INSTITUTE FOR THEOLOGICAL ENCOUNTER WITH SCIENCE AND TECHNOLOGY

BULLETIN

DATE: AUTUMN, 1995 VOL: 26 NO. 4

There have been several things in my life lately that have revealed to me God's hand in my life. Almost daily, it seems, events have led me to ponder more deeply God's Providence which surrounds me.

Even the very fact that there is a creature called Robert, son of Adolph and Helen, is so improbable an event that it is breathtaking. There was an interval of maybe 48 to 72 hours in the history of the universe when this Robert, this union of a very specific egg and sperm, could have been conceived. And I can multiply that by 10s of thousands of ancestors who were equally unlikely — so many that this Robert is either totally trivial or deeply and specifically wanted by God.

To the blessing that my parents were I can add the blessing of those who taught me, of friends and loved ones that I have encountered along the road of my life. Each of them is as improbable as I and the chain of circumstances that brought us together has been absolutely unpredictable. I — we — have been set on a pilgrimage along a road whose path we don't fully know to a destination we have never seen. If we are not in the hands of God we will never recognize our goal, even if we should accidently arrive there.

But in our human way we tend to think that we are in control of our present and our future. We had no control over our being here, but we think we can predict the future course of events. As noted on page 4, we demand predictive control over geological forces for 100,000 years. What nonsense! We can't control the rest of today, much less next year. We all need some lessons in humility. More we (and I in particular) need more loving trust in the God who loves us — until we can truthfully cry out with Paul: "There is only Christ; he is everything and he is in everything." God is the one primarily responsible for the creation and redemption of what is. And he loves us.

Robert Brungs, S.J.

The ITEST Bulletin: Publisher, Robert Brungs, S.J.; Editor, S. Marianne Postiglione, RSM

ITEST Offices: Director, Robert Brungs, S.J.
Director of Communications, S. Marianne Postiglione, RSM
221 North Grand Boulevard
St. Louis, Missouri 63103 USA

ISSN 1073-5976 (314)-977-2703 fax (314)-977-7211

ANNOUNCEMENTS

1. We apologize for giving an incorrect FAX number in the last issue. The FAX is (314)-977-7211 as listed on the first page of each bulletin. Unfortunately some of you tried to contact us at the incorrect number. We will *not* reprint it here for obvious reasons! Since the FAX equipment is not located in the ITEST office, we do not have exclusive use of it; we share it with several other offices. For the time being, therefore, we will use that line in the RECEIVE mode only. Address all FAX messages to ITEST, Fr. Robert Brungs, SJ.

2. SPECIAL OFFER: Since it is never too early to start thinking about Christmas presents, may we suggest ordering some ITEST books for your favorite person, library, college, church religious ed department? Since we have to make room for new publications, we must reduce the inventory on hand. Each book costs $8.95 including postage and handling. We will mail the publications directly to you or to the recipient. These are the titles available: *The Inner Environment (medicine, ethics & economics); The External Environment; Some Christian and Jewish Perspectives on the Creation; Sci/Tech Education in Church-Related Colleges and Universities; Transfiguration: Elements of Science and Christian Faith; Secularism versus Biblical Secularity; The Science and Politics of Food; the Human Genome Project.*

3. Work continues on the March 15-17, 1995 workshop on *Environmental Ethos.* Thus far we have secured three essayists. Fr. Albert Fritsch, SJ is Director: Appalachia — Science in the Public Interest. Mr. John E. Kinney, Environmental Engineering Consultant, is a registered professional engineer with widespread consulting experience nationally and internationally. Dr. Gary Comstock, Iowa State University, Coordinator of the Bioethics Program and advisor to *The Ag Bioethics Forum*, is developing ideas on environmental ethics particularly as they relate to evangelical Christianity.

4. Membership dues will be $45.00 for the calendar year starting January 1, 1996. Student dues, however, will remain at the current rate of $20.00 per year. Increased costs for paper products, inks and postage have forced us to increase the dues. While first class postage has risen only 10%, the rates for books, printed matter and bulk mailing has gone up 30-40%. When you receive the renewal notice (about mid-October), please note that there is a place on the membership card for your e-mail address and/or FAX. We hope to publish a new membership directory in the summer of 1996. So please send us all the pertinent information. We'd like the directory to be as complete and up-to-date as possible.

5. The staff and the Board of Directors would like to thank Miss Peggy Keilholz for her many years of service as a Board member. Peggy resigned from the Board, effective September 1, 1995. It is generous people like Peggy who make the functioning of ITEST possible.

6. We would also like to congratulate Doctor Linda Harman on her successful work toward her doctorate from George Washington University in Washington, DC. The title of her dissertation was: *Attitudes about the Use of Genetic Information and Genetic Engineering when Making Reproductive Decisions: Influence of Gender, Discipline and Role.* Those of us who are not too old to remember back that far into the past can share Laurinda's sense of accomplishment.

7. Although it may seem so, the ITEST Summary volume (*Biology, Law and Public Policy*) is not some mythical (in the sense of imaginary) thing. The Director has reviewed some twenty volumes of Proceedings and has only about six more to go before he begins to write. Please bear with us as we try to complete this work. There is such an immense amount of still pertinent material in the Proceedings that simply gathering it together is a major undertaking.

8. We have a bonanza of exposed 35mm color film and video tape available to anyone who is working in the area of electronic editing. This series of "outtakes" (MOS mit-out-sound) from our award-winning film/video, *Lights Breaking: A Journey Down the Byways of Genetic Engineering,* has been reposing in the well-insulated Chicago garage of our long-suffering producer, Dick Cusack, who would like to make some room for his car.

Scenes of breathtaking beauty from Dinosaur National Park, Utah, the mercurial Green River, along with pastel sunrises and bold sunsets could be used by a creative editor or student producer to forge new video/film pieces for prayer or discussion experiences. One caveat: you must have the proper equipment to view the material. Contact the ITEST offices if you know anyone who might have use for this material.

Scientific Misconduct at the *New York Times* Distorting Routine Science to Sell Newspapers

Thomas P. Sheahen, PhD

Earlier in 1995, it was alleged that the planned nuclear-waste repository at Yucca Mountain might blow up like an atomic bomb. The *New York Times* led the way in hyping up this story, which was utterly without scientific merit. The *Times* hid behind the usual excuses that newspapers give for resorting to sensationalism, but in fact their writers had the scientific background necessary to see through the errors. They published the hyped-up story anyway, and in so doing committed an act of scientific misconduct.

The history of this case was reviewed in detail in *Science* magazine [*Science 238,* 1836-1839 (30 June 1995)]. It deals with the controversial matter of storing nuclear waste.

The issue originates in nuclear physics: in a nuclear reactor, the uranium fuel gradually is transmuted into other elements, one of which is plutonium. Every 18 months or so, the old fuel rods are removed and replaced with fresh ones. The spent rods contain some isotopes of plutonium that decay quite slowly, with a half-life of 24,000 years; the result is that they cannot simply be thrown away. In fact, they have to be guarded and kept out of the hands of terrorists, who could extract and concentrate the plutonium to make atomic bombs. Back in the 1960s, it was expected that spent nuclear fuel rods from reactors would be reprocessed, but by the 1980s it was deemed better to bury them permanently. Meanwhile, ever since the first reactors began operating in the 1960s, their spent fuel rods have been stored on-site, in "swimming pools" (surrounded by water) where they slowly cooled and their radioactivity diminished. Obviously the on-site storage would run out someday, and hence the need for a permanent repository.

In 1987, after several years of "not in my back yard" wrangling from various parts of the country, the extremely remote Yucca Mountain Nevada was selected as that permanent burial site. Since Nevada had long been the site of nuclear bomb tests, this decision bothered very few people outside of Nevada. More recently, design and construction got underway at the site, with the expectation that it could begin accepting spent fuel rods a few years from now. Still, opponents of the project continued to look for any excuse to kill it.

Meanwhile, an alternate way to get rid of long-lived isotopes quickly is to bombard them with neutrons. That is what happens inside a reactor. A technique known as Accelerator Transmutation of Waste (ATW) is one variant of that process. Nuclear technology is no stranger to competition, and it is relevant to note that any impediment to the idea of permanent burial would act to promote research on alternatives such as ATW. At Los Alamos National Laboratory, with research funding under downward pressure, the developer of ATW (Charles Bowman) began to speculate about what could possibly go wrong at Yucca Mountain.

Bowman came up with the idea that if the plutonium in the permanent repository could leach out of the glass logs in which it was originally stored, and travel through the surrounding rock, then it might concentrate enough in one place to form a "critical mass." A "critical mass" means an active reactor, and without any control and under further very specialized circumstances, Bowman hypothesized that it might blow up. A series of highly unlikely "ifs" were strung together to produce this scenario.

Recognizing that such a scenario, if true, would make permanent storage impossible, the management of Los Alamos National Laboratory gave top priority to analyzing the scientific merit of Bowman's speculations. Three independent teams were assigned to review the hypothesis from distinct viewpoints and motivations: one team to attack the theory, one to promote it, and one neutral team. It is immensely to the credit of management that they didn't just summarily dismiss the idea as a "crackpot theory", a strategy one might expect from a government agency trying to protect a decision already made. After some weeks of study, all three teams (even the one assigned to advocate the theory) found Bowman's concept scientifically indefensible. Some of the estimated numbers needed for the hypothesis were wrong by a factor of a million. The clear, unified scientific conclusion was that "the probability of [the] explosion hypothesis being realized was 'essentially zero'."

The entire issue should have ended there, on the basis of solid, reliable scientific method having been applied correctly. However, scientists forgot that newspapers always like to sell a few more copies, and that is where the story of scientific misconduct begins.

Needless to say, word of the study leaked out, and draft copies of manuscripts reached the *New York Times* science writer, William J. Broad. Actually, Broad is an adequately intelligent scientist who used to write for *Science* magazine, and who certainly was able to understand the technical arguments being presented. He pretended not to, publishing an article (front page, on Sunday, March 5) that gave equal weight to both the Bowman hypothesis and its critics, and suggested that an important debate was ongoing, with obvious major implications for the Yucca Mountain project. The *New York Times* science editor, Nicholas Wade (also a former writer for *Science* magazine) defended the sensational article on the flimsy grounds that newspapers are supposed to report on disputes among experts. What the *Times* deliberately ignored what that *there was no longer any dispute;* the issue had been settled, fairly and openly, using the full process of scientific peer review.

Major damage was done very quickly: the next day, Senator Richard Bryan of Nevada accused the Department of Energy of a dangerous cover-up. Subsequently, Senator Bennett Johnston of Louisiana had the entire "neutral team" report entered into the *Congressional Record.* Unfortunately, the public never reads the details. The attendant adverse publicity may well kill the Yucca Mountain project, which of course is exactly what Nevada would like to do. In the intervening months, the subsequent release of additional independent reviews showing that the Bowman hypothesis is wrong have done little to comfort a wary and worried public.

We now have a situation where the name Yucca Mountain can be added to the list of Alar, Radon, Asbestos and related topics where hype drove out careful science, and public fears were exacerbated needlessly by screaming headlines. No amount of future clarification can remove this "bomb scare" strategy from the litigants who want to block the project. They will be able to muddy the water at every public hearing by resorting to this canard. Expenditures (so far up to nearly $2 billion) will probably double, if the project is ever completed at all.

To gleefully wreak this kind of mischief is nothing short of scientific misconduct. It ranks alongside Piltdown Man and the Cyril Burt twin-studies as examples of lasting damage perpetrated for no better reason than personal aggrandizement. For Broad and Wade, it would be appropriate punishment if their colleagues in the American Physical Society were to expel them from membership. They should not be permitted to hide behind journalism slogans which publishing stories they knew to be wrong. And certainly no one should ever believe anything they write again. Perhaps the message would not be lost on other aspiring sensationalists.

This behavior by the *New York Times* is damaging to the proper conduct and review of scientific research; but more important, it displays the *Times* total contempt for the intelligence of their own readers. On a slow news day when no "Aliens Capture Elvis" stories were available, the *New York Times* reached deep into the scientific wastebasket to hype up a story that few would understand, but many would become alarmed about. The final message for one and all is that the *New York Times* is by no means the bastion of sound reporting and faithful adherent to the search for truth that it would have us believe. In reality, the *New York Times* is just another yellow-journalism rag who will abandon objectivity in order to sell newspapers.

Dr. Thomas Sheahen is a physicist and currently is the President of Western Technology, Inc. He has served as a consultant at Argonne National Laboratories and elsewhere. Tom wrote the chapter on "Physics" in ITEST's volume Transfiguration: Elements of Science and Christian Faith.

In the August 11, 1995 issue of *Science* there is a short note indicating that the National Research Council released a congressionally mandated report on disposing radioactive wastes at Yucca Mountain. That report concluded "that researchers would likely have to predict the state of Yucca Mountain hundreds of thousands of years from now." Currently, the Environmental Protection Agency requires that a repository meet safety standards for 10,000 years.

The NRC report states that very long range forecasts are feasible because the Yucca Mountain region is likely to be stable for the next million years.

I suppose from any kind of lay view, the question would be: why are we worrying about something that far into the future. We have absolutely no assurance that there will be human life on the planet or, even more radically, we have no assurance that the planet will be here. Furthermore, we seem to assume in this time frame that whatever humans there are will be so like us that they will not be able to handle our radioactive wastes. In reality, for all we know now, they may well curse us for having made it so difficult for them to get this most highly prized commercially valuable material. Why do we worry about even a thousand years into the future? It's like the Romans worrying about their sewer system because 20th Americans would worry about it.

Many of the current members of ITEST will not remember the Summary Volume (1983) written by Peggy Keilholz for ITEST's 15th anniversary. The Director, who is now working on an updated volume of this summary, is so deeply impressed by the amount of work which went into the 1983 volume that he believes it would be helpful to our work to print excerpts from its first chapter on "Science and Technology, Theology and the Church: Shall the Twain Meet?".

Are science-technology and theology-church irreconcilably separated? Can they be in harmony? Does it make any difference?

Even a cursory view of newspapers, popular scientific magazines and professional journals shows the sweep of current technological advances: "test-tube babies," frozen embryos, super mice, artificial hearts, neutron bombs, Star Wars weaponry, toxic wastes and names like Love Canal, Times Beach and Bhopal, electronic surveillance devices, particle beams, satellite communications, space shuttles, and so many, many more. These products of science and technology are viewed as the inevitable progress of the human race or as the seeds of our destruction. Are we merely spectators at the greatest technological show on earth? Or can and may we have a hand in writing the script for that show? Do we want to have some input into the agenda of science and technology? If so, do we have a reference-frame, a set of guidelines, even principles, for making decisions about the development and use of the methods and products of science and technology?

With the ascendancy of genetics, biochemistry, and molecular biology, old questions about humanity have returned demanding our attention and needing new answers. The fact that some of the most rapidly advancing technologies are pointed directly at the human race gives urgency to the quest for answers, or better, to the attempt to ask more appropriate questions. For example, the birth of Louise Brown, Britain's and the world's first "test-tube baby," represents more than the birth of a child to a hitherto childless couple. The development and production of a micro-organism that eats oil means more than the addition of another organism to the catalogue of living creatures. The insertion of the gene responsible for human growth hormone into a mouse has implications beyond the individual monster mouse. These events stand as witnesses to technological capability and control which will ultimately lead to us human beings directing our further evolutionary growth.

Who is to decide where and to what end the evolutionary growth of the human race will be (or should be) directed? Will it be the scientist, the theologian, the entrepreneur, the bureaucrat, the lawyer or doctor, the atheist, agnostic, believer? Who or what is an ideal human being or a better human being? When confronted with questions of this magnitude, will science and technology by themselves be capable of answering such questions? Will government or the legal system? Will philosophers and theologians? Will the general public?

WHERE THEOLOGY AND SCIENCE MEET

The very framing of the question, "where do science and theology meet?" assumes that they do meet. Is the assumption valid? Several factors must be considered in replying to that question.

There is a limit of science that with serious implications must be noted: scientists cannot give us truths about the whole, only about definite and narrow parts of the whole. Science is everything but the whole truth. It gives the small truth, which is true about what it says; but by its omissions it unsays a great deal. This limitation springs from the nature of the scientific method. Scientists, by virtue of their methodology, cannot look at the whole picture all at once. "In the nature of things," Jacob Bronowski says, "it (scientific methodology) is bound to give me only an

approximation. . . And whether I treat that as a statistical approximation, or whether I get out some other concept, I am doing so in less than the total context of the world. Therefore, when we practice science . . . we are always decoding a part of nature which is not complete. We simply cannot get out of our finiteness."

In the experimental situation scientists attempt to control the experimental environment so that the behavior of specific variables may be identified. They wish to prove, for example, that X is a function of Y and acts in a predictable way as Y changes. They, by and large, examine phenomena a piece at a time; they attempt to control the variables and the experimental conditions so that relationships between variables can be determined and factual statements made about their relationships. The poorer the control the experimenter has over the variables, the less that can be said positively about the causal relationship between the variables. Control of the experimental situation becomes more difficult more difficult, the more variables there are in the system under investigation. Control becomes virtually impossible in large-scale, complicated systems like the atmosphere. So scientific statements about acid rain become much less certain than statements, say, about the properties of silicon, or the motion of particles in certain kinds of electric or magnetic fields. The difficulty is many times compounded when one moves from physics into the study of living systems (the biological sciences) and into learning about aggregations of living organisms (the social sciences).

To return to the initial statement, it should be noted that to work effectively in science one must isolate a small portion of the universe, protect it from all extraneous influences, then selectively change only one or two variables at a time. By strictly focusing on an isolated part — and only because of that focusing — science permits us to understand very precisely what is going on in this small part of the universe. Science can say nothing about the whole. The whole, in this case, is not simply the sum of its parts.

In an aggregation, in a society, there are as many, many variables — as many (and more, actually) as there are people and institutions. Furthermore, the problem in studying society scientifically is that all of the "variables" have varying degrees of connections with all the other "variables." This quasi-infinite set of sometimes changing, sometimes static, relationships is also part of the whole. Disciplines like sociology, together with normative studies like philosophy and theology, are properly concerned with such a relationship.

Science and theology certainly meet in the area of relationship itself. Technology associates scientific knowledge with usefulness for human desires and purposes; it is also a point of contact between science and theology. Moreover, philosophy and theology come into contact with science and technology whenever there is a question about goals, meaning and purpose. For example, questions which arise out of scientific research and technological application will have a grave impact on our understanding of what it means to be human. More specifically, when a technique like amniocentesis is used to determine which children to abort, or recombinant DNA or artificial insemination — like the "Nobel-laureate sperm bank" — are used to "improve" the human species, essential questions surface quickly. Is the human being an appropriate *object* for direct, immediate and systematic technological intervention? To consider an immediate simple question: what is an "improvement"?

Not only are the new and still developing capabilities of contemporary technology important in themselves, but they are important also because of the cultural context into which they will fall. That current cultural situation includes, among other things, a mood of hopelessness and despair — as evidenced in the fear of nuclear war, in a rising suicide rate. It is also seen in a society where death is an acceptable solution to social problems and where it is thought that, by properly devised institutional reforms, we can eliminate real or putative evil. In thought and in pretension our society has come to trivialize the material. Part of this has come from our more efficient production methods, a technology in its own right. As a result, relatively inexpensive goods have engendered what has come to be called a "throwaway society." What real value inheres in our products? They are so easily replaceable.

Also, our ideas in this realm are important in the trivialization of the corporeal. There's an irony here: the preoccupation with the real world of material objects and with the intervention into living systems actually leads to disdain of matter, and especially of the human body. Especially in a society that throws away used razor blades and automobiles with roughly the same ease, science and technology have led us to look at material things, and even our ecological system, as merely the substrate out of which something else can be made for use and pleasure. Even our vastly greater concern for our bodies, for health and vigor, can often be seen as no different from the kind of concern that takes care of a fine piece of machinery.

There are some who, like Lord Snow, believe that without an overarching scheme of things, some religious worldview, the scientific and technological enterprise would simply be out of our control. Others, like Jacques Ellul, maintain that that enterprise is already out of control. C. F. von Weizsäcker in *The Relevance of Science* sees science itself as having to an extent assumed the mantle of a religion, with a common creed, an inexorable claim for interpreting reality, a class of priests and, perhaps, an ethics.

One common feature characterizes both technology and theology, namely, responsibility. This sense of responsibility contributes both to the alienation of science/technology from theology (and vice-versa) and also to their hoped-for reconciliation. Scientists and technologists, by assuming control of the human world, must accept responsibility for that control. Control and responsibility are inseparable. To take control is to accept the consequences of our actions, to take responsibility for what we do. To be responsible for our deeds, we do more than merely stand up and be recognized and counted as the doers of the deed. We also inherit the results of those deeds. We not only admit to being in control; we must also admit to what our control has accomplished. Some scientists and technologists, like many of us in all walks of life, may not be willing to accept such responsibility. How often do we hear that all we did was discover this of that, or make such and so — say, like napalm or nuclear bombs — but it was the responsibility belongs of the politicians who decreed its use. But if scientists/technologists are willing to accept consequent rewards, they should be willing to accept penalties as well.

Nor are there two different sets of responsibilities, one theological and one technological. It is precisely because technology, like all other human activities, has responsibilities that it is linked to theology, to the One to whom all human accountability is due. Theologians, to be sure, have corresponding responsibilities to make themselves aware of what is really happening, to remove prejudice from their approach to that reality, as well as to search for truth rather than for position, notoriety, or any other self-serving ends.

In our times, science and technology have may good on many of their promises. There has been so much success and progress — the delivery of so many goods: leisure, relief from pain, hunger and disease, gadgets of all kinds, serious advances for the human race like space capability and recombinant DNA, etc. — that many people have turned to them for life and for purpose in living. In some ways for many people science/technology has taken on the mantle of the salvational. People look to them for salvation from the things they fear most. But no salvational promise made in the name of science and technology can be fulfilled. The promises made by post-Enlightenment thinkers, promises of progress promoted by the goal of ending superstition through scientific advance, have not been fulfilled in our twentieth century, a century of tragedy. Some maintain that we have worshipped a succession of false gods. In this arena science and technology have certainly outperformed the "god-of-the-gaps," that god who was the answer to all that we did not know. Yet in our honest moments we must admit that we have not attained human salvation from our woes through physics or chemistry, through psychiatry or psychology, through better social understanding from sociology or anthropology. Nor will we find it in the intentional control of our reproductive capabilities or of our genetic inheritance. Salvation is to be found neither in science, nor in technology nor in the "god-of-the-gaps." They are all most successful when they raise better questions.

We can call the idea of science as a quasi-religion and the seeking of salvation therein *Scientism*. That scientific and technological solutions are available to most, if not all, contemporary problems forms a part of the "belief system" of Scientism. But such an attitude of mind goes significantly beyond that by restricting genuine knowledge to scientific knowledge, i.e., knowledge acquired through application of the scientific method. Those engaged in the humanities, on the other hand, assert that there are neither scientific nor technological answers or solutions to many important human questions and problems. Simply but not simplistically stated, the one can provide us the directions for getting where we want to go and the other can supply us with many of the means. Tragically, however, too few people seem interested in linking the two in a productive union. Attempts at science/technology and faith/theology dialogues all too often experience the same fate.

Science/technology and faith/theology meet in the human person, in our deepest loves. The drives to make, to have control, as well as to question meaning and purpose converge in us. The dialogue between science/technology and faith/theology is essentially a human conversation in the full sense of "human"; thus of necessity it includes God.

SCIENCE/TECHNOLOGY-FAITH/THEOLOGY DIALOGUE

The primary two-fold question underlying science/-theology is: what difference to science does theology

make? and what difference does science bring to theology? Under this double-pronged question at least four other interrelated questions can be asked:

1. What are the themes or doctrines in the Christian theological tradition that are either presupposed or contradicted in science? For example, western science is in debt to theology in that it presupposes the theological idea of creation and its associated idea of the contingency of creation. While there is much argument about how deep this debt is and about other cultural and even political forces involved, and while many contemporary researchers might argue about the idea of creation, still there can be no doubt that modern science in fact grew up in a Christian matrix. If creation is contingent (i.e., not necessary), then facts about it must be investigated in order for us to know them. In other words, they cannot be deduced from a knowledge of eternal forms. the way things are from a knowledge of eternal forms. Many today either deny or declare irrelevant a basic presupposition of traditional Christian understanding, namely, the idea of final causality. This includes especially the notion of God's purpose in creating. So while it shares with Christian understanding a common presupposition about the contingency of creation and the discovery of the facts about the cosmos, science easily ignores the idea of final cause or purpose in or for creation.

2. Are there theological issues raised by science which the Christian tradition in particular has not or cannot address at all? For example, is the possibility of people as designers of their own future nature through genetic selection and manipulation so far divorced from Christian anthropology that, if we speak honestly and historically, we would have to say that the Christian understanding of creation has nothing to say? Gross irrelevance between science and theology always remains a conceptual possibility.

3. What are areas of potential contribution of science to theology? Does science help us to understand what it means for human beings to be God's agents or deputies in the world? We consider men and women as active initiating creatures. Have the achievements of science given us new normative and perhaps penultimate insights into what men and women are or what they ought to be?

4. Where is the real connecting point between science and theology? Do they contribute to each other's content? What is the theory of knowledge on each side, i.e., epistemology? What motivates the individual scientist or theologian? What consideration is given to ethics and to technology? Does the mutual wrestling with questions of corporate, social, human decisions on what we might call matters of social policy require more than the perspective of science and theology?

Content for dialogue is one thing; but the ability to communicate clearly across disciplinary lines is quite another thing. Complaints about the differences in terminology between science and theology are usually followed by pleas for a common language with which to carry on the dialogue. No one has advanced such a commonly accepted language that has won acceptance and there is considerable doubt about whether such a common language could be devised or whether such a new language would in fact serve its intended purpose. Might it not even so destroy nuances as to impoverish the language and the dialogue. Yet listen to the words of a South American theologian/chemical engineer, Guillermo Fell:

> I can say that engineers — might I say "technologians"? — are not communicating with theologians today . . . The people working with me on the process staff may find words like "Christ," "resurrection," "kingdom" meaningful on Sunday and in their discussion groups . . . but they don't find them meaningful at work in their engineering projects. We don't have common language or common goals to start with.

Do technologists, scientists, and theologians understand the same thing when they use the same words, words like "energy," "power," etc.? Do they understand the same thing when they speak of "death," "dying," "supernatural life," "image of God"? A common language could represent the bridge between worship and work. A related plea for common language springs from the need for clarification of terminology so that definitional problems can be resolved. Definitional problems need resolution before issues can be productively approached. Thus, a common language is needed for public discourse which must take place on important issues, so that reasoned and reasonable decisions can be made in the public arena. Then the problem becomes one making the languages of sciences, technologies and theologies intelligible to those who are outside those disciplines, call them consumers, patients, or, in general, laymen and laywomen. Jargon has a real value to the initiates; it is a good shorthand tool. It has no place when used to pander to our leanings to arcane knowledge. If it is used to cloud issues, then it is clearly counter-productive.

The problems of language, then, go beyond those of

meaning and definition. Laypersons (i.e., those who are not formally trained in science, technology, or theology) may be intimidated by terminology. There is the very real question of how one translates the data, jargon and terminology to make it understandable and yet preserve its accuracy. There are many communication techniques which are usable and should be applied in order to communicate exactly what is going on. Only in this way can people make decisions. They must be informed, and they must make themselves knowledgeable. Only in this manner can the various forms of language (whether the spoken or written word, film, etc.) be useful. One thing that cannot be tolerated is the use of language designed to exclude people from both dialogue and decision-making. We cannot allow that use of language which will assure that the scientific/technological or theological elite maintain control of the conversation.

The communication problem cross disciplinary lines seems difficult. It is little comfort, indeed, to discover that scientists, and even theologians, find it practically impossible to discourse among themselves about their discoveries. Language, needed for clarity, has become instead an obstacle to clear and effective communication. The sub-, and even sub-sub-, disciplinary nature of contemporary thought, with its attendant use of arcane terminology, isolates us from each other and from the rest of the human community. This reduces the effectiveness of anyone engaged in an open discussion of common social problems.

No one has proposed an effective answer to the difficulties presented by the language of science and that of theology as they enter into dialogue. Some have proposed an integration of the separate vocabularies and traditions to be the essential task of the science/technology/theology exchange. The aim is not to develop *the* common language, but to continue to talk with one another, to ask the questions necessary for clarification, and to begin to understand what the other is saying. The challenge thus issued is that we keep thinking rather than to risk the contentment that would come with the accomplishment of a common language. The assumption in this stance is that the basic task is translation, not the creation of some universal language. The latter accomplishment would allow scientists and theologians to speak more easily to each other. But at the same time, would there be a loss of the creative, translative, additive element that the good translator provides? In the science/theology collaboration there are two sets of vocabulary, concepts, and methods. But in the translation from science to theology, or vice versa, we introduce into the communication our own person and our unique personal understanding. This communication is impoverished if done by rote or by the assumption that we use common words in the same way and with the same nuance.

The introduction of the individual into the translation process keeps the system open, moving, changing and growing, leading to a rich understanding. At the same time, the individual person is a translator of Christ into the world, a unique reflection of God. A common language, understood in some univocal sense, would deaden the perception of the diversity which each person brings to any dialogue, including the person's reflection of God. In the science/theology collaboration, then, no one would need be ashamed of a lack of knowledge or expertise in a given area. The person on the "outside" often brings to the fore a concern thought to have been resolved, an issue thought to be "dead" by those in the know, but which in reality could use improvement. The object of the dialogue is growth, not an award for thinking better ideas than someone else. With such a perspective each person is a significant contributor to the dialogue. That person's absence is seen as diminishing the richness of the dialogic process. . . .

THE MEANING OF SCIENCE & TECHNOLOGY & THE DISTINCTION BETWEEN THEM

The foregoing discussion uses science and technology in virtually the same breath without distinguishing between the two. The two areas are distinct. Although some may define science as a more all-encompassing term thereby including what is commonly understood as science and also engineering and technology; others limit science to what is customarily called "pure research." Science can be defined thus: the doing of research into physical, or even social, phenomena in order ultimately to describe, explain, and predict those phenomena — some would also add the goal of control, particularly in behaviorist psychology and in the natural sciences. Another possible definition of science is: a methodology for discovering truth or for getting the model closer and closer to what we presume to be truth.

Science, then, in the narrow view, is a methodology for discovering truth, or, research into phenomena *without* reference to applications of the knowledge to specific problems or practical use. The movement from knowledge for its own sake to application or use marks the change from science to technology. But technology itself is not a unitary concept. We usually think we know intuitively what the term means until we try to define it. The term "technology" may include: *apparatus,* e.g., tools, instruments, machines,

appliances, weapons, gadgets, etc.; *techniques,* e.g., skills, methods, procedures, routines, etc.; *social organizations,* e.g. factories, labor unions, workshops, bureaucracies, armies, etc.

Technology, viewed in a general way, is not only concerned about control; it is control. It builds on science by taking the knowledge gained from science and applying it to the manipulation or control of the phenomena studied by science. This would include control over the material environment and control of human behavior. Then technology would be defined as the practical application of what is believed to be scientifically valid for the purpose of control and mastery over some aspect of the physical or social world.

Often, when we talk about technology, it seems as if we are talking about "Technology" with a capital T; it sounds like a concept "up there" either for us or against us. We do not have Technology, only technologies — individual tools, organizational principles, instruments, artifacts. The point of the distinction between "Technology" and technologies is that the latter are different things with different consequences. Therefore, it is not possible to declare them all good or all bad. Furthermore, the kind of society in which we live makes a great deal of difference in how we look at the various technologies and how they affect us and our lives. It can be maintained that there is no such thing as a non-technological society. A technological society can be described as one in which the technology plays a major causal role in how we relate to the physical universe and toward each other. All human societies of which we have any knowledge have had some kind of technology. Every society has its bows and arrows and almost every society has an agriculture which we can consider a technology. What distinguishes our society from previous ones in which there were technologies is the structure of domination which was not as obvious, not as all-pervasive, not as powerful.

From these delineations of science and technology we could conclude that the distinction between science and technology is clear. It could be stated thus: science emphasizes description, explanation and prediction; technology emphasizes control and manipulation. Then, discovering of truth and the taking of what is found and applying it to some particular problem would be two different things. Discovery (science) versus application (technology) are then quite distinct. The discovery of the properties of jellied gasoline, then, is distinct from the use of napalm bombs.

Such a distinction carries further important implications. Such a clear distinction between science and technology leaves scientists free to pursue discovery ("search for truth") without worrying about the consequences of their discoveries. Technologists, then, would bear the responsibility for the consequences of their applications. Those who question the sharpness and clarity of this distinction ask about the possibility of a search for "pure knowledge." The data collected, they would maintain, are answers to a question put to nature. Can that be entirely without purpose? Isn't there always a context within which a scientist works? If that is true, is it not true that a distinction between science and technology treats a difference of degree rather than a difference in kind?

Some would advance as an example of "pure knowledge" Einstein's theory of relativity. But is it "pure"? The equation $E=mc^2$ demonstrated the feasibility of atomic bombs. The theory was on an abstract plane, purely scientific. Technologists, strategists and politicians worked out the theory's military applications. The argument therefore often concludes that technology (i.e, technologists) is culpable for damage done to the environment and to human beings. Rather neatly, then, this distinction would absolve science and would allow technology to take the blame for injurious social and environmental consequences.

Also, the consequences of Einstein's powerful equation has gone far beyond the development of the atomic bomb. The research conducted in the Manhattan Project wedded science, technology and government to each other in a new way. This wedding has perhaps blurred forever the distinction between science and technology. Science and technology have become a hand-in-glove operation. If one were to put the question to scientists, one would probably not find a single outstanding scientist who would accept that science and technology are the same thing. It is doubtful that one would find a single scientist who would not claim that science is an *independent* search for truth. Almost all scientists would say that technology has to be dependent and that science is independent. Yet some argue that the linking of science, technology and government has caused science to forfeit the independence it had.

Can the scientist detect truth without producing effects? It is certainly questionable to maintain that he or she can do so. The social environment feels the effects and that puts the scientist in the middle of political action. In this perspective the distinction between science and technology may serve a political purpose rather than a useful intellectual purpose. Such a distinction attempts to absolve scientists of

responsibility for the human dilemmas posed by science and technology. If so, this is a distinction without merit and one that mostly serves those who do not want to claim responsibility for their deeds.

[Peggy Keilholz then treats "The Role of Science and Technology." Before returning to the section on "Theology and Church: Definitions and Roles." we will briefly outline her treatment of the role of science and technology.

From the assumption of truth as the goal of science we move easily to the myth of science as value-free and objective. That myth bears little or no resemblance to reality. Even if the goal of science is truth for its own sake, the problem of human goals in doing science remains. There should be some purpose to the acquisition of knowledge beyond the knowledge itself. There are human values that are more important than knowledge itself. The argument that science is neutral with respect to human values diffuses responsibility. Aren't values built into the methodology itself? There is a value-frame that sees scientific knowledge as valuable — even as the only valuable knowledge. Further, science comes out a culture which is value-laden and purposeful.

Some argue that we should not blame the tools for bad results, but should look to the wielder of those tools. This has some truth. Abuse should not take away use. But easy absolution by blaming society is not the answer either. This is all the more complicated a problem in a pluralist society. Scientists are citizens and to disclaim this is to renege on responsibility. Public funding directly binds science and technology to society. Should the public fund "pure research" or should research be directed toward specific public goals? to public accountability? Are scientists willing to "bite the hand that feeds them"? What is the role, then, of bureaucratic agencies? What does the shift from physics and chemistry to biology mean for humanity? Is it here that there's a role for theology and the churches?]

Theology has been defined as the study of God. Within this very wide definition, different issues of importance can be identified. It has, for example, been suggested that theology *is* responsibility; that that is always how theology begins and always how it ends: in direct *response* to God. Before it is talk *about* God it is already, and primarily, is talk *to* God. Sooner or later, and over and over, that is what theology must return to, talk to God.

For purposes of this treatment, we will define church fairly broadly and somewhat vaguely to mean the institution and the individuals who constitute it. To discuss theology and the church in the science-technology matrix is basically to ask how to bring faith, and reflection on it, to the challenges presented by that science and technology.

Faith is more than belief. How we shape our world, make our truth, and establish our laws are all consequences of prior convictions and those are part of faith. For the person of religious conviction, to enter into dialogue with scientists and technologists *only* to understand the challenges presented by them, is to miss the point of the theological encounter and to engage in a very helpful, but nonetheless secular, work. To emphasize the theological encounter is to include a reflective and carefully articulated account of theology vis-a-vis the sciences and technologies. If the Christian (remember we are dealing exclusively with the various Christian traditions) believes that the issues presented by science and technology have an impact on faith, vision and conviction, the Christian's challenge is to ask ourselves whether we have a simple (not in the sense of naive, but in the sense of fundamental, integrative, all-determinative) faith in something (really, in Someone). Do we really believe that this word we have received is the first, last and ultimately definitive word: that we need salvation; that there is salvation; that in no other Name (but Jesus) is there salvation. We believe that the very best thing we can share with our brothers and sisters is our Christian faith.

Again, for discussion purposes, let's consider faith, church and theology as together having a role in science/theology dialogue, although it would be possible to distinguish separate roles for each of them. Faith, theology and church in this volume together represent what the word "theological" stands for when we speak of a theological encounter with science and technology.

The church, like the scientific community, has a realm in which it must operate. Its activity, like that of science, has its limitations. Unfortunately, one of the great limitations now is ignorance. We are well into the last quarter of the 20th century and the churches' awareness of scientific activity and its meaning is still very far from adequate. The understanding of the impact of science on religion is not nearly as far advanced as it ought to be.

One of the first responsibilities of the believing community is to learn about the scientific and technological activity which pervades the world and to understand the meaning of what is happening. To accomplish that requires at the very least the rudiments of a dialogue, but the structures within which such a dialogue can happen are either lacking or insufficiently used. Some have argued that the church itself, so divided in matters of belief and practice, can only make matters worse by entering into such dialogue with the scientific and technical community. To such a position there is the counterpoint: take Lord Snow's point that we must provide some overarching, philosophical, "religious," "scientific" framework, a *Weltanschauung,* which incorporates our best understanding of the religious worldview as well as the implications of science and technology. It is better to enter the dialogue with the best that we can do than not to enter the dialogue at all. Perhaps that fortunate combination of serenity and stupidity — "serendipity" — which has produced results in science could also work in theology. Applied to the task facing the theological community, there is always the serenity of knowing that grace is present as well as the stupidity that is human sinfulness. Such a composite attitude could take a bit of the fear and frenzy out of the problems that presently compose the science-theology dialogue. The Christian (theologian and non-theologian) has to face these problems squarely, realizing at the same time that grace is at work. Let us never forget that great solutions are worked out in simple increments according to the imperfect capacity of simple people.

The fact that men and women are divided in their religious beliefs is no excuse for not entering into dialogue. Such an attitude would seem to concede that scientists and technologists are united on all issues in the scientific and technological spheres. Theology and science/technology are areas in which human knowledge is never complete. To enter into dialogue would enrich both theology and science/technology. It has frequently been suggested that the meeting place of science and theology is responsibility. Theology looks to responsibility and science/-technology, since they produce consequences, assume responsibility. The role of theology in the science/technology /theology dialogue is to invite scientists and technologists to look at and see their responsibility. A central task in this process is the orientation of the human community, aas well as the re-orientation of the Christian community, to the principal values of the Gospel. This demands a revitalized Gospel statement. It has the direct goal of the promotion of conscious awareness of responsibility to society, to our fellow men and women, and to God.

If theology is to call scientists and technologists to responsibility, the spokespeople for theology must be knowledgeable. Another problem that seems to confront the theological component of the dialogue is the perceived reactive stance of theology. But this is not a totally appropriate criticism. The question might be stated thus: must theology constantly react or does it have anything creative to tell the world? To demand of theology that it should have had answers before the fact is worse than naive; it is absurd. Theologians would be of no service to the Christian community if they devoted themselves to working out solutions to all hypothetical problems. Chances are that, in doing this, they would end up ignoring the real issues.

The present situation in which theology and science are rather estranged is a sort of intra-family squabble, a case of the parent (the Judeo-Christian culture) disowning the child (science and technology) and the child disowning the parent. Modern science and technology are lineal descendants of a Judeo-Christian culture. In our day we must begin to create a new family structure within which these different ways of looking at the world are integrated. Such an overarching worldview is essential if science is to find its fully proper role in human living. Moreover, we need to recreate a workable theology (true and appropriate) which takes in the terms and constructs of contemporary science and technology and incorporates them into a religious framework.

Religion has traditionally spoken to the fundamental security of life. Contemporary western society seeks its salvation in procedures, in science, in the vote. This is not something most Christians would care to defend theologically. Yet we cannot simply charge in and say we don't like that particular form of salvation and then merely offer a countervailing position. If we limit ourselves to that, we shall not have done any theology in the reasoned sense of "-logy". We would have simply said that we have different kinds of emotional preferences for where our salvation lies.

What would constitute a restructuring of theology is, of course, controversial. For some, theology is done and re-done in *praxis*. Others believe that no decent theology has been done for 400 years and that for church people to concern themselves with issues like the disposal of nuclear waste or power sources is trivial compared to the work which theology should be doing, which is to ask the meaning of God, Christ and grace in our world. The ideas of Newton, Darwin and Einstein have dramatically altered our under-

standing of the classical world from which we drew such meaning. The real question is whether we can reconstitute people's worldview, their order of thinking. What is our picture of the universe? How can we use our experience?

Rather than becoming embroiled in the specifics of issues in which the church has little or no expertise, the church and theologians have the duty to give theological and moral insights which could be of tremendous benefit to human beings. The church should rather develop respect for objective scientific truth obtained from the best available sources, or for the nearest approximation to objective truth that we can get. This involves more than refusing to say or to accept things that are not true. It also means not postulating ideas about the world unless we have reasonable evidence. It means, further, not insisting on things which are discredited by the bulk of the scientific community, unless there are strong reasons for going against views which are widely held.

Theology's important contribution is to give meaning to living in the creation God has given us. Meaning is more than well-thought-out theology; it includes thought, prayer and worship, etc.; in other words it is living the Christian life. The church must say that God really became and really remains man, that material creation is a proper vehicle for the Spirit, that the natural world is important from a Christian point of view, that our activity in the world is important to God, that the world is not simply beyond God's deliverance.

Is not involvement in specific issues, however, a logical consequence of such responsibilities? The difficulty arises less from whether or not the church's should become involved in detailed issues like the disposal of nuclear waste or acid rain than from its proper role in such specific cases. This suggests that that proper role may be different on various issues, depending on what the issue is and what is called for. In every case, the church's proper role, theology's proper role, is to provide the comprehensive framework in which to view specific issues, to help enlarge the context for discussion and debate, and, where appropriate, to provide moral guidance for decision-making based on the best available knowledge and evidence.

The church can and should serve as a legitimate critic of science and technology. Criticism can be directed at an ethos of science which simply pursues knowledge and makes that pursuit so important that scientists are willing to fudge data. The church can appropriately question the pursuit of knowledge when humanity is thereby degraded. The church and the Christian, furthermore, should summon scientists and technologists to consider those areas of human knowledge and human need which could benefit from their assistance. This means asking the questions which science and technology have not considered, much less answered.

Another question the church and the Christian can legitimately raise is how any research helps those who are the least in this world, the weak and the oppressed. It is not enough, however, to say that there is need for the social control of research. Such control can ignore social justice just as much as uncontrolled research. The society that shows no concern is as bad as the researcher who shows no concern — multiplied out to the degree of power available. The only valid kind of social control would be one that reflects the Gospel message for the salvation of the oppressed, that furthers God's action to liberate them.

The possibilities opened up by advances in recombinant DNA research and application highlight concern for the oppressed and the weak. There is clearly a chance for "chromosomal racism." Any drive for "genetic purity" is going to fall most heavily on those on whom these things always fall most heavily, on those least able to defend themselves, namely, the poor. The theological dimension here, one which is more often ignored, is the Judeo-Christian mandate to protect and defend the *anawim,* those most easily oppressed.

Probably the most basic question of the Christian approaching scientific and technological issues is: what difference does it make to believe in God? If we worship God rather than knowledge, then we are open to being the servants of much more than knowledge. Simplistically, to believe in God as the one Lord of life and creation is to be delivered from the captivity to any single human value.

The Christian, even one witnessing incognito in the world, mixes with the worker, the scientist, etc., to live the Christian presence to those different worlds. For this task, the Christian community is indispensable: it holds the individual accountable. The Christian cannot venture into the world without living a life of vivid faith. To live that life requires participation in the community. Christ's redemptive work involves the renewal of all of creation. Since that renewal demands that all work together, that all have something to contribute to the body of Christ, the strength of the whole community in Christ is needed to bring about the renewal of all things.

VALUES AND ETHICS

Having looked briefly at the meeting place of science/technology and theology and the respective roles of science, technology and theology, it is necessary to look briefly at values and ethics. It is necessary to consider the following: what are values? what is the center of values? what is the place of ethics in the science/technology and theology dialogue? what is the place of Christian morality in the dialogue? At this point the discussion shifts from the theoretical realm to the practical: how do Christian values make an impression in the scientific and technological context? In what ways can these values inform the choices posed by scientific and technological research? What is the role of the Christian community, the church, in political decisions which science and technology demand?

Ethics involves questions of value judgments about human actions. To speak of ethics is to recognize that there are competing and conflicting claims, as for example, when a physician as a practitioner of medical technology seeks to preserve the life of a terminally ill person and the ill person or his or her family believes that the treatment should stop. Who can answer the conflicting claims in such a situation? Who should make the decision? In such cases and others like them, science and technology alone cannot supply the values or the value theory on which decisions can be made. While science and technology embody values and operate from an implicit value system, they cannot supply their own value theory. Nor can they, in themselves, supply their own value. Neither can science and technology answer questions about the destination of society, its purposes, its values, etc. Almost any great social project most ordinarily serves a variety of purposes and values. That is one perspective from which the problem of ethical choice surface. What are the greater values, and what are the lesser?

The concern that people have about values and ethics in science and technology may not be focused so much on the science and technology themselves as on the scientist and technologist. Scientists are both right and wrong when they criticize lay people for not understanding the grounds of their fears. To dismiss those fears (and myths) on the grounds that one knows better as a scientist is, of course, to miss the human point as well as the political point. The human and political point is that *they do feel that way.* If they feel that way, it's real. To dismiss them out of hand is somehow to dismiss their personhood as creatures with nerve-endings and anxieties which everybody knows something about. Rather than dismiss them as unimportant, we must address the fear and anxiety as something worthy of consideration. To be fair, the church and theologians sometimes belittle those who don't understand, even when such information is difficult or nearly impossible in the case of the "little ones" to come by.

People may simply not believe the scientist or technologist who tells them they have nothing to worry about. Like a child who believes that there is something under the bed, the public needs to have its fears allayed. It's not enough to be told, "there is no ghost." Scientists and technologists who have the knowledge should be willing to share their knowledge and to *show* people that "there *is* no ghost under the bed." If they are unwilling to do this, they will even more convince people that there is something to fear.

Science and technology are forcing us to face perennial questions we might have rather avoided. Medical technology certainly has done this and, because it touches the lives of so many people, it serves as a clear example of the kinds of questions facing individuals and society. The health care crisis is forcing society to consider value questions such as: what is life? what is death? when is death? what is the nature of authentically human existence? what is health? what are the relative obligations and rights of patients, physicians, society?

Some ethicians describe three theories of values: the absolutist, the utilitarian and the relational. All of us are value absolutists at one time or another, i.e., there are some things that we value so highly that we are ready to dig in our heels and say that we're ready to protect this value, come what may. At other times we tend to be utilitarians, perhaps a little more open to a variety of at least instrumental values for the service of that thing in our lives we value most of all. The trouble with that characteristic is that it often leads to distress in public life, or at least to a stand--off which keeps us from grasping the hands of particular neighbors in our community. How do we deal with a plurality of values in such a way that we not destroy the community? This is the ordinary political problem.

Most technologists, it seems, are utilitarian in their value theory in the sense that they are always trying to understand the value of something relative to something else. The "something else," though, could be an absolutist value as, for instance, when physicians as applied medical technologists are seeking life for its own sake and are, therefore, valuing everything that they have to deal with daily in terms of its usefulness or service for that end.

In the view of its supporters, the relational value theory avoids the liabilities of the absolutist and utilitarian theories by recognizing that the objects in our lives are not valuable only in one relationship. What is in dispute in most questions of values is not the values *per se* but their order of priority. When do we permit ourselves to be the center of value? When do we permit the squirrel to be the center of value? When do we require each other to love our neighbors as ourselves, refusing to consider ourselves as exclusive centers of value?

Following Richard Niebuhr, these adherents would discuss what is at the center of all values. We need, they would say, some center of primary polarity as the organizing principle of value networks. That is to say we must identify the area of responsibility. The most practical part of any value theory is its answer to this question: to whom or to what should we mostly be loyal? Or put another way: what is our ultimate community of reference? What is our "overview"? What is our "over-community"? A humanist position would assert that the whole human community is the center of value. The difficulty with that position is that, in practice, each person tends to restrict the real centers of values to something more narrow than the whole human community. In practice, we, as individuals are not concerned with the whole human community but rather with functionally ultimate references that are much smaller.

Religious statements coming from a biblical perspective place God, rather than humankind, at the center of value. God is the audience to the play of human life; he is the "Someone" who "looks down" on this earth in some sense or other, who values it and all parts of it. If that view seems to be out of date, the question remains: where will we place that loyalty and trust which includes a large, rather than small, community? To whom or to what are we called to be responsible? That statement sounds very much like the notion raised before, i.e., that the meeting between science/technology and theology is responsibility. Ethics, then, would not be limited to consideration of the relationships between human beings. The proper center of an ethical system is bigger than the composite called the "human community." Consequently, an ethical system whose center is God rather than humankind will not be limited only to questions of relationships between humans, but would, for example, also include moral obligations to the non-human world. Practically all of the literature that dealt with science and ethics, until about 10 years ago, presupposed that ethics dealt only with the relationship of humans to humans, that we have no moral obligations to non-human creation except as that has an impact on other human beings. Nature is value-free, it was said; therefore there is no ethics in nature. One approach to the false dichotomy between nature and humans (the value-bearers) is to include nature within culture and to control it in ways defined by the culture. Nature would still have no value of its own, but only that which its association with the human community grants it. Another approach would recognize a reverent relationship, a valued relationship to the non-human. That relationship would be intrinsic to the practice of science and technology.

If it is possible to discuss values and ethics apart from any specifically religious notions and to arrive at an ethical relationship between humankind and the natural world which is the subject of science and technology, what role does Christian morality have? Does the Christian have any privileged insight which others may not have and which, therefore, makes an essential contribution to the discussions and decisions about the impact and the uses of scientific and technological advances? Some contemporary Catholic moral theologians, for example, hold that there is no specifically Christian morality. They say that the Christian church, the body of Christian worshippers, has nothing to say about what is the structure of good and evil in the world concretely that is not simply available to all people everywhere in this pluralistic technological community in which we live. This, of course, involves the silencing of a specifically Christian voice. Such a silenced Christian witness would eliminate an effective voice in science-technological issues and that silence would be a betrayal of the meaning of the Incarnation. The world in which we live will remain free, will remain moral, will remain responsible insofar as there is lived out a distinguishably Christian witness by those who are called by their faith to that witness. Christian morality addresses the question of freedom and what it means to live a free human existence in a scientific, technological society. Does our science and technology free us or bind us? What is the structure, the minimal structure, of a free human existence which is equivalently a worship of, a search for, the holy?

The discussions to this point have hinted at a linkage among the themes of freedom and responsibility and the meaning of bring human. These themes are the core of science/technology and theology *dialogue*. Our humanity is inherently bound to both freedom and responsibility. Understandings of freedom and responsibility reflect a view of what it means to be human, and to be human entails both freedom and responsibility.

LETTER TO EDITOR

The ITEST Bulletin has received the following letter:

Dear Bob,

Did you really mean this paragraph which appears in your article [Hybrids, Genes and Patents, *ITEST Bulletin*, Summer, 1995, p. 16]:

Mr. Rifkin's concerns about profit, greed and wealth, economic realities or fantasies are not mine, but, if his concerns can be re-directed to the great doctrinal issues inherent in our growing control of living things, so much the better."

Surely for our Lord, "concerns about profit, greed and wealth. . ." were absolutely central. The gospels are full of *his* concerns about these very matters. And Jesus was utterly unconcerned about "great doctrinal issues." My position is that only through the former can you get to the significant doctrinal issues. The rest is all "sounding brass and tinkling cymbal." Maybe the Bishops were wise to join the protest against patenting life forms. I believe Rifkin is closer to the gospel intent than the Jesuit.

Rustum Roy
Evan Pugh Professor of the Solid State
The Penn State University

Father Brungs Responds: I stand corrected: I should not have suggested that Mr. Rifkin re-direct his concern about profit, etc. Since I would not greatly welcome his suggestions that I re-direct my concerns, I withdraw mine concerning his work. I would just note that the sentence which Professor Roy mentions is but one sentence in the paragraph, not the whole paragraph. There are nine other sentences a re-reading of which I would recommend.

I concede that there is a great deal of mention of profit, greed and wealth in the gospels. I do not agree that these concerns are "absolutely central" to our Lord's concerns nor do I agree that Jesus was utterly unconcerned about ". . . the great doctrinal issues." Christ, in response to Pilate, says: "I was born for this, I came into the world for this: to bear witness to the truth; . . . (John 18:37)" Earlier, also according to John's Gospel, Jesus says: "I am the Way, the Truth and the Life. . .(14:6)." We cannot separate Christ from either his moral message, his teaching of the truth and his being the Son of God. His truth extended beyond profit, greed and wealth. We cannot capture Jesus Christ in one sentence, or in one lifetime or in a thousand lifetimes. As a Catholic, I cannot divorce Jesus from His Body, the Church, one function of which is clearly doctrinal. Professor Roy and I can probably fill many days with discussion of this, to me, essential relationship.

BOARD OF DIRECTORS ANNOUNCES SEARCH FOR ITEST DIRECTOR

The search is on for a successor to Fr. Robert Brungs, SJ, co-founder of ITEST and director since 1968. Fr. Brungs will become "chairman of the board" as soon as a new director is in place. His 27 years of "full-time" service to the organization has afforded little opportunity to write. He hopes to devote his energy to research and writing on aspects of the faith-science ministry.

Position:	Director of ITEST
Requirements:	PhD in Theology or Science, with an appropriate competence in the other area.
Responsibilities:	Organizational development (membership, fund raising, program administration),

(1) designing workshops\conferences for college/university professors, professionals in business and industry, scientists/technologists, clergy and church leaders and college and university students in theology and the sciences — all with a view to "meaning" for the Christian living in the world; (2) lecturing on topics of science/faith/theology; (3) writing on these same topics for publication, either in-house or in journals; (4) exploring new areas of ministry or service (i.e., campus ministry).

Salary/Stipend:	Very modest, but somewhat negotiable
Conditions:	One to two-year internship or residency with present staff.
Contact:	S. Marianne Postiglione, RSM, Dir. of Communications and member of search committee. (314)-977-2703; FAX 977-7211. Or send resumé with letter of intent.

NEW MEMBERS

BRODEUR, OP, Sister Susanne
2521 Old Tavern Road #61
Lisle, Illinois 60532
U.S.A.

(708)-305-3978
Doctoral student - nursing science
Rush University - Chicago

FADDEN, Elizabeth R.
13 Lindenwood Drive
Collinsville, Illinois 62234
U.S.A.

(618)-345-4173
Instructor — Nursing
S. Illinois Univ. — Edwardsville
World and community health

LAWRENCE, NSJ, Mr. Deron
Jesuit Novitiate — 1005 Summit Ave.
St. Paul, Minnesota 55105
U.S.A.

(612)-224-5593; FAX (612)-224-4734
Jesuit Novice
Wisconsin Province
ecology, bioethics, theology

MAY, JR, Fr. Raymond E.
1631 Crescent Road
Lawrence, Kansas 66044
U.S.A.

(913)-843-0357
Roman Catholic Priest
Kansas University
Physics & Astronomy

SALIWANCHIK, Mr. David R.
2421 NW 41st Street, Suite A-1
Gainesville, Florida 32606
U.S.A.

(904)-375-8100
Patent Attorney
Saliwanchik & Saliwanchik
Biotechnology

WATSON, Ms Lisa
236 Whitmoor Forest Court
St. Charles, Missouri 63304
U.S.A.

(314)-694-6383; FAX: 694-4228
Public Affairs
Monsanto Company

WELDON, MD, Virginia V.
800 N. Lindbergh Blvd. (Dept. DIA)
St. Louis, Missouri 63137
U.S.A.

(314)-694-3901; FAX (314)-694-3011
Senior VP, Public Policy
Monsanto Company
Biotechnology. Gene patenting

WOLBERT, Jerome J.
5734 S. University Ave. (Math dept.)
Chicago, Illinois 60637
U.S.A.

(312)-752-2340 email:wolbert @math.uchicago.edu
Grad. student/lecturer
University of Chicago
Math, linguistics, biol., cosmol., phil. of sci.

CHANGE OF ADDRESS

BERTRAM, Prof. Robert W.
611 Eckrich Place
Webster Groves, Missouri 63119
U.S.A.

(314)-961-1874
Professor (emeritus)
Lutheran School of Theology - Chicago
Salvation not just *from* world or *in* world but *of* world

DOSER FSE, Sister Sarah
14 Kings House Court
Silver Spring, Maryland 20904
U.S.A.

(301)-208-8237
Director of Admissions
John Paul II Institute (Washington, DC)
Body theology/health care ethics

DUNCAN OSF, Sr. Frances Marie
180 Grand Street
Jersey City, New Jersey 07302
U.S.A.

(201)-434-5579
Teacher - Secondary Education
St. Peter's Preparatory School
Bioethics, neuroendocrinology

HAYES, PhD, Alice B.
5998 Alcala Park
San Diego, California 92210
U.S.A.

President
University of San Diego
Biology

MC NEARNEY, Fr. John J.
P.O. BOX 1855
Maggie Valley, North Carolina 28751
U.S.A.

Catholic priest

Astronomy, theology, cosmology

PROKES FSE, Sr. M. Timothy
14 Kings House Court
Silver Spring, Maryland 20904
U.S.A.

(301)-208-8237
Theologian
Washington, DC, Diaconate Program
Theology of the body/bioethics

IN MEMORIAM

We announce the death of two very long-time members of ITEST:

John Bergin, MD (July, 1995)
Bishop Glennon Flavin (August, 1995)

We ask you to pray for them and their families. We also ask your prayers for ITEST members who are ill. May they feel the restoring hand of the Lord.

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221 North Grand Blvd.
St. Louis, Mo. 63103

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