

GAUDIUM ET SPES AND BIOLOGICAL ADVANCE

by
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 Antonianum, Via Merula, 124 Roma, Italia 70 (1995)

INTRODUCTION

Toward the beginning of *Gaudium et Spes** 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)."ⁱ

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 biology** alone leaves little doubt about the extent of those "profound changes." We

* 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.

** 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

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 an 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

happening outside the United States, it may be used as paradigmatic in this arena. (**This is part of endnote 3.**)

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.ⁱⁱ

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. . . .ⁱⁱⁱ

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; 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 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 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.^{iv}

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.^v

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."^{vi} Also, as 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.^{vii}

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.^{viii}

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.

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.^{ix}

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 Cæsarian 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.^x

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.*** 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.'"^{xi} 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.^{xii}

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.^{xiii} 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.^{xiv} 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

*** 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.

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 suggested^{xv}, 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: 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."^{xvi} 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."^{xvii} 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 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.^{xviii}

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 Vögelin^{xix} and Karl Löwith^{xx} 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,^{xxi} 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 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.^{xxii}

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. 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; 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 . . .^{xxiii}

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 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. . . .^{xxiv}

Dr. Crump^{xxv} 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."^{xxvi} 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.^{xxvii}

THIS IS THE END OF PART I OF THE ARTICLE. FOR THE FALL BULLETIN WE WILL START PART II WITH “DOCTRINAL IMPLICATIONS:

DOCTRINAL IMPLICATIONS

This section is built on three assumptions. First, like every other intellectual discipline, theology is a quest, a *quaerens* — from *fides quaerens intellectum*. In graduate school one of my physics professors began each class with the statement: "Gentlemen, you will not get the correct answer until you have asked the correct question." In many ways theology is simply an exercise in asking the right questions of Scripture and Tradition. Science, as well as all other disciplines, at its best is a process of asking better and better questions of the natural universe. Every advance should allow us to ask more penetrating questions. This can perhaps be seen even in the broad scope of the great theological struggles over the millennia: the "nature" of God, the "nature" of the Church and the role of the sacraments and, now, the "nature" of the human both individually and communally.

A second assumption is that the only creation that concerns the Christian is the creation-as-it-is. That creation is created in Christ, redeemed in the Incarnation of the Word and led forward by the Spirit toward the final fulfillment of God's work. It includes the physical parameters within which God's creative and redemptive gifts exist, grow and develop. Our understanding of that creation includes primarily the Revelation — Scripture and Tradition — and secondarily the authentic discoveries of science.

Gaudium et Spes's "individual and collective activity, that monumental effort of man through the centuries to improve the circumstances of the world, presents no problem to believers: considered

in itself, it corresponds to the plan of God. . . . (33)" represents a step between Pope Leo's statement in *Providentissimus Deus*^{xxviii} and Pope John Paul's more recent statements.^{xxix} In 1965, the Council's statement about science and technology was significant. It was a statement with conciliar authority declaring the intrinsic goodness of scientific effort and achievement. Thus, science and technology were seen in the Church as more than rhetorical tools with which to defend the Faith. They were seen as valuable in themselves.

Finally, I am assuming that the ultimate root of Catholic morality and thought is Revelation, not philosophy. Natural law as it has been used is not adequate to today's issues, especially those, both individual and communal, coming from advances in the life sciences. Natural law, however, has been based on an entirely new, Eucharistic, base by Pope John Paul II in *Veritatis Splendor*.^{xxx} Again, as before, *IVF* can be considered as a paradigmatic case.

In its statements to the world, the Church should call attention to the growing technologization of the human with its threat of further depersonalization. *IVF* is a hinge of major importance in this technologization. The Church would do well not to concentrate on the morality of *IVF* in itself, separated from the movement of which it forms a major component. When speaking to Catholics, however, the Church has much more than that to say and it must be said. To those for whom marriage is a sacrament, the Church must proclaim that human existence requires human love. When love is removed from the intimate association of a husband and wife for purposes of convenience, greater success, or whatever, the laboratory solution represents an ultimately destructive desacramentalization, one erosive precisely of the love-inspired good intentions that led to the use of the procedure. It is an interruption in the communication of love between the partners at least in the sense that a third person, the technician, translates and interprets this communication. So viewed, *IVF* is alien to the sacramental sign of conjugal love. It seems to substitute for the symbol rather than supplement or perfect it.

This above statement looks to objective malice or non-malice. The laboratory is a place where history is frozen, where all the free variables of human life are eliminated. In human affairs, especially those relating to love and its expression, there is a contradiction between the control needed in the laboratory and the indispensable spontaneity, the free exercise of personal responsibility which living in history demands. This does *not* make the laboratory a place of immorality, but it suggests that in actions intrinsic to the worship of God, of which sexuality (in marriage) is one, Catholics must exercise care, since, insofar as a process or an action dehistoricizes, it *eo ipso* desacramentalizes.

Christians must enter fully into the creative pattern which is the mission of Christ in the world; our entire reality is our response to this mission. This is the matrix of *Gaudium et Spes*. Our existence in Christ must be patterned on the paradigm of creation itself. In this context, *IVF* is merely manipulative of this creative pattern. It is often supposed that, because it is possible to intervene technologically, it is permissible insofar as we see no harm done. The problem with such consequentiality is that we do not very often see very far. Insofar as we do not serve the growing creation that sacramentally signs the Kingdom of God, whatever we do is an alternative to that sacramental creation — the new creation that St. Paul mentions in 2 Corinthians — and is therefore

destructive. Sexual immorality is immoral precisely because it is a departure from the history of salvation. It contains an ahistoricity, a failure of that exclusivity which is the very pattern of the coming-to-be of the created order: the relation of Yahweh to Israel, of Christ to Church. Is this failure verified in *IVF*? Is *IVF* an aid to the marital symbol or is it a substitute for it?

If the heart of the sacramental marital symbol is sexual intercourse between husband and wife, then *IVF* - a substitute for intercourse in propagating a child — is not acceptable. On the other hand, if the essence of the sacramental marriage is the life together of husband and wife, it would seem *prima facie* possible that *in vitro* processes might be considered as an aid to the fulfillment of the blessings of matrimony. Is it possible that *IVF* of a wife's egg by her husband's sperm can be considered as a technological *aid* to that complex of relationships between husband and wife which is summed up in the biblical phrase "two-in-one-flesh"? This point is not an area for the extension of already existing casuistry so much as it is for the Church's deep, prayerful meditation on the meaning of the matrimonial symbol in its relation to God's saving will.

Argumentation in much of the moral theological consideration of reproductive biological technologies has relied more on some abstract theory of natural law than on the sacramental nature of marriage. Moral argumentation on sexual issues law is to some extent dependent on a prior understanding of what is natural in the area of reproductive biology. Moral theologians, however, rarely argue that the use of artificial limbs or pace-makers (soon brain interventions?) is to be condemned as "unnatural." This strictness in reproductive matters certainly arises out of the Church's intuitive understanding that sexual difference and sexual activity is intimately linked to worship of God in history. If this is true, emphasis should be placed far more heavily on this worshipful character than on some putative violation of the "natural." Many Catholics see the basing of moral teaching primarily on natural law theory, as it has been used over the years, as reactionary. Contemporary mankind more often than not understands "unnatural" to mean "artificial," as if the product of human technological genius somehow stands apart from the rest of "nature." The "two-in-one-flesh" statement of Revelation provides us with a surer base from which to approach these new questions arising from reproductive technologies.

The Church has long taught that a sacrament is a sign which *effects* that which it symbolizes. What does Christian matrimony symbolize? St. Paul tells us (Eph 5) that Christian matrimony symbolizes Christ's relationship to his Church. Since Christian marriage is a sacrament, it effects that relationship between Christ and Church. Matrimony does not create the relationship of Christ and his Church — that pertains to Christ's continued and continual presence to his Church in the Eucharist — but it does effect it by strengthening it, making it deeper and more fruitful. The relationship between a man and a woman in Christian marriage is an image of the already existing relationship between Christ and his Church. As such, it must be patterned on Christ's relationship to the Church. Christian marriage, in which the mutual self-surrender to each other images the mutual self-gift of Christ and his Church, strengthens the Christ-Church relationship. Therefore, the decisive norms and characteristics of Christian marriage are theological, not the social customs of any particular time.

The relationship between Christ and his Church is inevitably fruitful; the Church is already the

fruitfulness of Christ and, united to him, the Church bears fruit. The union of husband and wife is fruitful physically (the procreation of children) and spiritually (the deepening and strengthening of mutual self-surrender to each other). The physical and spiritual fruitfulness of marriage form an unbreakable unity (like the union of body and spirit in an individual). Neither aspect can dominate at the expense of the other. Neither can be ignored, down-played or denied without seriously damaging a relationship which images and effects the union of Christ and his Church.

IVF, looked at in terms of the unitive and procreative aspects of marriage, is the inverse of contraception in which the unitive aspect of marriage is detached from the procreative aspect. In *IVF*, the procreative aspect is removed from the unitive. The physical "fruitfulness" occurs even in the absence of the partners, thus reducing it to mere mating. Since the mating of the gametes is separated in time and space, human procreation becomes merely functional, indistinguishable from animal mating. To suppose that human sexuality in marriage can be submitted to such use is to treat it, not as a sacrament symbolic of Christ's love for his Church, but as something that is of no more overall significance than, say, digestion. This can be shown by an extreme case at present (we think), but one which *can* occur. Suppose that a husband and wife should decide in their reproductive years to have a child born a hundred years from now. Suppose they're wealthy enough to ensure that this will be done. In what sense is that child a "fruit of their love?" Thus, in what way can *in vitro* procedures be considered a technological aid to the fruitfulness of their love? Even when sperm are gathered from sexual intercourse and immediately used to fertilize the already prepared egg, the mating of the cells represents an event separate in time and place from an expression of mutual love.

Even taking *in vitro* procedures as a neutral technology, unconnected with any kind of eugenics, this technological mating of two cells destroys the sacramental unity of the unitive and procreative aspects of marriage. Perhaps we can form a rough analogy from the Church's reaction to the growth of technology in the case of other sacraments. The Church does not allow sacramental confession and absolution by telephone. The Church teaches that sacraments require people present to each other physically. A televised Mass does not satisfy the obligation to attend Mass on Sundays and Holy Days. The comparison is not perfect, but it is helpful to our understanding that sacraments are historical events involving people present to each other and to God. It has been objected that in special circumstances the Church will allow "proxy" marriages. The proxy is a person, not a technological procedure. Moreover, and essentially, the proxy is only a proxy who will not live the sacramental union he or she witnessed as a proxy. In brief, the technologies involved in *in vitro* procedures separate the couple's mutual love from the fruitfulness of that love. Thus it is to be expected that the Church will not (and cannot) countenance this method for those who live a sacramental marriage.

As *Gaudium et Spes* teaches, we live in faith and look ahead in hope to our fulfilled lives when we shall be with God. This faith, while setting practical limitations on our activity, opens our minds and hearts to the richness of God's Kingdom. That faith, hope and love entail a will to engage totally, not partially, in following Christ; it involves a constant willingness to remove the barriers we erect to Christ's action in our lives and a willingness to live in conformity to God's will for his creation as he has revealed it in his Church.

Clearly the above is *not* a final word on biological topics. An immense amount of dogmatic theology remains to be done, especially on our bodiedness. We have not achieved a truly adequate understanding of any part of the revelation. *Gaudium et Spes* states this in somewhat different terms:

These difficulties [in the way of harmonizing culture with Christian thought] do not necessarily harm the life of faith, but can rather stimulate a more precise and deeper understanding of that faith. In fact, recent research and discoveries in the sciences, in history and philosophy bring up new problems which have an important bearing on life itself and demand new scrutiny by theologians. Furthermore, theologians are now being asked, within the methods and limits of the science of theology, to seek out more efficient ways — provided the meaning and understanding of them is safeguarded — of presenting their teaching to modern man: for the deposit and the truths of faith are one thing, the manner of expressing them is quite another. . . .

. . . . Let the faithful incorporate the findings of new sciences and teachings and the understanding of the most recent discoveries with Christian morality and thought, so that their practice of religion and their moral behavior may keep abreast of their acquaintance with science and of the relentless progress of technology: in this way they will succeed in evaluating and interpreting everything with an authentically Christian sense of values. (62)

I believe, however, that I am saying more than the above when I discuss the "development of doctrine." That phrase should include more than a better way of stating "of expressing the truths of the faiths." Development of doctrine does not carry the notion of introducing absolutely new material or contradictions into the deposit of faith. It does mean that new information and new approaches may well shed greater light on aspects of that faith which we have not yet understood adequately. I mention only one here — the discovery in the nineteenth century of the ovum in females and in the twentieth the genetics of the ovum.

That discovery showed that the mother contributed positively to the genetic inheritance of the child. She was far more than an "incubator." In the case of the Incarnation, all of Jesus' human inheritance came from Mary — as best we know. She was his only physical link to Israel, his only earthly connection to salvation history. His earthly relatives were from "her side of the family." While we do not know in detail how God effected the Incarnation, we can say with probability that all of Christ's physical characteristics were from her — except for his gender. In the Incarnation the Son of God did not assume some generalized kind of humanity; he did not become human in a "one-size-fits-all" body. His body was specific, one particular enough to locate him uniquely in time, in space, in the history of Israel and of the human race. This is to say that his body was completely appropriate to his time, to his place and to his relatives — as our bodies are appropriate to our time, place and relatives. In that conformity of his body to its natural and historical environment, he became a member of our race. Born in another time or place, the incarnate Son of

God could not have become Jesus of Nazareth — no more than we could have been born at another time or place and have remained ourselves.^{xxx1}

The discovery of the existence of the ovum and its special role in inheritance also sheds light on the reality and extent of God's Providence. Only one ovum in the history of the universe, combined with one particular sperm, could have resulted in you, in me. Multiplying the likelihood of the uniting of this particular egg and particular sperm over the thousands of generations of history, factoring in all that might have gone wrong over that span of time, one can say that he or she is either totally trivial or the recipient of God's very special providential care. That kind of understanding of Providence was not possible until the discovery of the ovum.

Another area needing a development of doctrine is St. Paul's notion of the New Human:

Christianity, starting with the Letters of St. Paul, has always proclaimed the advent of the New Human, now in sacrament and, with the return of Christ, in its integral reality. In contrast to the promises of scientific/technological advance, the Christian vision of the new human is eschatological and transcendent. The doctrinal question facing the church now is the relationship between the immanent "new human" of scientific/technical development and the eschatological "New Human" of Christian tradition. The question can be made more specific: is the immanent "new human" a part of (even an indispensable part of) the transcendent eschatological "New Human" to whom God has committed himself? This is certainly an issue worthy of doctrinal development. The rapidity of the scientific development makes this an immediate and urgent concern of the theological community and of the church. Can these two visions of the "New Human" be made to serve each other in order to bring about the deeper unity of the created world?

The human body, and hence the human person, is going to be "transfigured" one way or another — through the power of God and/or through the power and genius of human beings. We human beings are in a position to choose our bodied future. We Christians have the obligation to apply our view of that bodied future to the developing capacity to "re-do" ourselves according to some controlling vision of the meaning of creation and of humanity.^{xxxii}

Part of the contemporary theological crisis is our now centuries-long inattention to the covenantal character of God's relation to us and to all of creation. This inattention extends to what might be called a "Christomonism;" namely, a theological consideration of Christ apart from his relationship to Mary and through her to creation. Only in her acceptance of a two-in-one-flesh covenant does the Son become "one of us." It is in her covenantal "yes" that he has human relatives, a human genealogy, a human face. Overstressing the hypostatic union at the expense of the two-in-one-flesh covenant (between two *integral* persons) with Mary renders the Christian reality poorer. It is, seemingly, to make sacramentality practically meaningless, to render covenant incomprehensible and theology impossible.

A fertile area for future theological insight can be found in an emphasis on the "two-in-one-flesh" theme. Since the *Una Caro* represents a central statement of the "new and eternal covenant" in the Body and Blood of Christ, it is worthy of investigation. It provides a strong focus for many aspects of our contemporary scientific-technological society. Consider, for example, nuclear transplantation ("cloning") as a proposed mode for human reproduction. Nuclear transplantation escapes the "giftness" of the masculine-feminine relationship. It is essentially a monistic negation of the covenantal relationship of man and woman, and ultimately of Bridegroom and Bride. It touches the heart of the revelation of God's marital relationship to his people, and through them to creation. It is blasphemous in that (as a "one-in-one-flesh" relationship) followed to its conclusions, it would posit a monism in God, a unity that would negate the Trinitarian processions.

While technologically the advance in the life sciences is raising novel moral issues, the science can be a springboard for the development of our understanding of the living world and of ourselves and God's will for us. The investigation of the two-in-one-flesh theme requires development along many lines of doctrinal thought: Christology, Mariology, ecclesiology, sacramental theology and eschatology. Biological advance also requires such development; it is needed if we are to face this new challenge coming from science and technology. A development of the doctrine of the "two-in-one-flesh" theme may be a most appropriate unifying theme for the needed doctrinal explicitation of a "theology of bodiliness." It is my conviction that all the major issues agitating the church today revolve about the meaning of our bodiedness.^{xxxiii} This clearly includes all questions which relate to our sexual being as well as those regarding the nature of the church as the Body and Bride of Christ. The scientifically and technologically based issues surrounding our being bodied are among the most crucial facing the Church. For an historical (bodied) religion like Christianity this advance in knowledge of living systems and a growing ability to manipulate them will have a staggering impact (both challenge and opportunity). We have both the opportunity and the need for a major doctrinal development "on the body."

When we proclaim the Creed we profess our faith in the resurrection of the body. In almost all of the earliest of the creeds the resurrection is not proclaimed as the *anastasin nekrôn* of the Creed of Constantinople but as *anastasin sarkos*. St. Paul says in Romans 8 that we who possess the first-fruits of the Spirit groan inwardly as we wait for our bodies to be set free. He does not say that we are waiting to be set free from our bodies. In Philippians 3:21 he returns to the same theme stating that the Lord Jesus Christ will transfigure these wretched bodies of ours into copies of his glorious body. Irenaeus clearly stated that the flesh is good, being prepared now in the Eucharist for the incorruption of everlasting life. For two thousand years the singular newness of the Good News has been the resurrection of the flesh. It is strange that the Church does not have an adequately structured doctrine *de corpore* to cope with the revolutionary developments in the biological sciences and technologies. Although such a structured doctrine was not as necessary before the questions which now face us were asked, it is unfortunate that the questions about our bodiedness are now so difficult to formulate theologically.

Looking at the tremendous sweep of advance in the life sciences, technologies and industry since the publication of *Gaudium et Spes*, we can legitimately ask which of the advances will enhance our conformity to the Body of Christ and which will be destructive of it. That set of questions

should be a major aspect of our theological future. The answers will not come primarily from bioethics. I suggest five questions which might serve as a *beginning* of a doctrinal conversation on the meaning of the body in salvation and glorification. These are not the only questions which can be asked, nor are they completely developed. Nonetheless, they can be of service in sharpening the doctrinal issues raised by the burgeoning biosciences and biotechnologies. I shall simply list them here; more detailed development can be found elsewhere.^{xxxiv}

1. Does a particular biological alteration enhance the innate, internal dignity (which involves the sacramental and covenantal character of the body) of the human or does it set up external criteria by which a human being is to be judged? Does our perceived human dignity derive from being who we are or does it derive from success in functioning in society? We have already seen the beginnings of this situation in couples conceiving children in order to provide organs or tissue (e.g., bone marrow) for transplantation to older siblings who need them (it).

2. Tightly tied to questions of human dignity are questions of personal freedom which flow from innate human dignity. Does a particular enhancement foster personal freedom or does it lead to the establishment of expectations, the fulfillment of which will be coercive?

3. This question (probably the most important) is more difficult to address because the tradition is not as richly articulated in this area: does the proposed biological alteration preserve (and increase) some form of "bodily integrity"? This concept and the multiple questions it raises need serious attention. The concept of a bodily integrity necessary for salvation and glorification sounds strange to us, accustomed as we are to think of salvation as something "spiritual;" it is difficult even to pose the question convincingly. It seems, however, especially in view of the cumulative theological expressions of the Fathers of the Church, that there is a traditional intuition of its importance. It is precisely here that there is need for a significant development of doctrine.

Thirty years ago the concept of "bodily integrity" was broached only (if my memory is accurate) in discussing mutilation which involved such issues as surgical amputation as well as deliberate maiming and in questions about the state of Adam's body before sin. This latter was hardly an issue crying out for contemporary treatment. The central moral issue of "bodily integrity" was how much one might take away from the human body and still have a human body. Of course these were concerns before organ transplants, recombinant DNA, the new reproductive technologies and the developing neurotechnologies, before organs and fetal tissue became marketable commodities. That today's questions about "bodily integrity" revolve more about how much can be added to the human body without disturbing its human character shows how much the theological times have changed in the last quarter of a century.^{xxxv}

4. As a specification of the third question, it may be asked whether the proposed biological alteration promotes a closer integration into the human community. Even more important for the church, does it promote a closer entry into the sacramental living and growing of the covenantal community? Or does it, on the other hand, tend to isolate its recipient from the community or reduce that person to a cog in some social machinery? More likely than not, the "new biologies" will be used to develop exotic characteristics (like the denizens of the cantina in *Star Wars*) or

uniformity (like square tomatoes that can be more easily packaged).

5. Does the proposed enhancement tend to promote the sacramental and covenantal worship of God, or does it lead away from that worship? Issues of marriage and reproductive biology naturally come to mind.

To add to the difficulty of this whole situation, the Church and the theological community are not at home in the world described by science. The sweep of contemporary discovery and the aspects of the physical creation (including the human) it has uncovered are not yet a part of the Church's understanding. In our present position we are especially subject to two temptations: either accepting totally and uncritically all that contemporary science says, does and proposes in order to "catch up and be open to the world," or to ignore such discovery and its applications to "preserve the purity of the faith" — or to avoid the necessary hard work. St. Gregory Nazianzen would have called the former approach "reckless" or "unscientific," and the latter course "unfaithful."

The United States Bishops at the Fifth Synod of Bishops submitted a message on the relationship between the Church and the scientific community.^{xxxvi} This message should be read as at least a postscript to *Gaudium et Spes*. Scientific discovery and its technological application, especially in its intervention into the human, will have to be integrated into our theological understanding of creation. Moreover, some kind of open and positive set of limitations will have to be placed on its applications. This is no simple task since it demands a far greater theological understanding of creation than we now have. It also demands a basic, but critical, openness to scientific progress. This is a task for the whole theological community, working together with all the members of the Church, and especially with the scientific community, on the meanings of these discoveries. The time still available for us to form a real partnership with the scientific community in the quest for meaning is short.

It is impossible to overestimate the impact that bioscience, biotechnology, and bio-industry will have on the faith. We probably would have to look all the way back to the fourth century for a theological upheaval of the magnitude that science and technology are forcing on us. It is a scandal that so few Churchmen and so few theologians are aware of what is happening. A British Bishop, when asked about the birth of Louise Brown, remarked that he didn't see anything wrong with it. Undoubtedly this is an accurate statement: he didn't see anything wrong with it. But this is a "teacher in Israel" and the "Israelites" deserve better than this.

CONCLUSION

Finally, let me note a statement in *Gaudium et Spes*:

Those involved in theological studies in seminaries and universities should be eager to cooperate with men versed in other fields of learning by pooling their resources and their points of view. Theological research, while it deepens knowledge of revealed truth, should not lose contact with its own times, so that experts in various field may be led to deeper knowledge of the faith. Collaboration of this kind will be

beneficial in the formation of that sacred ministers; they will be able to present teaching on God, on man, and on the world, in a way more suited to our contemporaries, who will then be more ready to accept their worlds. Furthermore, it is to be hoped that more of the laity will receive adequate theological formation and that some among them will dedicate themselves professionally to these studies and contribute to their advancement. . . . (62)

It is always easy to state that seminarians be taught this or that. Ideally, it may be true, but there are still only 24 hours in a day. I would propose that seminarians, in the course of training, spend a total of two or three weeks learning (from practitioners) about the broad advance of science and about the obligation of the laity to evangelize the Church and the world. These are explained well (and at length) in the Council's *Constitution on the Laity* and in Pope Paul VI's encyclical *Evangelii Nuntiandi*.

One thing that should be emphasized for all in the Church is the worshipful character of human learning. The clergy and laity must realize that worship is a far more expansive notion than cult or liturgy. Clearly, learning can be used for evil, but so can every other created thing. Learning about God's creative and redemptive goodness and praising him is worship. All Catholics (clergy and laity) should be fully aware of this worshipful aspect. We are all called in baptism to be evangelists; it is our Christian duty. Being a scientist or a technologist is as important an evangelical state as being a theologian. Seminarians, clergy and laity alike share in the obligations and graces of preaching the word, in season and out. We should all be aware of the work and the vocation of the other.

As Pope John Paul has written:

Contemporary developments in science challenge theology far more deeply than did the introduction of Aristotle into Western Europe in the thirteenth century. Yet these developments also offer to theology a potentially important resource. Just as Aristotelian philosophy, through the ministry of such great scholars as St Thomas Aquinas, ultimately came to shape some of the most profound expressions of theological doctrine, so can we not hope that the sciences of today, along with all forms of human knowing, may invigorate and inform those parts of the theological enterprise that bear on the relation of nature, humanity and God?

. . . . For science develops best when its concepts and conclusions are integrated into the broader human culture and its concerns for ultimate meaning and value. . . . By devoting to these issues something of the energy and care they give to their research in science, they can help others realize more fully the human potentialities of their discoveries. They can also come to appreciate for themselves that these discoveries cannot be a genuine substitute for knowledge of the truly ultimate. Science can purify religion from error and superstition; religion can purify science from idolatry and false absolutes. . . .^{xxxvii}

Steeping ourselves in the spirit of *Gaudium et Spes* will lead us all to work together to integrate our daily activities, including our research activities, into our faith lives. Thus, one fundamental call of the Council will be lived and the Church will grow in holiness.

ENDNOTES

- i. 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.
- ii. 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.
- iii. Herbert Butterfield, *The Origins of Modern Science 1300-1800*, revised edition, New York: The Free Press, original copyright 1957, pp. 197-198.
- iv. 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.
- v. 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."
- vi. C.S. Lewis, *The Abolition of Man*, New York: Macmillan, 1947, p. 37.
- vii. Charles Frankel, "The Specter of Eugenics," *Commentary*, Mar., 1974, p. 27.
- viii. 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.
- ix. Linus Pauling, "Foreword to 'Reflections on the New Biology'" *UCLA Law Review*, 15:2 (Feb., 1968), 269. Quoted by Frankel, *op. cit.*, p. 28).
- x. 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.

- xi. 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.
- xii. *Ibid.*
- xiii. 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?
- xiv. 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.
- xv. Claude Lanctôt, M.D., "*In Vitro* Fertilization: An Overview," in *Fabricated Man: In Vitro Fertilization*, ITEST Proceedings, October 1974, p. 29.
- xvi. Bartha Maria Knoppers and Ruth Chadwick, "The Human Genome Project: Under an International Ethical Microscope," *Science*, vol. 265, 10 September, 1994, pp. 2035-36.
- xvii. 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.
- xviii. Frankel, *op. cit.*, pp. 32-33.
- xix. Eric Vögelin, *The New Science of Politics*, Chicago: University of Chicago Press, 1952.
- xx. Karl Löwith, *Meaning in History*, Chicago and London: University of Chicago Press, 1949.
- xxi. Cf., *Secularism versus Biblical Secularity*, eds. S.M. Postiglione, RSM and R. Brungs, S.J., St. Louis: ITEST Faith/Science Press, 1994.
- xxii. 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).
- xxiii. Dr. Evelyn Crump, "The Human Genome Project: Whither Are We Hastening"?, *The Human Genome Project*, St. Louis: ITEST Faith/Science Press, 1993, p. 22.
- xxiv. 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.

xxv. *Ibid.*, p. 27.

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

xxvii. 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.

xxviii. "There can never, indeed, be any real discrepancy between the theologian and the physicist, as long as each confines himself within his own lines, and both are careful, as St. Augustine warns us, 'not to make rash assertions, or to assert what is not known as known (Augustine, *In. Gen. op. imperf.* ix. 30).' If dissension should arise between them, here is the rule also laid down by St. Augustine, for the theologian: 'Whatever they can really demonstrate to be true of physical nature we must show to be capable of reconciliation with our Scriptures; and whatever they assert in their treatises which is contrary to these Scriptures of ours, that is to the Catholic faith, we must either prove it as well as we can to be entirely false, or at all events we must, without the slightest hesitation, believe it to be so (Augustine, *De Gen. ad litt.* i. 21, 42).'" *Providentissimus Deus*.

xxix. One example of the mind of Pope John Paul II is a citation from a Letter to Father George Coyne, S.J. on the occasion of the tercentenary of the publication of Newton's *Principia* (1988). See Endnote 34 for

publication data.

xxx. In an article, "The Moral Doctrine of Veritatis Splendor," Father Donald J. Keefe, S.J. states: "Rather, *Veritatis Splendor* simply transcends this contemporary scholastic debate between the relativists in their several guises and the defenders of the natural law tradition. The dissenting moral theology has been put out of court by this document, and this for reasons which undermine as well much of the *theology* which has been summoned to the explanation, and lately to the defense, of natural law tradition. . . . 'Human nature' in *Veritatis Splendor* is the primordially good creation, the free nuptial unity of man and woman which 'in the beginning' is integral and unfallen, which fell in Adam, which is redeemed in Christ, and which, in union with Him as the second Adam, its Head, is raised to the right hand of the Father." Father Keefe then quotes, among others, section §50 of *Veritatis Splendor*: "At this point the true meaning of the natural law can be understood: it refers to man's proper and primordial nature, the nature of the human person, which is the person himself in the unity of soul and body, in the unity of his spiritual and biological inclinations and of all the other specific characteristics necessary for the pursuit of his end." Keefe's article will be published in an upcoming issue of *Rivista de Teologia Morale*.

xxxi. See, Robert Brungs, S.J., "Biology and the Future: A Doctrinal Agenda," *Theological Studies*, 50 (1989), p. 706.

xxxii. *Ibid.*, p. 706.

xxxiii. This is my understanding of Pope John Paul II statements, beginning as early as 1978, in *The Original Unity of Man and Woman*.

xxxiv. For a more detailed treatment, see: Robert Brungs, S.J., "Biology and the Future: A Doctrinal Agenda," *Theological Studies*, 50 (1989) and Robert Brungs, S.J., *You See Lights Breaking Upon Us: Doctrinal Perspectives on Biological Advance*, St. Louis, 1989, pp. 225.

xxxv. Cf., Brungs, *Theological Studies*, 701-702.

xxxvi. Cf., "The Church & Scientists – Synod '77," *Origins*, 7, 21, November, 1977, pp. 330-331.

xxxvii. John Paul II, "Message of His Holiness John Paul II" in *Physics, Philosophy, and Theology: A Common Quest for Understanding*, ed. R. Russell, W. Stoeger, SJ and G. Coyne, SJ. Vatican City: Vatican Observatory, 1988), pp. M12-M13.