INSTITUTE FOR THEOLOGICAL ENCOUNTER WITH SCIENCE AND TECHNOLOGY

BULLETIN

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This issue, the final issue of the first twenty-five years of our group, is a great milestone. I have from time to time said that we began ITEST in 1968 with five people, $35.00 and a lot of hope. We now number about 500, with some more money and still a great deal of hope and a vision of what is needed in faith/science work.

I believe that that vision separates us from most of the groups that have sprung up recently. Our basic resource is people — us. Theory is good and needed. We, however, are not only sorely needed; we are indispensable. This effort to integrate our science into our faith will ultimately be successful only in individuals like ourselves. The arena for reconciling science and faith is the work bench, not the think-tank; it is the classroom, not the ivory tower of high level meetings. It is a matter of the heart more than it is a matter of the mind. That is ITEST's vision of the future in this work.

The runaway success of the movie, *Jurassic Park*, carries a message that we cannot ignore. That success is due in great part to the public fascination with dinosaurs. But the "science" involved also should be of concern to us. By that I do not mean that we can soon (if ever) expect dinosaurs to come rampaging out of scientific laboratories. At the same time, we cannot look past what is really happening with current efforts like the Human Genome Project or with future "genome projects" for species of plants and animals. These are of vital concern for all of us and for future generations — and not the least for Christian living.

There is immense good to be found in these initiatives. We shall need new sources of food, both plants and animals. We may be able to "conquer" certain vicious hereditary diseases. We may (carefully, I hope) improve our bodily composition. But this latter presumes that we know what "bodily good" is before we can seriously consider "bodily better." This in turn demands at least some guiding awareness of God's will for us, his bodied creatures and his beloved. Clearly, we are not in danger of running out of challenges nor of the need for continuing integration. May God help us all in this work for the growth of his kingdom here and in heaven. God be with us.

Robert Brungs, S.J.

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ANNOUNCEMENTS

1. The Board of Directors has confirmed the topic for the March 18-20, 1994 workshop: *Secular Ideology versus Jewish & Christian Secularity.* Thus far we have four confirmed essayists, Drs. Christopher Kaiser (history of secularization), Richard Blackwell (philosophy), Helen Mandeville (humanities) and Edmund Pellegrino, M.D. (medicine). We are searching for essayists to treat law, religion and the social sciences.

2. *The Science and Politics of Food* will be the topic of the October 14-16, 1994 workshop. Please note this date on your calendars. ITEST has often been "prophetic" in choosing topics for workshops and conferences. Daily horror stories of worldwide hunger make us brutally aware of the seemingly insurmountable problems associated with food production, storage, distribution and others. Dr. Robert Collier, Board member, is assembling a group of essayists, *pro* and *con* on four of the following sub-topics: food surplus, the science of food, international pricing mechanisms, production, distribution, religious ideologies, rural sociology, technology, and population. The precise topics will be decided at the September meeting of the Board of Directors.

3. Please let us know if you or any ITEST member has recently published or has received an award or recognition for your work or ministry. Please let us inform the ITEST membership of any personal achievement in your profession. We would be happy to publish that information in the Bulletin.

4. Please let us know if any ITEST books have been received in less than "mint" condition. A few members have received damaged books in the mail. As you know, a bulk mailing company takes care of sending out the books. We have not been notified of any trouble with the bulk mailings. If, however, a dues-paid member has not received the volumes, *The Human Genome Project* or *A Seminar with Fr. Stanley Jaki*, please let us know. If this problem is widespread, we shall have to consider some action.

5. The book of essays on science and faith, *Transfiguration: Elements of Science and Christian Faith,* should be available by early August. We plan to have a suitable premiere at the 25th Anniversary Convention in Holyoke, Massachusetts. As we noted in a previous bulletin, the book includes chapters on the methods employed in various sciences, philosophy and theology. It will also contain historical material on the growth of science and on the theology-science conflict and three chapters (representing the views of one Protestant, one Eastern Orthodox Christian and one Roman Catholic) on elements of the Christian faith. Special thanks are extended to the authors for their generosity and willingness to share their wisdom with us. This book is unique in that it presents a collection of ideas on science/faith rarely assembled in one volume. We suggest its use in college, either as a supplementary text for an interdisciplinary course in the development of ideas or for survey courses in the arts, humanities or science. We think it will be valuable for anyone in any aspect of faith/science work.

6. ERRATA in *The Human Genome Project* (proceedings of the October, 1992 workshop). Note on page 4: ". . . has been estimated to be 8 x 10^9 base pairs (bp), . . ." *should read* ". . . has been estimated to be 2.8 x 10^9 base pairs (bp),. . ." More significantly — on the same page — replace the full paragraph beginning with *The problem of length* with: The problem of length is further compounded in higher organisms by a phenomenon where most genes are not encoded in a continuous format. Instead, the coding regions of genes, known as exons, are interrupted by non-coding regions known as introns. Thus, both exons and introns are transcribed, but the RNA is processed to remove introns before it leaves the nucleus as message. The most obvious problem which this presents is that the genes from higher organisms are much larger at the DNA level than at the level of message or resultant amino acid sequence. Two developments, restriction digestion and production of cDNA, have advanced our ability to deal with these problems. Both of these methods will be explained in the section which follows.

7. The topic (working title) for the Spring, 1995 meeting is: "Risk — Perceived, Assessed and Real." Details on the structure of this meeting will be reported as they are developed.

This issue of the *ITEST Bulletin* marks the completion of ITEST's first quarter of a century. The Bulletin is an immediate lineal descendant of the Newsletter of the International Secretariat for Science-Theology Dialogue. In January, 1977 (Volume 8, Number 1) this became the ITEST Newsletter. Because the contents of the Newsletter had evolved over the years, it was suggested in 1984 that the name should be changed to Bulletin from Newsletter. This change was first implemented in Volume 16, Number 1, in January 1885.

Reprinting long segments of Volume 1, Number 1 represents more than a merely nostalgic look back. While much of that document reflects the mood of the late 1960s, it contains much that still faces us today. Many of the problems and issues mentioned in the consensus paper (the only one ever to grow out of an ITEST meeting) are still with us, although we suspect the order of priority would change if the list were compiled now. In other words, though the quaintness of the 60s is perceptible in this consensus paper, many of our present needs are stated. That should qualify this consensus document, it seems as *quaintly prophetic*. That it was prophetic is clear.

[The text of Volume 1, Number 1 is printed in column form.]

At a meeting, April 24-26, 1970, held in St. Louis, Missouri, under the sponsorship of the Institute for Theological Encounter with Science and Technology (ITEST), a committee was formed to promote communication among individuals and groups engaged in science/theology dialogue. The participants at this conference were specifically concerned with the implementation of the task of providing information on existing groups and the type of work they are doing.

The new structure proposed at the conclusion of the conference was assigned a specific mandate: (a) to promote exchange between the theological and scientific communities on the ethical and social meanings of science and technology; (b) to open up technological education to religious and ethical questions; (c) to open up religious education to scientific and technological questions; (d) to affect the mind of the Church.

The four members of this committee met at the Bergamo Center in Dayton, Ohio in mid-July to discuss the implementation of this broad and difficult mandate. It was immediately evident to those involved that this commission could be carried out only if many interested individuals and groups were to dedicate their knowledge and concern to these tasks. It was decided, consequently, that the initial function of the secretariat was to serve as a clearinghouse for information and as a focus for common concern and common effort. It was decided that the activities of the secretariat at present be confined to the publication of this newsletter.

Consensus Paper

A major common problem facing scientists and theologians is a lack of communication. Specialized languages, the differences in mindset and research techniques, the preoccupation of each group with the problems of its own profession, all contribute to this communications gap.

Resulting, at least in part, from the above, there is a breakdown between knowledge and decision making. The goal of both theologians and scientists has been more knowledge to the exclusion of integration of knowledge with values and power.

As a minimum there should be a common focus on the problem of human survival and the quality of life surviving. None of the above implies limiting individual and collective theological and scientific concerns to materialistic issues. The most important issues common to scientists and theologians include: (1) peace; (2) population pressures and world hunger; (3) ecological concerns; (4) racism; (5) maldistribution and misuse of wealth; (6) misallocation of intellectual assets; (7) inadequate social structures and moral commitment; (8) the disenchantment of youth; (9) problems of knowledge, value and power; (10) genetic manipulation; (11) experimental surgical techniques; (12) manipulation of the mind.

As time has passed it has become clearer that one of the major problems facing scientists and theologians is a lack of communication. It is not simply a lack of communication, however, that bedevils scientists and theologians. It is more than differences in mindset. If we are willing to tell the truth about it, we must add prejudice (on both sides) to the mix. Over the intervening years it has become more apparent that the debris of several centuries of *conflict* must be removed. ITEST believes that this will best be accomplished by "ordinary" Christians in science who have consciously and conscientiously endeavored to integrate their science and their Christian faith.

The acceleration of progress in science and technology is outdistancing theological conceptualizations. This represents a crisis because man's image is being shaped in a theological-ethical vacuum. There is a fear of irreversible damage being done to the planet and also to the climate of trust between men. Part of this is rooted in the obsolescence of the present decision-making base. An overstatement of the crisis, however, would be counterproductive.

The question is raised, "To what extent do government officials and the public share the perceptions of scientists and theologians concerning the major problems noted above?" The crucial problem is situated in leading the public to an awareness of the value issues at the base of the separate empirical issues.

This passage certainly reflects the time in which it was written. The "theological-ethical vacuum" has become a truism. Yet, two decades later the "vacuum" is still apparent, even more "vacuous" perhaps. We still talk (endlessly) about "values" and about "ethical decision-making." The question will not go away, however: is ethics without God simply a statement of "cultural manners"? Can any lasting society or Christian life be built on the dictum Al Capp put in Mammy Yokum's mouth: do good and avoid evil because good is nicer. Can we speak about *values* rather than *virtues* and expect that we will ever come to grips with any of the problem areas mentioned in this consensus paper?

The question is raised, "To what extent do government officials and the public share the perceptions of scientists and theologians concerning the major problems noted above?" The crucial problem is situated in leading the public to an awareness of the value issues at the base of the separate empirical issues.

It is difficult to determine who today is deciding goals, identifying problems, and setting priorities. Money buys technology. Thus the advertising media and the consumer response influence the direction of technological momentum and change. Military and social regulatory agencies likewise help determine present and impending priorities. Certain specific decision makers may be identified: (1) government; (2) private industry; (3) pressure groups; (4) universities and colleges; (5) churches; (6) foundations.

In spite of the foregoing, it is still not easy to pinpoint the "who" in the question under consideration. On the one hand, goals, problems and priorities are complexly set and identified by interaction between public opinion, mass media, government and industry. On the other hand, small, seemingly insignificant groups, acting at critical points are sometimes more influential than their numbers suggest. The role of national administrative policy is especially influential, as illustrated by the deplorable expansion of national military budgets around the world. Unfortunately the students play an uncertain and indirect role in societal decision processes. The Churches have too often been ineffective in dealing with problems, often lacking even the proper questions.

The para-university structures (institutes, task groups, etc.) appear to be able to bring an interdisciplinary vision to bear better than the university or the Church can. But they are handicapped by lack of permanent budgetary foundation and absence of tenure and the academic freedom that flows from it. The 1972 U. N. Conference on the Human Environment in Stockholm and the proposal of the Institute de la Vie for two assemblies (one reflective, one political) may be looked to hopefully.

In general, decision makers cannot meet the contemporary challenges. It is a paradox that everyone can, personally and locally, make decisions improving the quality of life while globally no one is able to do so. It is true in part, because

the capacity of industry to design products for minimum consumptive use of resources and for the recycling of that which is worn or used is minimized in a competitive economy. Further, we are hampered because technological policy is not coordinated for the following reasons: (1) Within governments, offices of science and technology are weak; (2) Much of the development of technology is in private hands; (3) Managers are not yet sufficiently affected by the knowledge that the resources of the planet are finite; (4) The Churches have not effectively used their economic power to push the development of technology in humane directions; (5) The universities are weakened by internal problems.

None of these problems has been "solved," certainly not in any sense of the word "solved" that would have been recognized in 1970. The more government has intervened, the less "rational" the problem solving has become. We should have learned by now that government can only regulate, it cannot really change hearts and minds. This latter, however, is the only basis for positive change. Blame must fall primarily on "industry" in the very broad sense of the word (this includes consumers) because of greed and on intermediate groups like schools, churches, labor unions and such because of ignorance, trendiness and a running to quick and easy solutions.

There are several procedures or structures most necessary to facilitate communication between theologians and scientists, particularly as this affects the processes of decision making. The question could be approached, in part, through existing structures: the Churches; the universities (especially in terms of programs of continuing education) professional associations; groups of people on the job in research and development.

However novel structures are needed to determine ethical direction and include: (1) Agencies within established scientific and technological structures to study technical developments and their implications; (2) Establishment of interdisciplinary groups; (3) Study centers organized for the examination of important issues and implications within specific fields; (4) Included with the allocation of funds for scientific-technological research should be a certain percentage assigned to finance the study of its value.

The resources that can help solve the problems mentioned are limited. Possibly the most fundamental is hope. Suggested resources that can help solve these problems include: (1) Existing exchanges in the Churches, universities and professional groups; (2) Attempts at interdisciplinary education; (3) The contacts that each member of the group has with scientists and theologians; (4) The only partially tapped resources of the professional associations to which academicians belong; (5) Campus ministries, students and administrators.

Other resources that should be noted include: (1) scientists writing in theological journals and theologians writing in scientific journals; (2) the untapped media such as television, newspapers and films; (3) "ethos men" as a type of human catalyst; (4) the computer has potential for problem-analysis; (5) student unrest; (6) good advanced planning and methods of operation (which are crucial); (7) new projects in the National Council of Churches on Environment and Population; (8) scientists employed by major industries and other professionals; (9) pooling of bibliographical resources; (10) certain educational and ecclesiastical administrators and their resources; (11) continuing education centers on seminary campuses; (12) telephone and telephoto conferences; (13) the training of missionaries to function in preventing ecological disasters in developing countries; (14) the arts; (15) search for new symbols in liturgy and worship; (16) libraries and bibliographies; (17) one particular untapped resource is money. It can come from the government, campus ministries, industries and philanthropists.

Certain new goals are now becoming more evident. One is a larger involvement of social scientists in the problems of technology and society. Furthermore, resources must be discussed in relation to particular problems.

Some distinctive changes that ought to be effected which would be apparent in a decade include: (1) It should become an accepted practice for scientists and theologians to evaluate activities in terms of social impact; (2) Academicians in public universities should be free to engage in research in science/theology relationships; (3) There should

be new structures in education; (4) There must be growth in interdisciplinary studies in seminaries; (5) There should be a general clarification of the terminology of issues and principles in the dialogue among scientists and theologians.

We must remember that this consensus paper was prepared not for science/theology work in itself. It was prepared in view of setting up a communications network among the groups without in any way suggesting changes in their work. Thus, its emphasis is on structural change and on increased communication among interested groups. One of the attendees even talked about building communication trenches between the scattered foxholes that then made up science/theology work. Clearly, some of the solutions seen by the group assembled in 1970 have been tried and found wanting. There is still a significant lack of cooperation (not all bad by any means) among people working in this crucial area and even more between the groups themselves and the larger scientific and theological enterprises. Also, the stress on social change has not been terribly successful in terms of the issues enumerated. Society has changed greatly. Its structures have been greatly modified and in some cases practically overturned. Yet the same problems face us. Should we be surprised? Should we now stop to consider our individual roles in the faith/science arena? It is in that spirit of individual dedication and commitment that we now present excerpts from Dr. Colella's paper.

SCIENCE AND FAITH

Is it Possible for a Scientist to Believe?

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Excerpts from a paper presented to the Conference: "Toward a Lay Spirituality for the Postmodern Era", International Schoenstatt Center, Waukesha, Wisconsin, October 23-25, 1992. This paper will be published in the Proceedings of the conference, and also submitted for publication to: *Living City*, the monthly magazine of the Focolare Movement, P.O. Box 496, New York, NY 10021.

The relationship between science and religion can hardly be described as a good friendship. We are inclined to think that the war is over, that it is a thing of the past, yet I often hear expressions of surprise when, in the course of a conversation, I mention the fact that I am a scientist and a believer in God.

It is my impression - I have no hard facts at hand, it is just an impression — that the number of people who have some kind of religious faith, in a typical science department (physics, chemistry, mathematics, etc.), is definitely below the average taken over a random sample of the U.S. population.

Whenever I go to a conference, or to some laboratory to do experiments, and a religious holiday is involved, I always find that I am the only one who worries about location of churches, times of services, etc.

Somehow the unspoken notion that science and religious faith are antithetic and contradictory pervades our culture to an extent that we do not even realize that it is there.

How did this come about? In the medieval world science and religion were part of the same cultural heritage, one was unthinkable without the other. What happened later to cause this chasm?

[In the original paper, Dr. Colella develops the history of the intellectual split between science and theology and the psychological split between science and religion.

This is not included here because the same material is treated at length in the forthcoming ITEST Faith/Science Press volume: Transfiguration: Elements of Science and the Christian Faith.]

In philosophy these ideas culminated in schools of thought, such as: Enlightenment and logical positivism, in which there was no room for a transcendent superior being. These schools of thought are usually referred to under the general name of "scientism."

Death of Scientism

During the academic year 1991-92 I had the opportunity of spending a sabbatical year in Paris. During this period, my wife Adele and I were happily surprised to notice an intense activity in form of books, conferences, symposia, etc., on the theme of *Science and Faith*, with the purpose of bringing them together after a long period of separation and antagonism. It is significant that this attempt towards a reconciliation is happening now in France, the country that so much contributed to the dichotomy between the two in the first place.

During the summer of 1991 a book was published entitled: *God and Science*, by Jean Guitton, Grichka Bogdanov and Igor Bogdanov (published by Grasset). The first author, J. Guitton is a highly respected Catholic philosopher, member of the French National Academy, very well known to the public. The other two authors, the Bogdanov brothers, are young scientists, whose fields of research are in astrophysics.

The book consists in a dialogue between J. Guitton and the Bogdanov brothers, in which the scientists answer the questions posed by the philosopher about the laws governing the natural world. Intriguing questions are debated: "Where is the Universe coming from? What is the real? What are the relationships between conscience and matter? Why is there anything rather than nothing?" In every instance the philosopher, who is also a believer in God and the Bible, finds that the answer he gets from science give him comfort and strength in his faith. He finds no contradiction between the two, on the contrary, everything he hears about science makes his faith stronger. The book has been a fantastic best-seller, which is an indication of the enormous interest in the public for this issue.

Another interesting book we came across during our year in France is a collection of essays entitled: *Le Savant et la Foi* (Faith and Scientists), edited by Jean Delumeau (Champs-Flammarion). It consists of nineteen contributions of scientists, some of them of high reputation, who explain why they are Christian (mostly Catholic, some Protestant and one Orthodox) and how they can reconcile their faith with their activity of research in science. Some of these testimonies are very touching, and will be quoted extensively later on in this article. One of the essays is the result of a collaboration among some twenty scientists, affiliated with the University of Paris-Sud (Orsay, Gif, Saclay, etc.). They form a group who meets once a month to discuss issues of science and faith, in relationship to the research activity at the University.

As a further proof of this renewed interest in the relationship between science and faith, we could mention the book *Can Scientists Believe?*, edited by Sir Neville Mott, Nobel prize for physics in 1977 (James and James, London). This is also a collection of essays, written by scientists of different religious traditions. One of these essays is from N. Mott himself, who explains how he became a Christian at the age of fifty, when, as head of the Cavendish Laboratory at Cambridge (England), he was invited by the Vicar of the University Church to give talks, along with other leading scientists, in his church about science and religion. Being agnostic, he felt a need to do some reading before discussing something about which he knew very little, and this was the beginning of a faith conversion.

The most important event, during our year in France, was a conference organized by the Catholic newspaper *La Croix* in a theater in Paris, at the end of January, 1992. The conference lasted one full day, and was widely attended (there were more than one thousand people). The theme was *Science and Faith*, and the participants were: scientists, theologians, historians and philosophers. All major religious traditions were represented (including atheists of good will and with an open mind), and some of the participants were people of high professional standing, members of the French Academy. The opening addresses were delivered by no less people than Cardinal Jean-Marie Lustiger, archbishop of Paris, and by Professor Hubert Curien, minister in the French government for scientific research.

The recurrent theme of all contributions was that "Scientism is dead." This was further reiterated by H. Curien, who also invited all scientists to be more humble. At the end of the 20th century we recognize, then, that science has its own limitations, and cannot cure all the evils of our human condition.

[At this point Dr. Colella has a section on "The New Science. Causality and Probability." This is not reproduced here because of space limitations and because

much of it will be found in Transfiguration.]

. . . . Our ability to grasp reality is somewhat limited. Waves and particles are different descriptions of the same reality we are not able to define in absolute terms as claimed by the deterministic science of the 19th century. At this point we realize that we must give up the idea of "the thing in itself."

All this does not mean that the old deterministic science was wrong. It only means that the old science was correct under certain approximations which are not valid in the microscopic world of atoms and nuclei.

The healthy effect of this great revolution brought about by the advent of the new science and Quantum Mechanics was to shake the arrogance of those who believed that everything could be predicted, once the initial conditions of the system were known, and to introduce an element of chance. We might say that, in different words, there was still a place for God in the new scheme of ideas.

The Development of Science and Christianity

If we go back to the origins of modern science, we find that it is no accident that it was born and developed in Christian countries, based on the Bible. The French philosopher François Jacob (agnostic) expounded, at the conference sponsored by *La Croix*, the idea that scientific thinking flourished in the West thanks to the concepts developed by theology, to the categories and the distinctions elaborated by medieval theology of the XIIth (sic) century. It is no accident that scientific thinking and science itself are born in this context. We can view science and religion as two approaches, different but complementary, to the same reality. In effect, there has never been a good reason for an opposition between science and religion. They are not based on opposing views about the natural world.

The great British philosopher and mathematician Alfred North Whitehead wrote in one of his works on the origin of science[1]

> My explanation is that the faith in the possibility of science, generated antecedently to the development of modern scientific theory, is an unconscious derivative from medieval theology.

P. E. Hodgson, a theorist in particle physics at Corpus Christi College, Oxford, England, writes, in regard to Galileo's story[2]

> All this has quite obscured the most important feature of scientific investigation, namely, that it is a thoroughly Christian way of studying the world that was first developed within a Christian civilization, precisely because it presupposes beliefs about the natural world that are, as a coherent whole, only to be found in Catholic theology.

The most striking example of the influence of Christianity on the development of science is the action of the Society of Jesus, founded in 1534 by St. Ignatius of Loyola. As part of their mission to spread the Gospel to the ends of the Earth, the Jesuits felt that their goal could be best achieved by acquiring and disseminating a wealth of scientific information relevant to cosmology, which was needed for a deeper understanding of the Bible, and mathematics, the God-created language through which the natural world expresses itself to mankind.

The American historian John L. Heilbron describes the role of the Jesuits in the development of science in the November, 1992 issue of *Physics Today*. It is impressive to see, in Heilbron's article, a 17th century map, which shows the extent of the Jesuits' presence over the world. All the continents are represented! Some Jesuits have been great scientists. Father Christoph Scheiner (1575-1650) discovered the sunspots in 1611 and explained why the sun appears elliptical when approaching the horizon line. We already mentioned Father Grimaldi, who discovered diffraction of light in 1665. Their function as educators has been invaluable. Great scientists have been educated by Jesuits, one of the most illustrious examples being Descartes. Heilbron states, in his article, that[3]

> A complete inventory of the Jesuit-trained savants would include most of the members of the Paris Academy of Sciences during the 17th and 18th centuries and the leading mathematicians of France, Italy and southern Germany.

Their role in science continues today. In 1987 Pope John Paul II invited a group of 21 eminent scholars, of various religious backgrounds, to his residence in Castel Gandolfo, near Rome, to explore topics of common interest for scientists, philosophers, and theologians, on the occasion of the tercentenary of Newton's *Principia*, a book that literally opened up the ways of the firmament. The conference was organized by the director of the Vatican observatory, [Fr.] George Coyne, a Jesuit astrophysicist. A cursory reading of the Proceedings of the conference shows that 4 of the 21 participants were Jesuits.

Awe and Excitement in Science and Religion

One aspect that links science and religion together is the feeling of excitement, the thrill that both, scientists and believers, experience when confronted with a new facet of the truth that lies beyond the boundary accepted as the ultimate limit, for the time being, of our knowledge. John Polkinghorne, a professor of theoretical particle physics at Cambridge, England, who later in life discovered a vocation for priesthood and now is an Anglican priest in Cambridge, dean of Trinity Hall, writes[4]:

> Part of the authentic experience of a scientist is the feeling of astonishment he or she experiences when contemplating the remarkable rational beauty of the physical world, as it unfolds in his/her research. This sense of amazement is a compensation for all the trials and frustrations a scientist inevitably has to face in doing research.

Another interesting testimony of this approach to science, which in effect helps scientists to reach God, comes from Victor W. Cohen, a professor of physics at Columbia University. In the early thirties he was the major professor of a highly distinguished graduate student, Isidor Isaac Rabi (1898-1991), about whom we will say more later. The episode is told in Rabi's biography,[5] because it had a profound impact on Rabi's life, and on his world vision of science and religion. Rabi himself had no particular religious affiliation, except for his background strongly rooted in Orthodox Judaism.

> A few weeks later, Cohen walked out of Pupin Hall into the darkness of early morning. After a long day at the laboratory, he should have been tired — but he was not. He walked with a light step across the campus and entered the subway station on the corner of 116th Street and Broadway. He was going home to sleep, but he was not sleepy. He had just finished an experiment with the equipment that he and Rabi had recently re-designed. The results were definitive. Cohen looked in the faces of those other passengers whose lot it was to be on a subway during the earliest morning hours. He had the rarest of feelings. *I know something that none of you know,* thought Cohen. *I am the only one in the world who knows that the nuclear spin of sodium is 3/2.* With Cohen's definitive result, Rabi had his answer by the end of the day. *Moreover, with that knowledge, Rabi moved nearer to God.*

An interesting experience of this feeling of amazement is told by Xavier Le Pichon, a professor of oceanography and geophysics at the *Collège de France*, one of the most prestigious universities in France. Member of the French National Academy of Sciences, Xavier Le Pichon has been exploring the bottom of the oceans for the last thirty years. This is how he describes his feelings during those explorations under the seas[6];

> I have often experienced this capacity of adoration during my scientific explorations. I think in particular of my first descent in a submarine in the Rift valley, in the middle of the Atlantic ocean, at a depth of ten thousand feet. We discovered then that the Rift is this extraordinary site where the Earth regenerates herself by producing the new crust which, much later, will be again immersed in herself, along the great trenches. In our little boat, we were the first people to discover this scenery reminiscent of Genesis, the virgin crust, produced by the marriage between fire and Earth. I had an appointment with the Earth so that I could make an offering to God of the great cliff of black lava which was twinkling at the light beams of the projectors of our submarine, in the middle of the absolute night, in these icy waters, where some bright spots revealed the presence of strange animals.
>
> More than the Earth, it was God who had set up an appointment with me, so that I could offer His creation to Him, emerging from a long geological history. What an extraordinary patience! What a delicacy!

What the Great Scientists Say About Religion

We have seen in the previous sections how much in common science and religion have. We really do not see why they should be at odds with one another. As a matter of fact, many great scientists believe in God, in one way or another, and have left clear testimonies of their faith in their writings.

Famous are Einstein's references to God, in many of his letters and essays. Even though he had a strong sense of his Jewish ethnic background, he was never associated with a synagogue, and shunned all forms of organized religion. Nevertheless, his belief in a God creator of the universe is very strong and there are many references in, his works to his faith. In the early stage of development of the new physics, Quantum Mechanics, he wrote to Born[7]

> Quantum Mechanics is very impressive. But an inner voice tells me that it is not yet the real thing. The theory produces a good deal, but hardly brings us close to the secret of the Old One. I am at all events convinced that *He does not play dice.*

I related earlier about the conference on Science and Faith, sponsored by the newspaper *La Croix* in Paris, in 1992, in which scientism *was declared dead.* Well, Einstein had come to this conclusion forty years earlier, as shown by a letter to his dear friend Solovino[8]:

> Now I come to the most interesting point in your letter. You find it strange that I consider the comprehensibility of the world (to the extent that we are authorized to speak of such a comprehensibility) as a miracle or as an eternal mystery. Well, *a priori* one should expect a chaotic world which cannot be grasped by the mind in any way. . . . There lies the weakness of positivists and professional atheists who are elated because they feel that they have not only successfully rid the world of gods but "bared the miracles." Oddly enough, we must be satisfied to acknowledge the "miracle" without there being any legitimate way for us to approach it. I am forced to add that, just to keep you from thinking that — weakened by age — I have fallen prey to the preachers.

Perhaps the best description of Einstein's attitude towards religion is given on the back of the dedication page of a recent biographical book.[9]

> Science without religion is lame, religion without science is blind — So Einstein once wrote to explain his personal creed. A religious person is devout in the sense that he has no doubt of the significance of those super-personal objects and goals which neither require nor are capable of rational foundation. His was not a life of prayer or worship. Yet he lived by a deep faith, a faith not capable of rational foundation, that there are laws of Nature to be discovered. His lifelong pursuit was to discover them. His realism and optimism are illuminated by his remark: - Subtle is the Lord, but malicious He is not -. When asked by a colleague what he meant by that, he replied: - Nature hides her secret because of her essential loftiness, but not by means of ruse - ."

Another important testimony about the mutual compatibility (we should say: complementary) between science and faith comes from a famous scientist we have already mentioned earlier: Isidor lsaac Rabi, an eminent scientist of highly distinguished reputation, honored with the Nobel prize in 1944. We read in his biography[10]

> When I discovered physics, I realized it transcended religion. It was the higher truth. It filled me with awe, put me in touch with a sense of original causes. Physics brought me close to God. That feeling stayed with me throughout my years in science. Whenever one of my students came to me with a scientific project, I asked only one question, "Will it bring you nearer to God?" They always understood what I meant.

Later on in his biography Rabi talks in more detail about the role played by religion in his attitude towards science.[11]

> Coming from an orthodox Jewish background, there was one God. The world was a creation of His, and therefore it must have a meaning and a coherency. When I chose physics, I was no longer practicing the Jewish religion, but the basic attitudes and feelings have remained with me. Somewhere way down, I am an Orthodox Jew.
>
> To choose physics in the first place requires a certain direction of interest. In my case it was something that goes to my background, and that is religious in origin. Not religion in a secular way, but religion as the inspirer of a way of looking at things. Choosing physics means, in some way, you're not going to choose trivialities. The whole idea of God, that's real class . . . real drama. When you're doing good physics, you are wrestling with the Champ. You have one life to do it, you don't want to waste it.

In another passage he talks in more detail about his religious background.[12] The holy books of the Bible were familiar readings in the Rabi household. The young Rabi was particularly impressed by the book of Genesis.

> The whole idea of the Creation — the mystery and the philosophy of it — it sank in on me, and it is something I still feel. . . There is no question that basically, somewhere way down, I'm an Orthodox Jew. In fact, to this very day, if you ask for my religion, I say: — Orthodox Hebrew — in the sense that the church I'm

> not attending is that one. If I were to go to church, that's the one I would go to. That's the one I failed. It doesn't mean I am something else. . . . My early upbringing, so struck by God, the maker of the world, this has stayed with me.

Rabi goes on to tell about his early struggles with the Jewish religion. As a sign of his future vocation of an experimental physicist, he felt an inclination to put the prescriptions about the Sabbath to the test.[13] One Sabbath he rode the streetcar, expecting the wrath of God to be manifested on himself. No catastrophe occurred. On another occasion he conducted a different test.

> I remember being in the synagogue and the priests, the Kohens (Kohamin) would stand up and with their hands outstretched and covered with a tallis, they would bless the congregation. You were not supposed to look at their hands, you might go blind if you did. Well, I tried ... with one eye.

I find this episode humorous and enlightening at the same time. Science too, in a certain sense, tries to look at God and nature "with one eye."

Life Experiences

As a scientist and teacher I have never felt a friction between my work in science and my life of faith. I have always considered the Bible as the inspired word of God and received from its treasures and wisdom the guiding light for my life.

For this reason, since my student days, I have always considered that an opposition between the Bible and Science is inconceivable. They both tell us the truth, and in my view are complementary to one another. A proper reading of the Bible, accompanied by an authoritative interpretation, can accommodate all facts of science, including evolution.

In fact, those of us believers who dedicate their lives to science, feel that in doing so we respond to God's invitation to be His collaborators. Creation, in a way, is an unfinished business, we are called by God to help Him in His works and to complete it.

I also believe that the laws of nature are an expression of God's revelation to humanity. His word is not only to be found in the Bible. He speaks to us through the facts of nature. The book of nature is open, in front of us, so that we can read into it. To explore the laws of the natural world, is to read the word of God. I was gratified, in preparing for this lecture, to find that this same idea, which accompanied me over the whole course of my life, had been expressed by the Fathers of the second Vatican Council: "*God gives to human people, through His creation, a never ending testimony of Himself.*"[14]

We can "sense" God's presence in the beauty of a mathematical proof or derivation, in the harmony of a great synthesis, when many scattered apparently unrelated phenomena are all brought together by a single formula, the signature of the One who is the principle of everything. Even when an experiment is not working out the way we expected, it is God talking to us, telling us how nature works, giving us a different picture from the one we had preconceived in our mind when we started. I see scientific research as a continuous dialogue between God and mankind. If someone were to ask me: "Is Faith a benefit to you as a scientist?" my answer would be: "Faith puts my work as a Scientist in the perspective of God. I read in the book of Nature, written by God. In this way, I can establish a special relationship with God."

I will now relate the personal experiences of some scientists of great distinction who also share the feeling of a strong presence of God in their lives and work. They tell us how this presence has affected their attitude toward scientific research and their colleagues.

In the section, Awe and Excitement, in Science and Religion, we met Xavier Le Pichon, a highly respected professor of oceanography and geophysics at the prestigious *Collège de France* in Paris. He explains his attitude toward nature; "God has entrusted us with His creation, but it is an unfinished creation, in a way. We must introduce love into this creation."[15]

He goes on to describe a profound crisis of values he went through at some point in his life.

[Dr. Colella recounts Le Pichon's description of the depression which finally led him to Mother Theresa in Calcutta and a cure "because of a starving child.]

. . . . He (Le Pichon) understood that he should not abandon his work in science, but now this had become part of a greater plan God had unveiled for him. He concludes his testimony:

> Science and technology are not only necessary, they are indeed the main tools needed to perfect this Creation entrusted to mankind by God. . . .[16]

. . . . To the extent we place the poor and the least ones at the center of our society, to the extent we ask them to inspire the civilization we are about to build up, science and technology will appear means offered to mankind in order to create a civilization of love, aiming towards their ultimate goal, God, who is merciful and tender, God, who is Love, who wanted us to be not only His servants, His collaborators, but also His friends"[17]

Another very touching experience of great harmony between science and faith was offered at the closing of the conference organized in Paris by the newspaper *La Croix*, mentioned earlier in the section on Death of Scientism. This testimony was presented by Louis Leprince-Ringuet, a highly distinguished physicist, famous for his contributions to cosmic ray physics, professor emeritus at the *Collège de France,* member of both the French Academy and of the Academy of Sciences. His is a passionate message of faith in God and love between human beings, his personal act of faith of scientist-believer. I like to conclude this article with Leprince-Ringuet's testimony, because it also represents my own attitude in regard to my work in science as a believer.

I will conclude with my experience. I am no theologian. I am not capable of entertaining a theological discussion, but I can give you my experience as a believer. I find such a great ideal in Christ's message. I find such a revolutionary wisdom in loving our neighbor, in our going beyond ourselves, as Christ asks us to do, I find such a great force in the Gospel, in order to break up our protective shells of selfishness, routine, cowardice, which surround us in the course of a day, I find such a great value in prayer, in the communion of the living and the dead, in the possibility we all have, even in the midst of great impediments, even immobilized in bed, in a hospital, in the midst of great sufferings, to intervene in favor of others, I find such a great life in the Christian attitude of hope in front of the tests staking out our existence we all have to face — you and I will not be able to escape them — no matter what the political and social structures are, I find it so stimulating for my intellectual and spiritual progress — Christ is with us up to the end of times — briefly, I find in the Gospel message such a potential for going beyond ourselves, for joy and boldness, such a meaning in life, that for me this message has the seal of truth.[18]

Acknowledgment: This article would have never seen the light without the suggestions and the encouragement of my wife Adele, who, early in our married life, started to point out to my consideration many parallels and similarities between scientific facts and our life of faith.

Endnotes

1. A. N. Whitehead, *Science and the Modern World* (Lowell Lectures, MacMillan, 1925) p. 17.

2. *Can Scientists Believe?*. Edited by Sir Neville Mott, James and James, 1991, London, p. 71.

3. *Physics Today*, 45, n. 11, p. 42 (1992).

4. *Le Savant et la Foi*, Ed. Jean Delumeau, Champs and Flammarion Publishers, Paris 1989; p. 230. Translated from French by R. Colella.

5. *Rabi, Scientist and Citizen*, by John S. Ridgen, Basic Books, Inc., New York, 1987, p. 82.

6. See *La Savant et la Foi*, p. 166.

7. *Niels Bohr's Times*, by Abraham Pais, Clarendon Press, Oxford, 1991, p. 318.

8. *Letters to Solovino,* by Albert Einstein, New York Philosophical Library, 1987, P. 131.

9. *Subtle is the Lord.... The Science and the Life of Albert Einstein*, by Abraham Pais, Oxford: Clarendon Press; New York: Oxford U Press. 1982, p. vi.

10. Ridgen, p. 73.

11. Ridgen, p. 79.

12. Ridgen, p. 21.

13. Ridgen, p. 24.

14. Dogmatic constitution *Dei Verbum* on divine revelation, Vatican II, Chapter 1 , Sect. 3.

15. *Le Savant et la Foi*, p. 166.

16. *Le Savant et la Foi*, p. 171.

17. *Le Savant et la Foi*, p. 173.

18. *Science et Foi*, Conference organized by the newspaper *La Croix l'Evenement*, Centurion, Paris 1992, p. 188.

PLATONISM AMONG THE SCIENTISTS

by Joseph P. Martino

Roald Hoffmann's essay, "Anti-Plato," in the Spring 1993 issue, points out that scientifically trained people often make the mistake of thinking that the world should be run "scientifically." He cites Marxism as one example of an attempt to design a scientifically run world, and draws from its failure the lesson that such attempts are futile.

It is worth noting that Marxism is not the only example of attempts to engineer society. I propose to present several more examples, to show that the tendency Dr. Hoffman describes is more common than many scientists may realize.

Many on the political Left deplore the fall of Salvadore Allende's government in Chile. Operations researchers, however, have a particular reason for that regret. Allende gave one of their own, Stafford Beer, the opportunity to show how a society could be organized efficiently by using the science of cybernetics.

Following Allende's election as President (by a slight plurality in a 3-way race), he seized control of most of the business firms in Chile. Running them under a command economy proved to be difficult. Beer proposed a solution which was put into practice.

The economy was divided into sectors and branches, then into individual firms. Beer created indexes of performance at the firm level (flow of production, use of resources, etc.). The raw data for each firm was transmitted daily, by electronic means, to the Ministry of Economics. There a computer generated an index for each firm. These indexes were aggregated for all firms in a branch, for all branches in a sector, and then for the entire economy. If an index was judged "out of bounds" at any level, the responsible manager was given a deadline by which to fix the problem.

Beer claimed that he gave the Chilean economy an "electronic nervous system," so that for the first time the parts of the economy could tell each other what was going on. The latter part of Beer's statement was clearly in error. The purpose of a functioning price system is precisely to tell each actor in an economy what other actors in the economy are doing, by aggregating the effects of all their decisions in the relative prices of different goods and services. What Beer had done was to give the government the power to ignore what the actors in the economy wanted to do, and instead force them to do what the government wanted. That is, he empowered the government planners to override all private plans.

Beer was not the first to try to rationalize society, at the expense of freedom. Edwin Layton, in *The Revolt of the Engineers,* describes the growth of "engineering progressivism" in the United States during the first part of the 20th century. He asserts that this movement inspired Thorstein Veblen to say that engineers are "the predestined leaders of a social revolution in America."

Layton summarizes the ideas of engineering leaders, expressed publicly between 1890 and 1925, as expressing an engineering ideology with three themes:

1. The engineer is the agent of all technological change.

2. The engineer is a logical thinker, who is unbiased and therefore a suitable arbiter between classes.

3. The engineer has a special responsibility to protect progress and assure it leads to human benefit.

Layton identifies the conservation movement as a conscious model for the engineers. "It was an example of central scientific planning by technicians. Engineers engaged in resource planning were not limited to the perspective of a single plant . . . " At the White House Conservation Congress of 1980, the engineering societies proposed that all Federal engineering activities be placed in a single agency, which "would substitute rational calculation by experts for the usual log-rolling."

To the engineers, it was a short step from an ideology that engineering projects should be run by engineers to the ideology that society should be run by engineers. Layton quotes Comfort A. Adams, a prominent electrical engineer, as writing in 1919 that engineers should guide society rather than "leave the steering to those we consider incompetent."

Moreover, it was not just that engineers and scientists believed they were rational while politicians weren't.

They believed that scientific laws existed which could determine how societies should be run. Adams also wrote, rhetorically, "Are there no laws in this other realm of human relations which are just as inexorable as the physical laws with which we are so familiar?" Frederick W. Taylor, renowned for "Taylorism" as a means of making factories operate efficiently, claimed that his methods would allow him to engineer society and render obsolete all class conflicts and inefficiencies in the economy. Henry Gantt, a follower of Taylor, had invented a type of planning chart which is still in use in industry. He argued that his chart would be suitable for central planning of the entire economy. He was even willing to do away with democracy, which he described as a system for doing things, "not according to the laws of physics but by majority vote." In short, the engineers believed the laws governing human society were essentially similar to the laws they used in their engineering work. Given that, it was easy to believe that society could be engineered as easily as they engineered a collection of machines.

Herbert Hoover probably came closer to achieving this ideal than anyone else in the U.S. He saw the national planning of World War I as the model for society. He believed that this planning should be done by a coalition of engineers, big business, and government. His ideas were virtually identical with those of Benito Mussolini, who argued that society could be run best by combining the economic efficiency of private ownership with the political efficiency of government control. As Secretary of Commerce in 1921, Hoover encouraged businesses to fix prices and divide markets. He oversaw some 2000 such agreements, anticipating the New Deal's National Recovery Administration by 12 years.

Whether it is presented as cybernetic socialism or engineered fascism, the idea of "engineering" society according to some "iron laws" of social behavior recurs again and again. Friedrich Hayek, in *The Counter-Revolution of Science,* has traced this idea back through Comte and Saint-Simon to the French Ecole Polytechnique, in the early 19th century. Even earlier, however, Adam Smith had warned against the "man of system," who "seems to imagine that he can arrange the different members of a great society with as much ease as the hand arranges the different pieces upon a chessboard."

Engineers and scientists have the ordinary passion for tidiness raised to a high pitch. In them, the ordinary notion that things "run better" under a consciously designed system all too often becomes elevated to the idea that society would run better if it were consciously engineered, instead of being subject to the pulling and hauling, the haggling and negotiating, which are the very stuff of free human interactions.

The fall of this century's Marxist societies should be a warning to Platonists among scientists and engineers. However, even without those particular examples, there are ample warnings to scientists and engineers that they are prone to mistake people for machines, and to try to control the former the way they do the latter.

Dr. Joseph P. Martino is a Senior Research Scientist at the University of Dayton Research Institute. A longer version of this essay originally appeared in ***Technological Forecasting and Social Change.***

Professor Dennis Tuchler in "Some Legal Problems of Fabricated Man," Proceedings of *Fabricated Man and the Law*, October 7-9, 1977:

Fabricated man may be bred or produced for certain characteristics which will make him highly desired as an employee in certain industries. Hence, labor unions may well wish to prevent the production of such persons or to impose limits on such persons' economic opportunities. If, however, fabricated man is truly a person, then such inequalities, and, perhaps, limits on their production or reproduction, will be quite difficult to impose and enforce. . . .

. . . . The legal position of fabricated man may depend upon his acceptance as a human or a person. Such acceptance or non-acceptance may have a very serious effect on our society, and that effect should be considered if the decision as to fabricated man's personhood is to be made in proper context. In fact, the very decision as to whether fabricated man should be produced and introduced into our society should be made in this context. . . .

It is possible that the introduction of androids, cyborgs, clones and the products of fertilization *in vitro* into our society, poses a serious threat to us. It may be asking too much of those enamored with scientific progress, and who hold it as an article of faith, that that which can be done ought to be done, to consider the social consequences of what they wish to achieve. I am afraid that the response would be: "We have; think of the benefits to Man!"

Technopoly: *The Surrender of Culture to Technology*
Neil Postman. Alfred A. Knopf: New York, 1992. (222 p.)

Review by Marianne Postiglione, RSM

As I sit on my "ergonomically correct" chair "imputting" data into my 386, 160 MG AT, I realize that I am dependent upon technology to accomplish certain tasks. Seven years ago ITEST hesitantly "computerized" its operations; today we wonder how we could possibly accomplish anything without our user-friendly aids.

Neil Postman, author and chairman of the Department of Communication Arts at New York University, warns us that it is only when human beings search for meaning *solely* in machinery and technique that Technopoly gains a strong foothold in the culture and in our individual lives. He believes that the United States is already a Technopoly, although a young one: we have largely "surrendered" our culture to technology, according to the author.

Postman uses a number of definitions or descriptions of Technopoly: "totalitarian technocracy" (19th-century industrialism with inventors and industrialists as the new royalty), "deification of technology" (with technologists as the new high priests and consumers as worshippers).

Although the Industrial Era may have ushered in the "golden age" of technology, the "gold" was soon to lose its glow. With the gradual erosion and devaluation of traditional religious beliefs, "technology" in the late 19th and early 20th centuries began to replace the traditional "belief systems" with its own set of tenets.

> As the spectacular triumphs of technology mounted, something else was happening: old sources of belief came under siege. Nietzsche announced that God was dead. Darwin didn't go as far but did make it clear that, if we were children of God, we had come to be so through a much longer and less dignified route than we had imagined. . . John Watson, the founder of behaviorism, showed that free will was an illusion and that our behavior, in the end, was not unlike that of pigeons.
>
> The trust of a century of scholarship had the effect of making us lose confidence in our belief systems and therefore in ourselves.

Amid the "cultural debris" and an uprooted religious "faith," ". . . there remained one sure thing to believe in — technology."

A powerful commandment of this 20th century new "religion" is, Remember to keep holy the results of statistical studies. With tongue in cheek, Postman describes the folly of a fanatical belief in results of "scientific" polls, psychological studies, "scientific surveys" and others. Although he is not one of those "hard scientists" bashing the "soft sciences"; he gives short shrift to social science when it attempts to mimic science, indicating that ". . . it is misleading to call it science." Science is the ". . . quest to find the immutable and universal laws that govern processes, presuming that there are cause-and-effect relations among these processes." "It follows," he adds, "that the quest to understand human behavior and feeling can in no sense except the most trivial be called science."

Undoubtedly, social scientists will find areas of disagreement with Postman, as they question the ever-changing results of some scientific studies on good and bad cholesterol levels, for example, or the role of caffeine in heart disease. Yet, I invite them to read his book, especially Chapter Nine, "Scientism" where, with a certain humor, he skillfully caricatures psychological and sociological art.

Quoting a writer covering the social-science beat for *The New York Times,* Postman recounts the report of "'recent research findings' "that psychological researchers have discovered that *people fear death."* Aren't we raising pretentiousness to a more ridiculous level when we state, with all seriousness and even pomposity, something that most rational human beings have known "in their gut" for ages: that people fear death?

Postman uses other examples to illustrate what happens to a culture when science/technology becomes its god with no place for belief in truths that cannot be demonstrated scientifically. Are people searching for meaning in this new and evolving *process god* of a *processed technology?* The following anecdote demonstrates the absurdity of a too literal interpretation of statistics.

We must keep in mind the story of the statistician

who drowned while trying to wade across a river with an average depth of four feet.

The author's sense of humor shines through each chapter even the most serious of his subjects, perhaps those dearest to his heart, cultural criticism and education.

Postman begins by offering an imaginative way to counter Technopoly. "Become a loving resistance fighter," he states. Rather than propose a "how to," the author lists 10 commandments (principles) to guide those with courage to resist American Technopoly. Those are people

who pay no attention to a poll unless they know what questions were asked, and why;

who refuse to accept efficiency as the pre-eminent goal of human relations;

who refuse to allow psychology or any "social science" to pre-empt the language and thought of common sense;

who admire technological ingenuity but do not think it represents the highest possible form of human achievement.

What can the schools do, then, to help our youth resist Technopoly? ". . . give them a sense of coherence in their studies, a sense of purpose, meaning and inter-connectedness in what they learn." That may be easier said than done in the educational "morass" of the 90's.

Today, with the pressures of "educating" the young with "marketable job skills," the notion of an "idea-centered"; "coherence-centered" education has been relegated to the last row of the classroom (often, through no fault of the beleaguered teacher).

The Technocrat's idea of an educated person is one with marketable skills having little concern for a point of view or commitment. What else is needed in the Age of Technopoly than making money and living "the good life"? (no longer "a chicken in every pot," but a three car garage and a five bedroom house).

Postman advocates a true return to the liberal arts proposing for study the theme of Jacob Bronowski's *The Ascent of Man*: the destiny of the human being is the discovery of knowledge.

"Moreover," Postman adds, "although Bronowski's emphasis is on science, he finds ample warrant to include the arts and humanities as part of our unending quest to gain a unified understanding of nature and our place in it." A formula for success? Postman treads lightly here; rather he suggests that liberal education, after all, may be one of the threads which will help us to re-weave the fabric of an American society sadly rent and raveled at the edges.

In the final analysis the question of technology will center on the question of control. Will our culture work out its "salvation" on the altar of Technopoly where freedom and community is sacrificed to a de-personalized, processed god? Or will it use technology as a tool to advance the good of human beings, strengthening relationships, building community and preserving the dignity of the people of God.

I did find some points of disagreement with the author. For instance, Postman notes:

. . . Einstein and his colleagues told us that there were no absolute means of judging anything in any case, that everything was relative.

Postman would benefit from a simple lesson on the theory of relativity.

On the whole, however, I would recommend this book to thoughtful readers.

Yahweh created me (Wisdom) when his purposes first unfolded, before the oldest of his works. From everlasting I was firmly set, from the beginning, before earth came into being. The deep was not, when I was born, there were no springs to gush with water. Before the mountains were settled, before the hills, I came to birth; before he made the earth, the countryside, or the first grains of the world's dust. When he fixed the heavens firm, I was there, when he drew a ring on the surface of the deep, when he assigned the sea its boundaries — and the waters will not invade the shore — when he laid down the foundations of the earth, I was by his side, a master craftsman, delighting him day after day, ever at play in his presence, at play everywhere in his world, delighting to be with the sons of men.

Proverbs 8: 22-31.

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IN MEMORIAM

On June 28, 1993, Professor J. Norman McDonough died at his home in Venice, Florida at age 82. "Mac" to his friends, Professor McDonough was an early member of ITEST and served on the Board of Directors for many years until he moved to Florida in the late 1980s. ITEST is poorer for his death. We extend sincere condolences to his wife, Beth.

We are also sorry to learn of the death of another long time member, Father Bernard Perera who died in Colombo, Sri Lanka in July, 1992. We were informed of this only within the last month.

We recommend both of our brothers to your prayers.

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