



Institute For Theological Encounter With Science and Technology

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Summer 2008 Bulletin

Opening Message

Here we are again! It's Ordinary Time in the church calendar. Yet it is no ordinary time for ITEST and our membership; it is a *"temps extraordinaire."* After two years of searching for a director to lead ITEST into the second decade of the 21st century, the ITEST Board has enthusiastically and unanimously approved the search committee's selection of Thomas P. Sheahen, PhD, physicist and vice-director of ITEST as the director to succeed Father Robert Brungs, SJ starting September 1, 2008. The Board of Directors strongly believe that Tom is the most qualified of applicants not only to continue the mission and ministry to which Father Brungs devoted most of his life but to advance and expand that vision

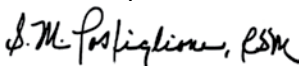
Dr. Sheahen attended M.I.T. and received BS (1962) and PhD (1966) degrees in physics. He is a registered Professional Engineer in Maryland. His professional career in research includes time with AT&T Bell Labs, the National Bureau of Standards, U.S. Department of Energy, Argonne National Lab, and most recently National Renewable Energy Lab; he has worked in the private sector as well, and has his own independent consulting firm. His work has been primarily in energy sciences, especially about ways to use energy efficiently. Dr. Sheahen is the author of the textbook *Introduction to High Temperature Superconductivity*. He has also taught physics at both the college level and in high school. With Father Ernie Spittler, SJ, he co-taught "issues in Religion and Science" at John Carroll University in 1999.

Sheahen serves on the Advisory Board of ITEST's pilot program: educational modules interfacing science/faith for K- 4th grade, *Exploring the World, Discovering God*, now in its final phase of a three year testing period. Tom, highly regarded in his professional life as a scientist, is no stranger to theology. He has studied the theology of Lonergan and has done extensive reading in Teilhard de Chardin. Recently he traveled to Shanghai and Beijing with a group of colleagues interested in Chardin, "...who was part of the team that discovered Peking Man in 1929." We hope to read more about Tom's trip in later issues of the Bulletin.

What's inside this issue? We are printing Part One of the paper by Father Brungs published in 1995 for the *Antonianum*, a Vatican journal on "Gaudium et Spes and Biological Advance." Written to celebrate the 30th anniversary of the encyclical, it still speaks to us on the 43rd anniversary of the document years later. Sister Carla Mae Streeter, OP will do a paper for the September 19-21 conference on the same document from a cultural/theological perspective. What role does *Gaudium et Spes* play in the 21st century, 43 years after its promulgation? Has it been relegated to the climate controlled temperature of a Vatican Vault or does it still have relevance today?

Also in this issue is a tribute to Dr. John Billings, founder of the Billings' Method of Fertility Regulation and an ITEST member and supporter. John and his wife, pediatrician Evelyn (Lyn), worked together worldwide for many years teaching this method to the "advantaged" and "disadvantaged" alike. Although John died in April of 2007, the ministry is alive and well from the simplest villages in the developing countries to the cosmopolitan cities of the "first world."

Echoing the sentiments of Gaudium et Spes, I wish you joy in the present and hope for the future.


Marianne Postiglione, RSM
Acting Director: ITEST

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Announcements

1. Remember to mark your calendar for this special event! The ITEST 40th anniversary celebration, September 19-21, 2008 at Our Lady of the Snows Conference Center, Belleville Illinois. Our title: *Faith/Science/Culture: Converging or Diverging Realities* (a 4-decade retrospective and “prognosis” for the future).

You have received the registration materials brochure with a listing of the three presenters:

Edmund D. Pellegrino, MD, professor emeritus of Medicine and Medical Ethics at Georgetown University Medical Center, a Senior Research Scholar of the Kennedy Institute of Ethics and Adjunct Professor of Philosophy at Georgetown.

John F. Haught, PhD (from the Catholic University, 1970) is Senior Fellow, Science & Religion, Woodstock Theological Center, Georgetown University. He was formerly Chair and Professor in the Department of Theology at Georgetown University (1970-2005).

Sister Carla Mae Streeter, OP, PhD is a Dominican of the Congregation of Catherine of Sienna in Racine, Wisconsin. She is currently associate professor of Systematic theology at Aquinas Institute of Theology, a graduate school sponsored by the Dominicans of the Central Province at St Louis University.

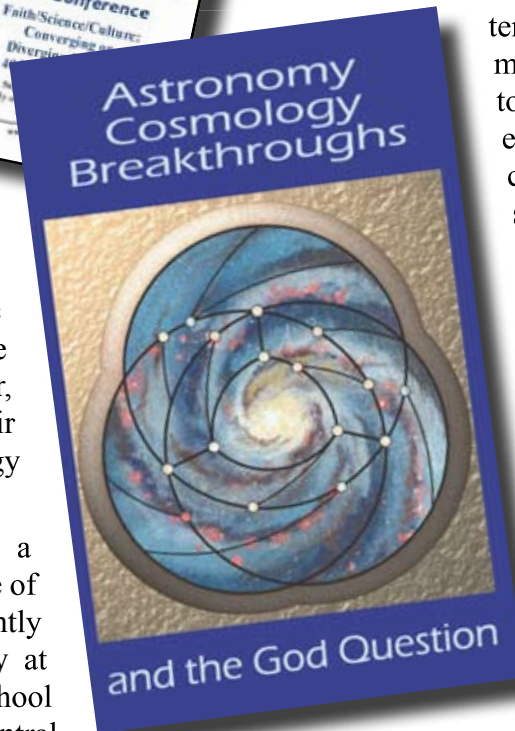
(For detailed information on the presenters, see the *Spring Bulletin, Volume 39, No. 2.*)

If you need extra brochures on the conference or if you would like us to mail information to anyone, just send us the name and address and we will gladly oblige.

2. All ITEST members in the United States who have paid dues for 2007 and 2008 should have received by now a copy of the edited proceedings from our September, 2007 symposium *Astronomy/Cosmology Breakthroughs and the God Question*. If you haven't received your copy yet, please contact us by phone 314.792.7220 or e-mail mariannepost@archstl.org

Attention, Overseas Members: For a variety of reasons, among them the terrorist threat, all books must be mailed via first class to overseas members. It is expensive, but a necessary cost in this day of extra security precautions. We mailed the first 23 books to European countries this morning; within the next week we plan to mail the remainder of the books overseas. Please be patient. If you don't receive your book within the next month at the latest, please contact me by e-mail and I will rectify the situation with the Post Office.

We are very pleased with the proceedings and thank all who helped us to achieve the professional quality of the book. If anyone wishes to purchase extra copies, just let us know. We will have a special one-time discount on this book for members. We accept checks with proper routing numbers, Euros, Visa and MasterCard.



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Tribute to the late John Billings

by Dr Joe Santamaria

[Among the moving tributes delivered at the funeral of Australian Dr. John Billings, founder of the Billings Method of Fertility Regulation, we chose the following by Dr. Santamaria, a longtime and loyal ITEST member. John and Evelyn Billings knew our late director, Fr. Robert Brungs, SJ and supported him in the faith/science ministry over the years. The ITEST staff, learning just a few months ago that Dr. Billings had died on April 1, 2007, contacted Evelyn Billings and received her permission to reprint this tribute honoring her husband.]

My short contribution today is but a glimpse of the profound influence that John Billings exercised over his very distinguished career.

I knew and worked with him for over 50 years, both at St Vincent's Hospital and on a more global scale. In medicine, he was a doyen in the field of clinical neurology and sat on the boards of St Vincent's Hospital, the Royal Australian College of Physicians and the National Health & Medical Research Council. He won the highest accolades from his peers and the Royal Australasian College of Physicians established a travelling scholarship to commemorate his name.

In the field of research he had many outstanding achievements, but none to compare with his discovery of the Billings' Method of Fertility Regulation, which he and his wife Lyn promoted for over 50 years to the point of physical exhaustion.

In the world of political life, he fought for the Right to Life and for the Natural Family. He capably and courageously defended his convictions. He played a leading role in the establishment of the Right to Life Movements and Family Associations in Australia and internationally. He was one of the founding members of the St Vincent's Bioethics Centre, which in its day became internationally famous.

He won the highest acclaim within the Catholic Church and was the confidant of a line of Popes and a member of several pontifical bodies from the 1950s until his death on April 1, 2007. I believe that he and Lyn were the first lay persons to articulate what is now known as the Theology of the Body. For their contributions to the mission of the Catholic Church and to secular society, both John and Lyn receive honours that are too many to list today.

On March 30, 2007, Archbishop Stanislaw Rylko, president of the Pontifical Council for the Laity, read out a message from the Pope addressed to the participants in the ninth International Youth Forum, which had been convened under the theme: "Bearing witness to Christ in the world of work."

"All human activities," Benedict XVI wrote, "should be an opportunity and an occasion for the growth of individuals and society, an opening to develop personal talents which must be valued and placed at the orderly service of the common good, in a spirit of justice and solidarity. For believers, the ultimate aim of work is the building of the Kingdom of God."

Indeed John and Lyn have inspired thousands of people throughout the world to join them as witnesses of Christ and I pay personal tribute to them both for their inspiring and most fruitful lives. May John Billings rest in the peace of the Lord whom he served so well.

In Memoriam

We also recommend to your prayers those who have died in the Lord this year.

Fr. Albert Moraczewski, OP (5-1-08) in Houston, Texas.

Father was the President of the National Catholic Bioethics Center in Philadelphia from 1974-1979.

Sister Rosemary Connell, CSJ, in St. Louis, Missouri.

A biology professor at Fontbonne University and Advocate for the Poor.

We also ask your prayers for ITEST members who are ill. May they feel the restoring hand of the Lord.

On Earth as it is in Heaven

Guy Consolmagno, SJ

About one month after our ITEST 2007 symposium John Cross, Board Member, brought to our attention the following commentary by Brother Guy Consolmagno, SJ published in The Tablet just a week before our own meeting. This piece provides us with a foretaste of Consolmagno's address to the participants who gathered at Our Lady of the Snows Conference Center in Belleville, Illinois. The editors of The Tablet graciously granted us permission to reprint the article with some editorial comments. (The Tablet Publishing Company, Ltd., 1 King Street Cloisters, London, United Kingdom September 22, 2007.) www.thetablet.co.uk

A group working in the interface of science and theology at a Jesuit university¹ in the American Midwest invited me to give a talk at a workshop² under the title of "Cosmology Breakthroughs and the God Question."³ When I agreed, I thought I'd be in North America already. Instead, I'll be flying five thousand miles from Rome this weekend to make the talk.

I'm not a cosmologist, and God isn't a question – not to me, anyway. I study planets. What's the connection between planets and God? Well, in the opening words of the Creed we claim to believe in a God who created Heaven and Earth. And certainly my field has redefined the meaning of "Heaven and Earth".

When we talk about God creating the "Earth" we all instinctively look around and see this flat disk of dirt and streams and lakes we call "here," the Earth; and a sky overhead that makes a dome over this disk, the "heavens". And so the first chapter of Genesis describes God creating such a sky, "a dome in the midst of the waters" that separates the "waters" above and below the land on which plants, animals and people are eventually placed. The planets above move in their spheres of Heaven, ordered into ranks like the angels are.

But then Isaac Newton found natural laws that acted the same both on celestial bodies and objects as humble as an apple falling from a tree. The Earth was no longer at the bottom of a chain of creation, but raised to a status equal to that of the other planets. Newton's physics showed that "Earth" was not in a unique place in the universe, favoured in contrast to the heavens. It completed what Copernicus had started: the death of the concept that the physical universe could be thought of as a parallel to the spiritual universe.

And this, in turn, freed up science to look more carefully at the concept of "other worlds". The possibility of other planets has been understood, intellectually, since the Enlightenment; indeed, we've had stories speculating about life on other planets since Roman times. But it is only since

we've actually been able to see the real planets in our solar system, close up, that this reality has come home to us at a gut, emotional level. (Think of those spectacular images that the rovers have sent back from Mars: pictures which make you understand you're looking at a real place where one day people will have adventures.)

Then there's all those planets we're discovering around other stars. Certainly they pose the ever-increasing possibility of extraterrestrial intelligence. How does this affect the assumptions underlying traditional explanations of original sin and Christ's salvation?

The most important aspect of this challenge is how it reveals the unrecognized assumptions we have made in our previous understanding of Heaven and Earth – and the assumptions we have made in our understanding of God as its creator. It is both new, and familiar. What we once thought was the physical universe, Earth, turns out to be only one tiny bit of it. What we once thought of as Heaven, the stars and planets, turns out to be just a bigger part of "Earth". What we now think of as heaven is not a location accessible to our telescopes; but whatever, wherever, whenever it is, it too is a creation of the same creator God we say we believe in at the very beginning of our Credo.

We have to stretch our minds farther than we ever expected to. The universe, and its Creator, are a lot bigger than we could have imagined three millennia ago, before we learned the true nature of the planets. By contrast, the five thousand miles from Rome to St Louis is a mere weekend's jaunt.

(Guy Consolmagno, SJ is the curator of meteorites at the Vatican Observatory)

1. ITEST, although located until December, 2006, on the campus of St Louis University, has always been an independent entity and is not a department of that university.
2. The September, 2007 meeting was a symposium, not a workshop.
3. The title of the symposium: "Astronomy/Cosmology Breakthroughs and the God Question".

Gaudium Et Spes and Biological Advance

Father Robert A. Brungs, SJ

At the invitation of the editors of the Antonianum in 1995, Father Brungs wrote this article on the 30th anniversary of the promulgation of the encyclical. The ITEST editorial board decided to reprint this article because it still has much to say about the issues confronting the Church and culture almost 15 years later. Because the article is a lengthy one, we are publishing it in two parts: Part One (Volume 39, No. 3); Part Two (Volume 39, No. 4). Cited with permission from Atonianum, Via Merula, 124 Roma, Italia 70 (1995)

Abstract

Gaudium et Spes

The special interest of *Gaudium et Spes* (GS) is particularly culture. It examines science and technology as one of the most important aspects of this culture. Actually, if it does not do it in detailed fashion, GS is nevertheless an important declaration from the Magisterium, for it is essentially open to scientific progress and to technological development. The Council document, although avoiding detailed treatment of science, particularly biology, takes specifically into consideration scientific endeavors as a good in itself and at the same time as a crucial element of cultural maturation. Avoiding specific discussion offers little assistance in judging cultural effects of scientific progress; on the other hand, it protects the Constitution from rapid obsolescence.

Opening a dozen years after Watson and Crick discovered the double helix structure of deoxyribonucleic acid (DNA), the Council most likely underestimated the rapidity and extent of biological developments. But it was not alone in this miscalculation: Political leaders too understood only very slowly the revolution about to happen. On the other hand, the Council Fathers knew prophetically how to see in the family a central element of culture. It is actually the family, together with an understanding and appreciation of sexuality, which was seen as a privileged object of biological discoveries and biotechnological applications.

Moral theology (and bioethics) is perhaps still inadequate in keeping abreast of such progress, while marvelous discoveries and their utilization properly demand a common effort by scientists and theologians. Moral questions will only find satisfactory solutions when theologians develop a theology more focused *on the body*. This requires the involvement of the whole Church, in cooperation with the scientists. One may forgive the Council for a lack of foresight, but, as for us, we cannot escape responsibility.

[Abstract translated from the original Italian to French by Father Angelo Serra, SJ and from French to English by Dr. Jean-Robert Leguey-Feilleux.]

Introduction

Toward the beginning of *Gaudium et Spes*¹ the Council Fathers wrote:

Ours is a new age of history with critical and swift upheavals spreading gradually to all corners of the earth. They are the products of man's intelligence and creative activity, but they recoil upon him, upon his judgments and desires, both individual and collective, upon his ways of thinking and acting in regard to people and things. We are entitled then to speak of a real social and cultural transformation whose repercussions are felt too on the religious level. (4)

In *Gaudium et Spes*, *cultural* "refers to all those things which go to the refining and developing of man's diverse mental and physical endowments." (53) In immediate reaction to *Gaudium*

et Spes, Fr. Donald Campion, S.J. remarked:

Many readers of *Gaudium et Spes* will judge that the section treating the proper development of culture (section 53-62) represents the Constitution's most novel venture in theological exploration ... Whatever the problems inherent in arriving at a definition, it is possible to speak of a new age in human history characterized by profound changes in the ways contemporary man "strives by his knowledge and by his labor to bring the world itself under his control (53)."²

The thirty year period since the publication of *Gaudium et Spes* has been one of the most pregnant (the pun is almost unavoidable in English) periods in the history of mankind. Simply listing the advances in biology³ alone leaves little doubt

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about the extent of those “profound changes.” We need merely mention contraception, *in vitro* fertilization (hereafter, *IVF*), molecular biology, embryology, neuroscience, endocrinology, ideas on human origins (evolution) or population expansion to outline some of the major cultural transformations of our day. The three decades since the promulgation of *Gaudium et Spes* have seen a unparalleled spurt in scientific and technological capability. The few years until the end of the century will see a continuing growth — barring global catastrophe, man-made or otherwise. Even more important than the products of this tremendous advance is the effect it has had and has now on the culture itself. In its own way it is expressive of the deepest hopes and greatest fears of the human race. The Council was correct in saying that “man now produces by his own enterprise many things which in former times he looked for from heavenly powers.” (33)

Defining “culture” in such broad terms made it inevitable that the Council could speak only briefly and generally about any particular component of culture. This is true of war and peace, of economics, of population, of the family as well as of science and technology. In their treatment of culture in general and of science and technology in particular, the Fathers of the Council tried valiantly to “discern in the events, the needs, and the longings which it shares with other men of our time, what may be the genuine signs of the presence or of the purposes of God.” (11) It is in the search for signs — not necessarily in the finding — that the Council is to be judged. We may judge ourselves more harshly in the finding.

Nonetheless, it seems fair to say that the Council Fathers did not see science and technology as central to questions of contemporary culture. Since it did not understand how essential science and technology is to our society, it is unfair to critique *Gaudium et Spes* on this aspect of culture alone. In another sense, it is all the more necessary to do so precisely because *Gaudium et Spes* did not recognize the real state of affairs. Why didn’t the Conciliar Fathers see how central science and technology are to the contemporary cultural enterprise? It is to be hoped that by critiquing their failure to respond more fully to the “signs of the times” of thirty years ago we might begin to address honestly our own failure to read the signs of our times. Why, thirty years later, do many Church leaders still consider science and technology to be peripheral to the real “signs of the presence or of the purposes of God”?

The authors of *Gaudium et Spes* incorporated their treatment of science and technology into a treatment of the broader culture. This simultaneously made the document both less valuable and more valuable than it might have been. Let it merely be noted here that at best this Constitution gives a *position* to which members of the scientific/technological community can refer. Because of its lack of specificity, it does not give scientists

or technologists any *direction* to follow. By itself this lack of specificity can be seen as a weakness in the document.

On the other hand, the manifest purpose of the Constitution is to address the role of the Church in the broader culture. It tries to locate scientific/technological advance in the wider context of culture, the family, the nation and the international community. There is, however, a need to provide direction. By and large, science does not supply its own direction. At a recent ITEST conference on the science and politics of food, Dr. Robert Collier, an animal scientist, stated:

Technology does not transform society; society transforms technology. Technology does not impact our social and governmental structures; those structures impact the technology. Basically it’s done through an elaborate series of risk-benefit analyses carried out at virtually every level, starting with the government. Take the example of a transgenic plant. The [United States] Food and Drug Administration (FDA) will do the risk-benefit analysis from a human safety perspective. There will be a different series of analyses at the Environmental Protection Agency (EPA) from an environmental perspective. The Department of Agriculture (USDA) will have a different set of risk analyses on its impact on the agricultural system. There will be still another set at the political level, its impact on *my* home industry, *my* state, or *my* county... What will be rejected and what will be accepted is essentially up to our society as a whole. It won’t be a technology dictating to the society.⁴

Butterfield makes the same point in referring to the history of science in the late 16th and early 17th centuries:

The passion to extend the scientific method to every branch of thought was at least equalled by the passion to make science serve the cause of industry and agriculture ... Francis Bacon had always laid stress on the immense utilitarian possibilities of science, the advantages beyond all dreams that would come from the control of nature; and it is difficult, even in the early history of the Royal Society, to separate the interest shown in the cause of pure scientific truth from the curiosity in respect of useful inventions on the one part, or the inclination to dabble in fables and freakishness on the other. It has become a debatable question how far the direction of scientific interest was itself affected by technical needs or preoccupations in regard to shipbuilding and other industries; but the Royal Society followed Galileo in concerning itself, for example, with the important question of the mode of discovering longitude at sea...⁵

In our own day, we need merely to point to the effect on physics of the Manhattan Project or the Cold War and the space race;

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in medicine there can be little doubt of the effect AIDS has had on research funding and the direction of medical science itself.

Thus, we see all around us reasons for the Council having treated science and technology as a part of the broader context of culture. If it is difficult to disentangle science from the cultural matrix of 16th and 17th century Europe, as Butterfield notes, the task of doing so is immensely more complex in our own day. In short, the Council's treatment of science and technology, though lacking in specifics, is still important in understanding our contemporary culture. Nonetheless, it is important to realize that culture itself has changed significantly because of new options available, or soon to be available, from advances in the life sciences.

Advances In Biology

Theologians, along with the majority of social thinkers, have yet to notice what will be the most significant expansion of

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technology in the history of the human race. Scientific advance (and its attendant technological capacity) has begun to open up a world of incredible beauty, complexity and significance that has escaped the view of most religious and social leaders. Theologians and academicians in general are hardly aware of the significance of these discoveries.

Since World War II, the biological sciences have moved rapidly from an observational posture, through an intense analytic phase which still continues, into the beginnings of a synthetic capability. *Synthetic* is used here in the sense of making something, of making living systems. Beginning with the identification by Watson and Crick of the structure of deoxyribonucleic acid (DNA) in 1953, genetic sciences have made rapid and significant progress. The same is true of other branches of the life sciences, of microbiology, biochemistry, molecular biology, brain physiology, and so on. We are now disassembling and rearranging basic genetic components. The details of this work, though fascinating and beautiful, are of less importance to us than what they indicate for the future. We have witnessed the application of the methods and goals of physics (for example, the study of smaller and smaller "parts" of organisms down to the molecular level) in the life sciences. With a fair degree of accuracy we can now talk about the "physics of living systems."

We are observing the beginnings of a remarkable and major technological revolution, a revolution far more important to the future than the technological revolutions of the past. In the last quarter century, the balance of scientific discovery and technological application has shifted from physics and chemistry to the life sciences. Science and technology have become more centered on living systems in general and on human beings in particular. The human race reaches for unprecedented knowledge of and technological control (i.e., power) over itself. We are literally on the threshold of

We are literally on the threshold of consciously and deliberately directing our own evolutionary development.

consciously and deliberately directing our own evolutionary development. Dr. David Schlessinger has remarked on this:

My argument today is that ongoing studies of the human genome have in fact brought us to a sharp divide in evolution, a point unparalleled in history. Knowledge of human genetics brings with it the power to change ourselves — to change, prevent, or accelerate processes in our lives that have been heretofore thought immutable.

The prospect of such impending power inspires awe, providing as it does Faustian choices to humanity. It also promotes efforts to anticipate the new possibilities, in order to be ready for them.⁶

Historically our technology has been primarily addressed to changing things external to human beings for our "good." It was directed to domesticating plants and animals or harnessing the forces of nature to change the environment external to the human. Whether the object of the technology was plants, animals or the processes and forces of nature, it was the "world out there" that was immediately affected. One branch of chemistry, however, (the pharmaceutical) was directed to immediate intervention into the human composite. Together with pharmaceuticals, medical intervention in general was primarily directed to changes inside the human, but only on an *ad hoc* basis. The latest scientific discoveries in the life sciences and their technological applications allow (may even mandate) humans to intervene directly into the human composite with little or no mediation by either the physical or social environment.⁷

Almost fifty years ago, C.S. Lewis perceived that technology's so-called conquest of nature deeply affected humans: "In every victory, besides being the general who triumphs he (Man) is also the prisoner who follows the triumphal car."⁸ Also, as

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Charles Frankel observes, this is doubly true with respect to technological innovations involving direct interventions into the human composite.

...biomedicine differs in significant ways from other kinds of technology...Biomedicine ...involves the deliberate, not incidental or inadvertent, modification of the human organism; and it involves, besides, the making of changes that will be irreversible...Biomedicine has eliminated the insouciance with which most people have embraced technological progress. It forces consideration not simply of techniques and instrumentalities but of ends and purposes.⁹

In treating science and technology as a part of the culture, the Council in effect called for a search for meaning behind the spectacular growth of the life sciences. Harry Boardman — then Secretary General, Council for Biology in Human Affairs, Salk Institute, La Jolla, California — remarked that the crucial issue in the area of science and values is the viability of the norms upon which the culture rests:

Such misleading rubrics as “the social responsibility of science and scientist” and “the ethical implications of science and technology,” commonly packaged in sexy and monstrous bundles, like bioethics, are indeed ...often regarded as comprising novel and wholly contemporary problems...Certainly these science and value questions are interesting mostly to the extent ... that they may be regarded as contemporary manifestations of perennial issues...But far too pervasively, these endless biomedical-science-value discussions manifest a deplorable blindness which seems to proceed directly from an hypnotic fascination with appliances and appliance makers...(T)he central concern is not with science or scientist, but with the whole of knowledge — its benefits, the price it exacts, and its special province: that of ideas. For ideas far afield from science and technology may be the most lethal. Inspiration to man’s action lies not in his appliances — much as they may encourage or inhibit it — but in the spell of ideas and the convictions of mind and heart which they generate... Neither the curse of nuclear detonation nor the boon of genetic research depend principally upon machinery. Rather their vice or virtue lie in the ideas to which the technology becomes fitted.¹⁰

These advances in science and technology have a characteristic not present in the older science, technology and industry. We cannot ignore nor underestimate the calculated nature of the life sciences and biotechnological revolution. While we continue to transform the earth, and, in time, other planets, we are developing the capability of transforming the human race. It has been a commonplace to say that human nature has not changed over the

ages — circumstances, options and challenges have changed, we say, but not human nature. How long shall we still be able to assert this? Profound changes in the physical composition of human beings or in their “spiritual qualities” cannot help but introduce profound changes in our “human nature.”

This direct, immediate and systematic intervention into the human is revolutionary. As noted earlier, medical and pharmaceutical products and techniques have been used for direct and immediate interventions into the human body. The additional trait, “systematic,” demands close scrutiny. Systematic can mean “based on or involving a system” and “characterized by the use of method or orderly planning, methodical.” Historically, medicine has been directed to the alleviation of pain and/or the removal of pathological barriers to good health in the individual. It has been aimed at the restoration of an individual to some general norm of good health, with the accent on an individual’s welfare. This will not be true of the “new medicine.” These biomedical techniques will not be directed primarily to the good of the individual, to restore him or her to some already perceived norm of health. They will be ordered to the creation of new norms of health. In specifying a few aspects of the new technological capabilities we can adapt an outline proposed several decades ago by Dr. Leon Kass: (a) control over life and death; (b) control over human potentialities; (c) control over human achievement. It is of more than passing interest to note that the common word in each section is “control.”

A. Control over life and death

Attempting to “control” death is one of humanity’s oldest occupations. We have tried to ward off death by amulets, diets, elixirs, dances, and most recently better plumbing, i.e., by purging the spiritual and material environment external to the human. Scientists now propose many different hypotheses, among them lowering the temperature of the body by one degree Fahrenheit or so or by adding properly coded genetic information to the human body. Earlier attempts to ward off death looked to changes in the external environment; the newer attempts look to changes in the human body itself.

At the other end of the life continuum, we have seen the successful beginning of the laboratory production of human beings with *IVF* techniques. *IVF*, ultimately combined with *in vitro* gestation techniques, is aimed at creating an environment external to the mother, which will, incidentally, provide opportunities for experimentation and eventually “quality control” to enhance genetic qualities or eliminate less desirable genetic types. We shall return to an extended discussion of *IVF* later.

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B. Control over human potentialities

As noted, surgical and pharmaceutical therapies have directly intervened in the human composite but with quite limited goals; namely, to remove a pathological condition or to alleviate pain. The new biotechnologies look to interventions, the results of which are to be passed on to future generations and which will generate new norms of health. Thus they look to developing new types of human beings. Humans may well become the major artifact of technology. Let me list only a few applications.

1. Amniocentesis and selective abortion: Amniocentesis is a procedure whereby discarded fetal cells are drawn from the amniotic fluid in the womb of a pregnant woman and put through biochemical and cytological examinations to determine the presence or absence of certain genetic defects. Some have proposed that this technique be made more sophisticated so that carriers of a genetic defect (who do not have the genetic disease) could be identified. Then all the carriers of a particular defective gene like that responsible for cystic fibrosis or sickle cell anemia could be aborted. Over a period of about fifty years a disease like cystic fibrosis could be eliminated by aborting twenty or so million carriers. This is obviously a negative form of eugenics, culling the weak and deformed from the population. But once they are gone we shall have strengthened and improved the human genetic stock — so they say. What is not said is that it is not “bad genes” that have been removed from the population, but “people with bad genes.”

2. Monitored mating: In the late nineteen forties and early fifties, a noted geneticist, Hermann J. Müller, proposed that reproductive cells be removed from all adolescents and stored. These adolescents would then be sterilized. Their lives would be monitored and evaluated. The reproductive cells of those who lived “good civic lives” would then be mated. Theoretically this would lead to a more reproducible improvement of the human race than is possible with what one dyspeptic scientist has called “the roulette of random reproduction.” Müller’s proposal was a flight of fancy when *Gaudium et Spes* was written. It can be carried out now. We can successfully freeze and store sperm, ova and embryos. Now that *IVF* techniques are more reliable, all that is needed is the social will to do it. Moreover, we can improve on Müller’s suggestion. With better genetic knowledge and far more sophisticated computers available, we can mate the reproductive cells both on social and genetic criteria.

Dr. Linus Pauling set forth an interesting variant on such thinking:

I have suggested that there should be tattooed on the forehead of every young person a symbol showing possession of the sickle-cell gene or whatever other similar gene...that he has been found to possess in a

single dose. If this were done, two young people carrying the same seriously defective gene in a single dose would recognize this situation at first sight, and would refrain from falling in love with one another. It is my opinion that legislation along this line, compulsory testing for defective genes before marriage, and some form of public or semi-public display of this possession, should be adopted.¹¹

3. Nuclear transplantation, or cloning: The nucleus of the reproductive cell (half of the human chromosomal content) is removed from the cell and replaced in the properly prepared cell by the nucleus of a differentiated cell (the total chromosomal content). This is chromosomally equivalent to fertilization. Barring accident, such a cell will grow into a mature individual with practically the same genetic characteristics as the donor of the differentiated cell. This technique has been successful with many types of plants and animals. As Dr. Robert Collier, in speaking of reproduction in animals, has stated:

Cloning ... holds the promise of truly supplying a potentially unlimited number of copies of the same animal. The resulting clones can be stored frozen or used to place in recipient animals. The trick is to identify the superior embryo while it is still outside any recipient animal. This is presently not possible. Also, for reasons I will outline below, the process of cloning has not produced truly identical animals.

The cloning process involves permitting the desired embryo to grow to the 64-cell stage. The embryo is then dismembered to produce 64 individual cells. The nucleus from each cell is then taken out and placed in an unfertilized oocyte (egg obtained from ovaries from slaughter houses) that has had its own nucleus removed. Thus, 64 nearly genetically identical embryos are produced which can then be allowed to grow to the 64-cell stage and the entire process repeated. Since the mitochondria are maternally inherited (found only in the egg and not the sperm), and since each nucleus is placed in a different ovum, there is an obvious mitochondrial difference between clones. In addition, it has been discovered that cells from one location of the 64-cell embryo (inner cell mass) produce very large fetuses which have to be delivered by Caesarian section. The resulting offspring grow to be 15-20% larger than normal. However, cloning has reached the stage where it is practically possible to create 64 individual animals from one embryo. It is important to remember that cloning adds nothing new to the genetic pool. The value lies in enabling rapid proliferation of desirable genomes which might otherwise be confined to small numbers.¹²

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Successful application to human beings is, however, a question of technique, not of principle. We still must learn how to get adult cells to produce material suited for fetal development. We don't yet know how to do this. Cloning, an asexual mode of human reproduction whose product will be almost totally predictable, When perfected, it will be one of the most revolutionary technological events in human history.

4. Molecular biology: in many ways molecular biology is the leading edge of "physics" in the life sciences. The last forty years or so, beginning with Watson's and Crick's discovery of the "Double Helix" structure of the "master molecule," deoxyribonucleic acid (DNA), a dozen years before the publication of *Gaudium et Spes*, has seen enormous development in molecular biology and genetics. Scientists have learned enough about DNA to develop technologies for experimental use to correct some genetic defects. Almost every issue of *Science*, for example, carries a notice of the identification of another gene responsible for a serious genetic disease.

Perhaps the clearest manifestation of the perceived importance of molecular biology is the U.S. government's launching of the Human Genome Project. This is a multi-billion dollar research effort to sequence and map the entire human genome — with approximately 2.8 billion base-pairs.¹³ Dr. Stephen Lefrak quoted a few statements from some of HGP's greatest proponents: "Walter Gilbert, a world class molecular biologist, said, 'the total human (genome) sequence is the Holy Grail of human genetics.'"¹⁴ Dr. Lefrak, in the same article, also quotes (not with complete approval) Dr. Renato Dulbecco:

Its [HGP] significance would be comparable to that of the effort that led to the conquest of space and it should be carried out with the same spirit. Even more appealing would be to make it an international undertaking, because the *sequence of the human DNA is the reality of our species* (emphasis mine), and everything that happens in the world depends on those sequences.¹⁵

Many ethical (I prefer "moral") considerations arise from molecular biology. Here I simply want to note that in therapeutic issues we must distinguish between somatic gene therapy (applies only to the one carrying the disease) and germ-cell (reproductive cell) therapy (will affect future generations). There is also a distinction between therapeutic genetics and what I call "enhancement genetics." Until now, almost all of the research has been directed to somatic cell therapy; that, however, is now beginning to change.¹⁶ Beside germ-line therapy, the attempt to "direct evolution" has been an enduring human temptation.

5. Embryology/IVF: On July 25, 1978, Louise Brown was born in Britain, the product of an IVF and embryo transplant procedure. Her birth was accompanied with full press coverage,

acclaim for the scientists' accomplishments and the hope that this exploit holds out to hitherto childless couples as well as, finally, a sense of foreboding about what this technological feat might mean for humanity.

Fertilization *in vitro* is a development (or by-product) of a large amount of reproductive biomedical research over the preceding two or three decades.¹⁷ This research, which had already created the contraceptive pill, intrauterine devices, safer and more efficient methods of abortion, is used to open up the several fronts of experimental embryology, artificial or asexual reproduction, genetic engineering and eugenics in general.

The process of fertilization, the joining of male and female germ cells into a new fertilized egg, has been understood only in the last fifty years. In the IVF process, the ripe egg is removed from the ovary by laparoscopy. It is then joined to the sperm outside of the mother's body. When grown to the proper stage, the blastocyst is reimplanted in the mother's (or some other woman's) womb. Prior to re-implantation one has the additional option of multiplying the copies of the embryo, either storing them for future use or placing them in different environments (i.e., families). If everything proceeds well, the process eventuates in a normal birth. Ostensibly the technique was developed to treat women who could not conceive because of blocked Fallopian tubes. Now, many other reasons are given for its use.

As Dr. Claude Lanctôt has suggested¹⁸, the questions arising from life technologies, such as IVF, must be considered on a broad base. We cannot adequately handle moral issues (contraception, abortion, IVF, cloning and so on) merely by considering each as if it were unconnected with many other phases of the technologization of human beings. They must be considered within the context of a broad-gauged technological revolution, and, also, in the context of a collapse of the moral theological consensus in the Church. It is interesting to note that Dr. Lanctôt's observations were made less than a decade after the publication of *Gaudium et Spes*. Probably no single biomedical technique can rival IVF in its importance "for the culture."

Recently in the United States, the Clinton administration vacated the ban on federal funding of research on embryos and on fetal tissue which the previous two administrations had put in place. Although no funding has yet been provided, it is now possible for researchers to submit grant requests to the government for such research. The creation of human embryos solely for research is not permitted, but this will have very little effect on the overall research. At approximately the same time, an international ethical "consensus" seems to be growing on the use of information from the Human Genome Project. This "consensus" looks primarily to the following areas of concern:

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autonomy, privacy, justice, equity and quality. As the authors of a recent report state: “Ensuring that these international areas of ‘commonality’ are reinforced and adopted by the HGP is an ethical and political challenge — a unique opportunity to direct rather than react.”¹⁹ Further consideration will be paid to the ethics of the Human Genome Project later in this paper.

6. Neuroscience: The strides made in this area of the life sciences since the publication of *Gaudium et Spes* are too numerous even to list. Let me just point out such things as new scanning equipment [including CAT scanners (computerized axial tomography), PET (positron emission tomography) and MRI (magnetic resonance imaging)], whole new families of analgesics and mind-altering substances and a vastly deeper understanding of the molecular chemistry and activity of the brain; behavior and its control is a major objective of both neuroscience and eugenics. Scientists, halfway through this “Decade of the Brain” are looking toward the understanding of single events in the brain. Less than two decades ago Dr. Robert White, in forecasting such advances, remarked that the then-available capability resembled “hanging a microphone over Chicago.” That kind of limitation on available capability is rapidly vanishing.

I do not intend to extend this painfully brief treatment, not because it’s not important, but for a quite different reason. The Church, I believe, does not consider neuroscience to have the same doctrinal importance as the reproductive sciences and technologies. It is my belief that this situation exists, not because “old male celibates are hung up on sex,” but because the Church (rightfully in my mind) is deeply concerned with the intrinsic linkage between human sexuality and procreation on the one hand and its (the Church’s) essentially marital covenantal relation with Christ on the other. The neurosciences and technologies are critically important to our human future, but they do not immediately touch on the Church’s relationship with Christ.

Social/Moral Questions

The Church is facing a great technological (and spiritual) challenge; namely, the growing capacity technologically to master ourselves physically, mentally and perhaps spiritually. For the first time we face a technological challenge which must be met primarily in terms of human ends, not merely in terms of instrumentalities. We live in an especially critical time in history and in salvation history. In our present situation, any fascination with or reliance upon bioethics, unsupported by an understanding of ends and purposes, either within or without the theological-ecclesial community, is misplaced. Bioethical (and often moral) discussions rarely proceed to questions of meaning. Usually they are pragmatic, more concerned with desires than with virtues, hardly concerned at all with the ideas and convictions which undergird any moral or ethical system.

Among other things, any understanding of our present situation must include the contemporary scientific-technological frame of mind out of which judgments are most likely to be made in and for society.

The scientific-technological frame of mind is basically instrumental, having grown out of a mathematical world view. It looks on all things, human beings now included, as *essentially* quantifiable and manipulable. Michael Zimmerman has stated it succinctly: “For us (contemporary humanity) *to be* means *to be re-presented*, or transformed and re-arranged, according to our desires and projects.”²⁰ A spirit of transformation and re-arrangement is at the heart of the scientific and technological spirit. As science and technology increasingly turn toward knowledge of and power over the human, this spirit of transformation will become increasingly worrisome to society and even more to the Church. Bioethics (even moral theology) *of itself* will be of little help in meeting this challenge. It is absolutely necessary to develop a basic understanding of the human in the context of the new powers. In short, it is essential to develop a Christian anthropology drawn from Revelation but consonant with contemporary scientific knowledge.

As noted earlier, the new technologies, to achieve their potential, cannot be conducted on an individual *ad hoc* basis. Rather, their application must be *systematic*, i.e., methodical and methodological. “Methodological” must be carefully considered. A systematic technological intervention into the human composite demands a controlling system. These new powers will be tied to some dominant social system. The principal reason for any social application of biomedical or biogenetic technologies is more order, less randomness, i.e., less freedom and less moral responsibility. Making changes to be passed on to future generations to develop new norms of health is eugenics. This word is (justifiably) freighted with the horror of the policies and practices of the Third Reich. While it is impossible completely to put aside this negative reaction, “eugenics” is used here in its root sense; namely, well-bred. But we must be aware that many proposed uses of biotechnology is directly aimed at eugenics.

Any society-wide advance in improving the human stock will eventually demand new criteria for judgment. In this regard *Gaudium et Spes* remains a most pertinent document: biotechnological advance must be located in “the culture.” As we move from concern for individuals to concern for society or for mankind, what criteria will be applied to bioscientific discovery? Most likely — maybe inevitably — the criteria for the social application of bioscience will be the basic canons of experimental science wedded to the desires and demands of the dominant cultural system. These three canons of experimental science are simplicity, predictability, and reproducibility. Technologically, simplicity becomes efficiency. Any rational

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attempt at eugenics demands a predictable product. Without such a result, one might as well be content with the normal processes of procreation. Moreover, if predictable results are not reproducible, eugenics is a fleeting dream; randomness will not have been overcome. As Frankel has stated:

The most astonishing question of all posed by the advent of biomedicine, probably, is why adults of high intelligence and considerable education so regularly give themselves, on slight and doubtful provocation, to unbounded plans for remaking the race. . . . What unites the Puritan radicals, the Jacobins, the Bolsheviks, the Nazis, and the Maoists is the deliberate intention to create a “new man,” to *redo the human creature by design* (italics mine). That is the modern idea of Revolution. . . . It is what has lifted revolution in the modern world above purely mundane concerns . . . and has made it a process of transcendent meaning, beyond politics or pity, and justifying any sacrifice. These are the accents with which Sir Francis Crick, still another Nobel laureate, speaks, when he states his belief that no newborn infant should be declared human until it has passed certain tests regarding its genetic endowment, and that if it fails these tests it forfeits the right to live.

The partisans of large-scale eugenics planning, the Nazis aside, have usually been people of notable humanitarian sentiments. They seem not to hear themselves. It is that other music that they hear, the music that says that there shall be nothing random in the world, nothing independent, nothing moved by its own vitality, nothing out of keeping with some idea: even our children must not be our progeny but our creation.²¹

This “nothing random,” “nothing independent,” is the hallmark of experimental science. In the laboratory, the system under investigation must be closed as tightly as possible. No random variations can be tolerated, i.e., the results must be reproducible. If variables cannot be accounted for and controlled, no valid experimentation is possible. The social application of a biotechnology based on such criteria demands the closing of the social system, demands that no random, independent, uncontrolled variations take place. Spontaneities such as “uncontrolled reproduction” or “deviant” behavior of any kind — however “deviant” might be defined — cannot and will not be permitted. This is essentially Aldous Huxley’s vision in *Brave New World*. Seventy years have confirmed the validity of that vision.

The scientific canons of simplicity (efficiency), predictability and reproducibility were developed for experimentation on inanimate objects. The adoption of the methods of physics by the life-sciences has triggered their sudden growth toward technological and industrial application. The use of these

canons is premised on the total manipulability of matter; the knowledge sought is objective and quantifiable. Laboratory science based on quantification needs complete freedom to transform and rearrange the basic structure of matter. Such science, applied to humans in a collective fashion, demands the unrestricted control of social life. Such a closing of social options is inevitable if biotechnologies are to be used systematically to improve society and humankind. Judging from proposals made by many social planners — not to be confused with sociologists — these technologies will be used systematically. We already see an example in the culling process of widespread abortion for “fetal indications” to remove those who would burden society. The use of these sciences certainly has to be considered in the broader framework offered by *Gaudium et Spes*.

In brief, the *social* application of biotechnology will not be aimed at individual therapy. At best, it can be said to be therapeutic for society, for the “good of the species,” or some other abstraction. The systematic technological intervention into the human is a salvation scheme. The “nothing random in the world, nothing independent, nothing moved by its own vitality, nothing out of keeping with some idea” should alert the Church to the fact that the source of the social idea to be used as the basis of the social use of these technologies is “religious.”

Our century has seen many competing attempts at the secular redefinition of the human, all of which have, as Eric Vögelin²² and Karl Löwith²³ have shown, a common characteristic: reductively, they are all Christian heresies. They are all gnostic salvation schemes oriented in one way or another to that final state when justice will pervade the earth in history; they all represent a present, immanent eschatology. These utopian cultural forces are, in their manifold forms, the basic vehicle for the contemporary attack upon the Church. Since it is here that this technological revolution will have such a critical impact on the Church, it is also here that an understanding of the message of *Gaudium et Spes* is crucial.

Since secularism is a dominant social force in our culture,²⁴ it is necessary to understand its impact. Secularism postulates the temporal perfectibility of the human, taking upon itself the remedying of social evils and injustice. Having postulated that social ills must be remedied in time — a denial of the Christian eschaton — society must either totally ignore the remedy or provide a total remedy. Alleviating social evils is not a viable option because it puts a remedy off to some indefinite future. A full secularistic approach to reality leads either to anarchy (no remedy) or totalitarianism (full remedy). “Total remedy” demands the “nothing random in the world” that Frankel mentions.

We are dealing with a monism based on a quest for unity in uniformity, in the predictable and reproducible. As such, it

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corresponds to Frankel's diagnosis of the pathology inherent in a systematic application of the technological vision to human beings: "that there shall be nothing random in the world." Vatican II's statement (*Gaudium et Spes*, 33-34) that technology *in se* accords with God's will is correct. When technological effects on humans were mediated and moderated by a physical and social environment external to the human, it was adequate to consider technology *in se*. When technology consists of direct, immediate and systematic intervention into the human composite, Vatican II's approach will no longer be adequate, or even possible. There is no longer the leisure to consider these technological capabilities *in themselves*. As *Gaudium et Spes* itself teaches, they cannot be separated from cultural elements, not least of which is a growing hatred of the faith and of the human beings whose dignity and transcendent worth that faith affirms.

Let us consider *IVF* as a paradigmatic example of a specific moral issue. As a development of reproductive research, it is less an isolated technological achievement than part of a chain of technological advances that will stand as the basis of a new world and, perhaps, of a concept of the human alien to the Christian tradition.

Within the Church and within the prevailing culture, the state of a question is always set by the "innovator." As one might suspect, the question is usually cast in favor of the specific short-term goal of the innovator. It is usually cast in a more "sentimental" than "truth-seeking" form. In three great moral questions of the last thirty years (contraception, abortion and "test-tube babies"), none of the issues seem to have been engaged beyond individual short-term effects. The questions posed to the Church from within and without have been of the following kind: "How can you deny Catholic married couples the use of technology available to regulate and control the number of children they will have?" "How can you deny a woman the right to control her own body, especially in a more than usually serious situation?" "How can you deny a couple deeply in love a biological child of their own?"

Besides being cast in form designed to put the Church on the defensive, all these questions ignore history. They take for granted that individual acts of people are self-contained and have no relevance either for society or for the growing Kingdom of God. Has the Church successfully posed a better question? Prophetic proclamations about science and technological application demand broader and deeper questions about the lives of individual Catholics and the Church's loving service to the Lord of history. The meaning of reproductive science and technology in contraception, abortion and *IVF* is critical. What does the movement from "sex without babies" (contraception and abortion) to "babies without sex" (*IVF*) mean in the light of Revelation? Ethics or moral theology cannot provide this meaning.

In individual cases the espousal of the legitimacy of technological contraception may not automatically lead to an acceptance of the legitimacy of abortion. Many sincere people who accept contraception fight abortion. Nonetheless, socially, the acceptance of the "virtue" of contraception was needed to break down the public consensus that abortion is an unspeakably heinous crime. Culturally it is necessary to separate sexual activity from procreation before the culture can accept eugenics, can build a social attitude willing to consider a human being as a product of technological achievement. The technological shortcircuiting of cause and effect (sexual union and procreation) — especially in terms of attitudes — is necessary to prepare for a cultural acceptance of eugenics. So long as the notion of babies being natural and desirable in sexual union is retained, there can be no successful eugenics.

Of course, the Church must deal with the individual in moral cases; the above implies nothing to the contrary. But the fact that the Church must deal with individuals in matters of contraception, abortion and *IVF* should not lessen attempts to widen its social and religious perspectives. In short, the Church cannot allow itself to look at the life-technologies only in themselves, without connection to the past or future. To treat them in themselves is to forego living in history; and that is to cease to be Catholic.²⁵

Thoughtful reasons are given for the use of *IVF* techniques: the right to have one's own biological child has few, if any, restrictions; important knowledge can thus be obtained; it is more human to control our reproduction at all levels. The desire for children of one's own lineage is significant; the desire for and need of more information about our bodies and their processes is good. We need greater understanding of our physical composition to help us alleviate the physical evil of disease. Finally, a case can be made that rational control over things, ourselves included, is more human — not forgetting, however, that rational deliberateness is an essential note of sin as well as of virtue. In general, these purposes are good. But there are social and religious problems with these arguments.

It has been argued that procedures like *IVF* (or heart transplants or AIDS treatment) drain talent, money and research time from things more directly related to the social good. If such a procedure as *IVF* remains only for the use of individual couples on an individual basis, it has health ramifications no broader than the individual couple.

Is *IVF* therapeutic? It is not primarily aimed at removing or curing a pathology; it is directly aimed at the psychological and social well-being of the infertile couple. The procedure is therapeutic only in an extended sense of that term. Dr. Leon Kass, M.D., of the University of Chicago, argues for the "old-fashioned view" that health is the true goal of the physician's art.

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Practices such as *IVF* are not directed toward a patient's health but toward satisfying the patient's wishes. Although these wishes may be quite reasonable, these acts and practices "are acts not of medicine but of gratification: for consumers, not patients." The need for a doctor's skill to achieve successful *IVF* does not make it a medical procedure, at least in a traditional sense of medicine. The physical pathology has not been approached, much less remedied. Furthermore, we are related to each other and events are related to other events. If the question of *IVF* is one of good or bad, whose good is to be served? How wide a network of human beings is to be considered? Is it relevant to take into consideration only the patients' interest? only the doctors' interest? Is it relevant to ask about the baby's interest in this situation?

Other problem areas in what can be called "social ethics" are a wastage of zygotes (many eggs are usually fertilized and the one that "looks best" is chosen or implantation into the mother's womb; the other zygotes are destroyed). This is not abortion in the strict sense of the word, but it is the destruction of deliberately-started, unique individual human life. This destruction is, however, not a matter of principle so much as a matter of practice. The use of surrogate mothers, i.e., of women hired to bear the baby in the place of the woman who supplied the egg, must be considered. Complex legal struggles (and legal concepts) have developed here. What if, after the pregnancy and birth, the "womb-mother" decides to keep the child to whom she has just given birth? Who is the baby's real mother? Is it the "womb-mother"? Is it the "egg-mother"? Does the "father" have any rights? This is now a matter for the courts in the United States. What happens if the "womb mother" decides upon an abortion? The United States Supreme Court (in *Roe v. Wade* and other decisions) has decided that abortion is merely a private matter between the pregnant woman and her doctor. The father has no rights in this matter, so why should the "egg-mother"?

Although these latter remain intriguing questions, they are not the most important issues even on the social level. They remain on the level of "appliances," to use Boardman's language;

***The essential question for us in the
advance of biological science,
technology and industrialization is
what it means to be human.***

they do not get down to the meaning of things. The essential question for us (as it was in *Gaudium et Spes*) in the advance of biological science, technology and industrialization is what it means to be human. This question faces every human generation. But it has been granted to the generations now alive to

preside over the beginnings of the greatest technological revolution the world has known. The Church, the repository of the true meaning of human existence and human destiny, must challenge the world with these questions of meaning. No other agency will do so. *IVF* as a successful procedure has been added to our already revolutionary technological repertory. We cannot allow ourselves or society to ignore the significant role that these biotechnologies will have in our lives now and in our future scientific and technological development. We must persuasively inform the world about the cost to human freedom and dignity involved in the new technologies. While we can be sure that we shall find answers in Revelation, it is our task to raise the proper *questions*, those that will aid us in developing more fully our knowledge of God's will.

We cannot be content with the questions about biotechnology and bio-industry raised by the culture. We must ask our own questions and, if the answers to those questions are negative, we must persuade the culture that *IVF* (and other technologies) is not merely a benign new technique that will be used only to help some infertile couple have its own biological child. While *IVF* does indeed provide this opportunity, it is also one of the linchpins necessary for the construction of a fully orchestrated eugenics program. It is naive to ignore the eugenic probabilities thus opened up. This is neither to espouse some kind of intellectual "domino effect" nor to suppose that abuse, or, even more, potential abuse should suppress use. It is, rather, a sober, non-sensational analysis of where we are and where we shall go if we are not alert to the meaning of procedures like *IVF*.

IVF, of course, is not the only procedure that raises serious issues. The Human Genome Project, along with just about every other scientific/technological advance, does so also. As Doctor Evelyn Crump has written:

Besides raising old ethical issues in new contexts, genetic research, with or without HGP, is well on its way to developing germ-line gene therapy, embryo diagnosis and therapy, preimplantation diagnosis and therapy, and even gametic analysis and therapy. As those technologies are developed and adopted, a whole set of unfamiliar ethical issues will arise . . .²⁶

Doctor Crump notes later:

Fortunately, at least a part, up to 3%, (five million dollars for 1992) of the HGP budget has been earmarked for study of the ethical, legal, and social implications of HGP research. When (Dr. James) Watson became director of the National Center for Human Genome Research he established the HGP Working Group on Ethical, Legal, and Social Implications of HGP (ELSI). Its six members have backgrounds in civil rights law, ethics, medicine, and science. All have had considerable personal interest

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and experience in analyzing the implications and social effects of genetic screening programs. While the group's first assignment was to decide how to spend most effectively ELSI's part of the HGP budget, the members quickly expanded its tasks. They drew up a list of the kinds of research and other projects that should be funded and circulated them within the scientific community, urging that proposals seeking funding put strong emphasis on solutions to social dilemmas and on public policy options...²⁷

Dr. Crump²⁸ notes in concluding her essay that, as the fundamental knowledge of life processes increases, the capacity to control more and more facets of human life will expand.

It becomes important, then, to remember that as human beings "we have the freedom to destroy our capacity to be free."²⁹ Each new advance in reproductive biology, organ and cell culture, designer drugs, and proteins now poses new questions that challenge traditional values about human life. Mapping the human genome, exploring the eugenic possibilities of somatic and gametocytic genetic engineering, and expanding the uses of artificial intelligence and artificial organs are examples of developments that surely will have profound ethical implications but whose ethical ramifications are still poorly understood.³⁰

Endnotes

1 All the citations of *Gaudium et Spes* are taken from Vatican Council II: The Conciliar and Post Conciliar Documents, Austin Flannery, O.P. editor, Northport, NY: Costello Publishing Company, 7th printing, 1984.

2 Donald Campion, S.J., "The Church Today," in *The Documents of Vatican II*, Walter M. Abbot, S.J., editor, New York: Guild Press, 1966, p. 190.

3 In this paper I shall concentrate on scientific and technological advances, as well as cultural trends in the United States. I do not feel competent to discuss other cultures in any great detail. Although much is happening outside the United States, it may be used as paradigmatic in this arena.

4 Robert J. Collier, *The Science and Politics of Food*, (eds. Robert Brungs, S.J. and Marianne Postiglione, RSM), St. Louis: ITEST Faith/Science Press, 1995, p. 172.

5 Herbert Butterfield, *The Origins of Modern Science 1300-1800*, revised edition, New York: The Free Press, original copyright 1957, pp. 197-198.

6 Dr. David Schlessinger, "Influence of Genome Studies on Human Evolution." This paper is a lecture presented to the Istituto Italiano di Studi Filosofici, Naples, Italy, November 22, 1989. It was reprinted in *The Human Genome Project*, St. Louis: ITEST Faith/Science Press, 1993, p. 226.

7 See, "Through the Glass Lightly," *Science*, Vol. 267. 17 March 1995, p. 1609. This article is a collection of the responses of "scientists at the frontier" to the question of what they see in the future of science. Only one (by Harvey F. Lodish, Whitehead Institute for Biomedical Research, Cambridge, Massachusetts) will be partially quoted here. "By using techniques involving *in vitro* fertilization, it is already possible to remove one cell from the developing embryo and characterize any desired region of DNA. Genetic screening of embryos, before implantation, may soon become routine. It will be possible, by sequencing important regions of the mother's DNA, to infer important properties of the egg from which the person develops.... All of this information will be transferred to a supercomputer, together with information about the environment — including likely nutrition, environmental toxins, sunlight, and so forth. The output will be a color movie in which the embryo develops into a fetus, is born, and then grows into an adult, explicitly depicting body size and shape and hair, skin, and eye color. Eventually the DNA sequence base will be expanded to cover genes important for traits such as speech and musical ability; the mother will be able to hear the embryo — as an adult — speak or sing."

8 C.S. Lewis, *The Abolition of Man*, New York: Macmillan, 1947, p. 37.

9 Charles Frankel, "The Specter of Eugenics," *Commentary*, Mar., 1974, p. 27.

10 Harry Boardman, "Some Reflections on Science and Society: A Terrain of Mostly Cliches and Nonsense, Relieved by the Sanity of Whitehead." This lecture is available to the author only in manuscript form and further publication data is not known. It was delivered, as I recall, around 1973 or so.

11 Linus Pauling, "Foreword to 'Reflections on the New Biology'" *UCLA Law Review*, 15:2 (Feb., 1968), 269. Quoted by Frankel, *op. cit.*, p. 28).

12 Robert Collier, "Impact of Advances in the Animal Sciences on World Food Production, Proceedings of ITEST Workshop on *The Science and Politics of Food*, St. Louis: ITEST Faith/Science Press, 1995, p. 6.

13 A base-pair is two nucleotides (adenosine and thymidine or guanosine and cytidine) held together by weak bonds. Two strands of DNA are held together in the shape of a double helix by the bonds between base pairs. A DNA sequence is the order of base pairs whether in a stretch of DNA, a gene, a chromosome, or an entire genome (all the genetic material in the chromosomes of a particular organism). Genetic mapping consists in determining the relative locations of different genes on chromosomes.

14 Stephen S. Lefrak, M.D., "The Human Genome Project: Strategic Plan or Boondoggle," in *The Human Genome Project*, St. Louis: ITEST Faith/Science Press, 1993, p. 40.

15 *Ibid.*

Continues on page 16

16 According to a very brief notice in *Science* (Vol. 266, 9 December, 1994) The National Institutes of Health's Recombinant DNA Advisory Committee (RAC) plans to create a panel that will study genetically altering human fetuses and germ-line cells. Up until now, gene therapists have been barred from manipulating egg and sperm cells. Food and Drug Administration (FDA) molecular biologist Amy Patterson is reported by *Science* to have urged the panel to study fetal gene therapy. This comes not long after NIH's recommendation to conduct experiments on living human embryos. Clearly the pace of human experimentation is picking up. I suggest that we might all ponder the limitations (if we think there are any) to our human quest for knowledge. Is "knowledge" the highest goal to be sought?

17 For a brief history of the early work on *in vitro* fertilization see Claude Lanctôt, M.D., "In Vitro Fertilization: An Overview," in *Fabricated Man: In Vitro Fertilization*, ITEST Proceedings, October 1974, pp. 2-23. Cf. also, Robert Brungs, S.J., "A Proposito della Fecondazione *in vitro*", *La Civiltà Cattolica*, Vol. I, Quaderno 3087, 3 Feb., 1979, pp. 217-231. Many of the ideas developed in the present paper were originally suggested in the 1979 article.

18 Claude Lanctôt, M.D., "In Vitro Fertilization: An Overview," in *Fabricated Man: In Vitro Fertilization*, ITEST Proceedings, October 1974, p. 29.

19 Bartha Maria Knoppers and Ruth Chadwick, "The Human Genome Project: Under an International Ethical Microscope," *Science*, vol. 265, 10 September, 1994, pp. 2035-36.

20 Michael Zimmerman, "A Brief Introduction to Heidegger's Concept of Technology," *HPT (Humanities Perspectives on Technology) News* (Lehigh University), No. 2 (Oct., 1977), p.1.

21 Frankel, *op. cit.*, pp. 32-33.

22 Eric Vögelin, *The New Science of Politics*, Chicago: University of Chicago Press, 1952.

23 Karl Löwith, *Meaning in History*, Chicago and London: University of Chicago Press, 1949.

24 Cf., *Secularism versus Biblical Secularity*, eds. S.M. Postiglione, RSM and R. Brungs, S.J., St. Louis: ITEST Faith/Science Press, 1994.

25 This statement is a paraphrase of John Henry Cardinal Newman's remark: "To be deep in history is to cease to be a Protestant." (*An Essay on the Development of Christian Doctrine*, New York: Doubleday, 1960, p. 35).

26 Dr. Evelyn Crump, "The Human Genome Project: Whither Are We Hastening?", *The Human Genome Project*, St. Louis: ITEST Faith/Science Press, 1993, p. 22.

27 Crump, *op. cit.*, p. 24. Dr. Crump then lists many of the issues ELSI identified:

1. fairness in the use of genetic information with regard to insurance, employment the criminal justice system, education, adoptions, the military, any other areas that can be identified;
2. impact on the person of knowledge of genetic variation including stigmatization, ostracism, labelling, self image;
3. privacy and confidentiality of genetic information relative to ownership and control of genetic information, consent issues;
4. impact on genetic counseling in such areas as prenatal testing, presymptomatic testing, carrier status testing, testing for disorders for which no therapy is available, counseling and testing for polygenic disorders, population screening versus testing;
5. reproductive decisions influenced by genetic information regarding effect of genetic data on options available, use of genetic information in decision-making process;
6. issues raised by the introduction of genetics into mainstream medical practice on qualifications and continuing education of all appropriate medical and allied health personnel, standards and quality control, education of patients, education of general public;
7. uses and misuses of genetics in the past and relevance to the current situation, e.g., the eugenic movement in the U.S. and abroad, problems arising from screening for sickle-cell trait and other recent examples in which screening or testing resulted in unintended and unwanted outcomes;
8. questions raised by the commercialization of the products from the HGP in areas of intellectual property rights (copyright, patents, trade secrets), property rights, impact on scientific collaboration and candor, accessibility to data and materials;
9. conceptual and philosophical implications of the HGP on the concept of human responsibility, the issue of free will versus determinism, the concept of genetic disease, particularly in view of the high rate of genetic variability and the large numbers of people who will be found to have genetic vulnerabilities.

28 *Ibid.*, p. 27.

29 Gilbert Meilander, "Mastering Our Gen(i)es: When Do We Say No?", *The Christian Century*, 107, 1990, pp. 872-875.

30 Edmund D. Pellegrino, Mark Siegler and Peter A. Singer, "Future directions in clinical ethics," *The Journal of Clinical Ethics*, 2 (1): 1991, pp. 5-9.