for personal responsibility is a genetically evolved capacity that we inherit through our genes. Our genes carry the legacy of our evolution; and our personhood itself, including our capacities for consciousness, moral decision, and faith, arises from our genes as selected by evolution [23].

Specific decisions and beliefs of a person within given contexts are not carried fully genetically since the contexts do not belong to the person making the decisions and the decisions are affected by the evolution of clarity of the will itself within a given environment. In fact, our decisions and beliefs, are agents that can change the environment and the very personal choices of action by a great extent of willing. Our genes apparently do carry our individual inclination toward broad categories of attitude, religiosity and behaviour. While our genes apparently incline us toward certain attitudes and behaviour, the whole person (genes plus environment plus that irreducible sense of personhood) guides the behaviour by selecting from options presented by our environment. We are therefore not responsible for the genetically inherited condition and extent of perfection or imperfection of this capacity (will), even though we (specifically, the will itself) are responsible for what we do with the will.

Second, HGP clarifies our individual genetic differences, but in time, we will come to see how our individual genotype influences not merely our eye colour but our social attitudes, behaviours and religious activities [18]. Traditional Christianity has assumed that all are morally and spiritually equal. All have sinned, all stand in need of grace, and all have the same degree of need and capacity for salvation. All have the same moral capability due to free will, and all are equally responsible for their behaviour. In the future we will understand individual genetic variations more fully. We will learn how we vary in our capacity for moral and religious behaviours.

It is very important to stress, therefore, that Theology must begin with a new axiom, namely, that we are all individuals before God, with a unique set of genes and a unique set of moral and spiritual needs and capabilities. Hence, salvation must be personalized even as it is personal in a community. Individual differences must be affirmed, not discriminated against. We need therefore the Holistic Category of Nature and Humanity which yields enough personal identity and differences within the higher value of the holistic connectivity of Humanity and Nature. Individuality must be comprehended theoretically and theologically, not rounded off statistically and ignored pastorally. The Holistic Category makes it possible. The more we learn about genes, the more we will know about individuality and the element of holistic counter-supervenience nature in individuals [18].

## **6. Patenting human DNA sequences**

Is it anthropologically and theologically suitable to patent human DNA sequences if they are viewed as part of humanity's common inheritance? Is patenting human DNA sequences compatible with respect to the dignity of human beings individually and human life in general? One interpretation of concerns about common heritage focuses on the patentability of things that occur in nature. Regardless of legal justifications, the interpretation can be formulated as two moral issues: Are there moral justifications for intellectual property rights? And, why should anyone be allowed to patent something that they

isolated, but that already existed in nature and is therefore not new? Does not the special nature of human DNA sequences make their intellectual property protection incompatible with human dignity? The intellectual property protection of human DNA sequences is immoral if one considers it to be equivalent to ownership of humans in the substances that define human identity. Patenting human DNA sequences would therefore be immoral because it might involve inappropriate modifications in our genetic integrity [18] and ultimately end up in degenerating the human race.

A philosophical analysis of common heritage issues reveals that merely because human DNA sequences are found in nature as part of a common heritage, such givenness might not suffice to prohibit intellectual property rights on moral grounds. Tangible property rights can be claimed to naturally occurring substances as minerals. Still, common heritage concerns might justify, on a moral basis, a system of property rights that includes an exception in experimental use. That human DNA sequences are solely responsible for personal identity is not true as humans are not just walking DNA molecules. Moreover, the human genome shares significant similarities with animal, plant, and microbial genomes. Hence, since most human DNA sequences are not unique to the human species, human identity is not defined by these sequences alone.

Finally, concerns that patents on human DNA sequences might exacerbate economic disparities among developed and less developed nations are largely based on concerns about common heritage, for which moral arguments are equivocal. Equity and justice are important moral considerations, but policymakers seemingly can approach these issues more effectively through means other than intellectual property protection. Apart from the legal patentability requirements, are there reasons an invention might not be patentable? In a few instances, courts have found that inventions are not patentable because they are immoral. Additionally, the U.S. Constitution prohibits the ownership of humans. Thus, intellectual property rights in human DNA sequences should be examined in light of possible moral and constitutional concerns.

Peters observes that “a cell line with a known DNA sequence is not a living being. Even ... DNA ... in itself is not life. Nor is it a human being. Nor is it a person. Therefore, the debate over patenting DNA sequences – regardless of which side one takes – is not a debate over patenting life.” [16] That DNA is not equal to life makes the patenting dispute less fierce and emotional. But without DNA and many other building blocks that have been identified no life is possible, and DNA is particularly relevant because it accounts for so many things. Amani and Coomby cite a decision by the Canadian Council of Churches: “The race to patent genes is at fever pitch. Some think of it as a kind of 21<sup>st</sup> century gold rush. What is now being privatized is not common land, but bits of the internal structure of life itself and the number of patents on human genetic material may already be as high as four million. Whole movements are afoot to protect ‘the genetic commons’ but so far those movements are dwarfed



by the army of interests championing the new array of intellectual property rights.” [24]

There are numerous ethical arguments made about the appropriateness of granting patents on human DNA. In fact, some argue that a moratorium is the only way to address ethical qualms surrounding human DNA patents. The US Constitution provides little protection for improper uses of human DNA patents. European nations, through the European Union, have taken thoughtful steps in looking at ways of encouraging the beneficial commercialization of human genome research and protecting morality and public order concerns.

Indeed, scientific progress in mapping the human genome is depicted as a 'credit to human reason' and as something that honours the Creator and source of all life who entrusted the human race with stewardship over the world in its totality. Patenting of human genes is not acceptable since the human body is not an object that can be disposed of at will and the results of research should be made available to the whole scientific community and cannot be the property of a small group. Human beings as made in the image of God (*Imago Dei*) and therefore with an inherent dignity. Life is a great gift from God and must be protected and enhanced.

## **7. Conclusions**

HGP will bring us to a profound understanding of human biology and the product of HGP will be an enormously rich biological database, the key to tracking down every human gene - and thus to unveiling, and eventually subverting, the causes of thousands of human diseases.

The presence of a genetic defect raises profound religious questions of divine justice, personal guilt, and personal abnormality. In particular, clergy must become competent to provide theological care to those confronted by the question of terminating a pregnancy for genetic reasons. Parents who are expecting a baby have the right to see if they will have a healthy young child. When the baby is developing, the parents should have a choice to see if there are any birth defects or other abnormalities of the foetus that would lead the child to live a miserable life. If the foetus is found to have genetic defects, instead of aborting the child, measures should be taken to cure the baby through gene therapy. If therapy is not available, accept the child with deformities as a gift from God. It is difficult to find out the meaning of suffering through research. But the leadership of research, cure, and policy-making should be so well formed and practically aware of the fact that the Wholeness of Nature and Humans is a divine category. They have the responsibility to mediate this divine category of thought and action to the people.

In light of genetics research, the Churches should be advocates of fair access to genetic services including genetic counselling. Furthermore, the Churches should advocate safeguards on genetic information to protect against unwarranted discrimination in employment or health insurance. HGP will produce new insights for theological research into perennial concerns of moral

theology in particular and philosophical ethics in general. We will learn more about the interplay between genetic inheritance and personal responsibility and about human origins. This new insight should stimulate fruitful theological research [16, p. 172].

We need to foster the development of Science in a way that enhances its potential benefits while extenuating the probable risks and likelihood of direct and indirect harms. A responsible research guarantees a respectful approach to the dignity of the human person, Humanity as such, and Nature, and the primary concern for all research should be to safeguard the Earth's bounty, the world's safety, and the environment in which future generations will flourish.

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