INSTITUTE FOR THEOLOGICAL ENCOUNTER
WITH SCIENCE AND TECHNOLOGY
(ITEST)
NEWSLETTER

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For Your Calendar:

The October 9-11, 1981 Conference will discuss the topic of "Warfare in the 1990's." We have assembled a panel of speakers who will consider: the role of science in military planning; the technologies of warfare in the next decade; the theological question "whether in the age of nuclear, biological, chemical, light and particle warfare, a nation may legitimately defend itself, and, if so, how?" The speakers are: Profs. William O'Brien (Georgetown) and James Johnson (Rutgers) to address the theological issues, Bishop John O'Connor (Catholic Military Vicar) to consider the technology, and Prof. George Rathjens (MIT) to speak about the role of scientists. A great deal of interest has already been shown in this program.

The March 19-21, 1982 Workshop will deal with the topic of the impact of contemporary science and technology on the survival of the nation state. The aspects that will be considered are: economics, geopolitics, technology, environment, development, theology, and perhaps an historical perspective. More details on this workshop will be announced in the October, 1981 issue of the Newsletter.

The October, 1982 Conference is being planned. It is hoped that this Conference will be held in the Wisconsin or Minnesota area. The tentative topic is "The Meaning of Health." Planning is progressing nicely with the help of several of our members in the area.

ITEST Notes:

We remind those who have not yet renewed their membership for 1981 to do so soon. The Proceedings of the 1981 Workshop (The Patenting of Recombinant DNA) and Conference (Warfare in the 1990s) will be sent only to dues-paid members of record as of August 31, 1981. Please renew your membership by then, if you have not already done so.

Also, we are issuing another invitation for essays for the Newsletter. These essays should be of the order of 1500-2500 words on topics of interest to those concerned with science, technology, faith, society, etc. In this regard, I would like to quote from a letter from Dr. Stefan Ansbacher, a long-time member of ITEST: "We've come a long way from "mulieres in ecclesiis taceant", but we continue to have only silent approval or disapproval of sermons uttered from the pulpit. How about enlarging the ITEST Newsletter by publishing thoughts of ITEST members." We would be greatly pleased to do so, but clearly we must get these thoughts from you.

We are eager to come up with ways to maximize the value and effect of the ITEST meetings. For most of the ITEST membership this means maximizing the use of the Proceedings of those meetings. We would like to establish some sort of a forum of ideas to accomplish this. If you have any ideas (or practice) for the maximization let us know so that we can share these with the whole membership. We need your ideas and your commitment.

We have recently received a letter from Dr. Edward O'Boyle at Louisiana Tech University. In it he enclosed a notice to the effect that the National Honor Society of Phi Kappa Phi is soliciting manuscripts on science and religion for publication in Spring, 1983. He notes that some ITEST members may want to consider submitting manuscripts. We thank him for bringing this to our attention. Here are parts of that notice:

The Editorial Staff of National Forum: Phi Kappa Phi Journal, an interdisciplinary periodical published quarterly by the National Honor Society of Phi Kappa Phi, announces the following themes for special issues of its publication in 1981-1983.

Issue	Topics	Deadlines
Spring, 1983	"Science and Religion"	July 1, 1982

National Forum includes nontechnical analyses of issues of social concern. Articles dealing with ethical, historical, social, legal, educational, or other dimensions of these problems are invited. The policy of National Forum: Phi Kappa Phi Journal is to foster interdisciplinary scholarship, to provide an open forum for the analysis of issues of general social and scientific concern, and to publish scholarly treatments of different aspects of culture. Typescripts should range in length from 1200-2000 words; footnotes should be minimized, internalized or delected where possible. Inquiries about manuscript titles or materials intended for publication should be addressed to:

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A Theological View of Nuclear Energy

by: Thomas L. Cullen, S.J.
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(Presented at a Round Table sponsored by the Comissao Nacional de Energia Nuclear at the Universidade do Estado do Rio de Janeiro, October 21, 1980)

There are many today who think of the radiations of nuclear energy as one of the occult forces of nature, colorless, odorless, tasteless. It is one of the hidden evils that will, without warning, devour mankind. It is a thing to be feared and should not be let loose on mankind.

So it was that primitive man viewed the conflicting forces of nature. In the winds and rain and lightning, he saw warring energies that threatened his peace and security. They were divine forces that were only to be feared and, if possible appeased.

In the Mesopotamian valley between the Tigris and the Euphrates, they believed in two primal gods, male and female, who gave birth to an innumerable progeny. The children revolted and killed the father. The mother was an ugly monstress, chaos personified. In a land threatened by floods, she was identified with the sea that gave birth to the land, only then to try to devour it. Finally, Mardok, god of the city of Babylonia, rose up and slew her. From her carcass he fashioned the sun and moon and stars.

It was for people who knew this legend that the author of Genesis wrote. In the context the meaning of the first chapter of that book becomes very clear. First, the God of Genesis is not identified with any of the natural forces. Secondly, He created them all. Finally, as is repeated several times in the first chapter, "He saw that it was good." The author states then that all the forces of nature were created by God and are good.

In this world God gave man a privileged place. Man was commanded to dominate the earth and its forces. Adam was to give a name to all the cattle, and the birds of the air, and the wild beasts. They were to be subjugated to him. This idea of domination is softened later in the Old Testament to that of stewardship, a notion that is strengthened still more in the New Testament.

As an image of the privileged position of man in creation, I like to think of the famous painting of Michelangelo in the Sistine Chapel. The Father Creator leans low, stretches forth His arm and, with His finger, touches the outstretched finger of Adam. "Thus man became a living being."

It is the vocation of man to point to the different things on Earth, its energies, its forces, its animals and, pointing with his finger, give meaning to each. In one sense all the things of creation are good, for they were made by God. Still, in another sense, their meaning is not complete until stated by man. Things are still ambiguous, for they can be for good or evil. Man, it is, who removes this ambiguity.

Today we know that the world took five billion years to evolve. It took three billion years for life to evolve on this earth. And man has been evolving, perhaps, for two million years. While the Book of Genesis was to state the religious meaning of creation, it was for science to discover the historical meaning.

It is worthwhile to imagine the earth as it were, a liquid sphere, with all the lighter compounds floating to the surface. It was thus that the compounds of thorium and uranium and potassium concentrated mainly in the crust of the earth. In fact, the crust is ten to a hundred times richer in these radioactive minerals than the center of the earth. Our thrusts into solar space reveal that the same ratio holds between our crust and the surface of the Moon and the visited planets. The crust of the Earth is ten to a hundred times more radioactive than any other known spot in our solar system.

In this richly radioactive environment the evolution of life and of mankind happened.

It is also worthwhile recalling that during this evolution the first nuclear reactor came into being by natural forces. It was about 1.7 billion years ago in what is now called the Republic of Gabbon in Africa that masses of uranium flowed together. That long ago the isotope uranium-235 made up 3 or 4% of the mass, so that it was what we now call enriched uranium. This mass was flooded by natural water as a moderator, and the reactor went critical. There were six such reactors and they functioned for perhaps ten thousand years. And we still might repeat "And God saw that it was good."

The Christian vision of creation is a still richer insight. The central mystery of Christianity is the Incarnation, and it is in the light of this mystery of the God-man that we view all else.

It goes without saying that we discuss no longer the old question: if there had not been sin, would there have been an Incarnation? In recognizing the transcedent beauty and importance of the God-man, we cannot think of this mystery as dependent on the sinfulness of man. Rather it is through Christ that the Father penetrates man and realizes the sanctification and divinization of man.

Strangely enough, it is in some primitive Christian hymns, as quoted by St. Paul, that we have the sweeping evolutionary view of the Cosmic Christ. Let us look at two of them, one in the letter to the Colossians (I: 15-20) and the other in the letter to the Philippians (II: 6-12).

In the first hymn the Cosmic Christ is presented as the firstborn of creatures, the one in which all things were made. Here we picture the Father Creator, before time began, contemplating in the Second Person of the Trinity, the image of the God-man. The dignity and beauty of this idea, in itself, justifies the act of creation. The God-man was the purpose and "raison d'etre" of creation.

All things were created "in Him." The universe, the world, the sun and the stars were thought of first as a universe in which He would live. The mountains and seas and trees were made for Him. And each and every person was thought of in Him and as an imitation of Him.

All things were created "for Him." We belong to Him, and our purpose is to give Him glory. By "giving glory" we hardly mean the cheers of a crowd in a large stadium. No. Each of us lives, hanging at the end of a fine thread of Divine Thought, the continuing thought of creation. And this thought comes to us through Christ. So, we subsist in Him. Now, a stone gives glory simply by being a stone, and a flower by being a flower. We humans give glory by exulting in our humanity and by living as completely as possible our condition as men.

When we think of that divine contemplation by the Father of the God-man, we now realize that it included a dynamic evolution of this world over five billion years, and two million years of the evolution of man. We might even think again of radioisotopes concentrating themselves in the crust and flowing together to form natural reactors. Viewed in the dynamism of the Cosmic Christ, the words "God saw that it was good" take on a deeper meaning.

The Christian sees the Incarnation as so central to the mystery of this world and life, that life and the Universe would be absurd, without meaning or sense, without the God-man.

In the letter to the Phillippians we have another view of the Cosmic Christ. The humanity of the God-man had every right to honor and worship, but He did not cling jealously to this right. Instead, He emptied Himself.

The image, then, is one of Him who plunges down to embrace the human condition. He assumes our experiences from infancy to death: the need to learn to walk and talk, the warm clasp of a hand in friendship, watching the beauty of sparrows that fly without care and lilies of the valley that dance in the wind. He knew the joy of a wedding party, the tears of a widowed mother, the crush of a busy street, and the loneliness of a garden.

After absorbing this wealth of human experience He knew the bitter taste of betrayal. He knew obedience in suffering and death, even the humiliating death on a cross. He plunged into the bowels of the earth in death.

Then, in His enormous grasp, He embraced the whole human race, the entire created universe, imposing on it a new unity, healing its breaches and disharmonies. He penetrated it with a new beauty and sanctity. This new unity He offered to the Eternal Father as a perfect sacrifice. And each day we offer this anew through Christ, with Christ, in Christ.

This Lordship of Christ, under its double title of creation and redemption, extends from the past and into the future. It embraces an evolutionary past and an evolutionary future.

In the past we can discern an evolution in the intelligence and the consciousness of man. Man is not only an animal that knows but one that knows he knows. He is also conscious of death, of being limited in time and space, and in his yearnings for transcendence. It is the idea of Teilhard de Chardin that this direction is continuing. Man is moving towards a noosphere, a new unity of consciousness, a unity of mankind in thought.

Here the Christian paradox tells us that there can be no growth without suffering, no evolution without pain. We must die to live. In our recent past man has known the calm security of village life. There everyone was known by all. One's position in the social and economic structure was respected. It was a comfortable, secure, small existence.

This peace was fractured by man's escape to the city and social and economic mobility. There came fear and hurt in the realization that five million people do not even know my name. It is interesting that man reacts in this pessimistic way, rather than in happy thought that there are still five million I still have to know. It hurts when man's consciousness is stretched in growth.

Is it not possible now to imagine this human consciousness being stretched still further by future evolution? Are there not so many other lands, other peoples for us to know and understand? So many new things to learn and discover? In the Christian sense we are moving towards a deeper unity of mankind in Christ, and there are still many sufferings that are still to be filled up in the sufferings of Christ.

It is in the context of this future and now evolution that we must view the role of nuclear energy, the communications revolution and all the new technologies. Are we actually coming to the point where we can consciously control our own evolution? Certainly we already are controlling the future evolution of the food we eat. We manage the genetics of wheat, and corn and fruit as well as the livestock. To what extent do we now control our own evolution?

And if, in the process, we become more human, by the same token we become more sanctified. For the penetration of the human race by the divine takes place insofar as we become more radically human.

It is never facile to speak of sin and evil in the context of evolution. Perhaps we might develop a small idea. Evil has been treated traditionally as a non-being, an absence of something. When it is a lack of something that should be there, it becomes a deformity. And when man wills that deformity, it becomes sin.

Any evolution is a movement from disorganization to some organization, from chaos to harmony, from disunity to unity, from ignorance to knowledge. It is a kind of ordering of elements that were not ordered, a decline, shall we say, of a spiritual entropy. Something was missing, and, in this sense, there was evil. So there is a change from evil to good.

Sin comes in when man freely refuses such a process. Life is a series of challenges, of opportunities, of invitations to growth. To say "no" to this is to deny growth and life. It is a refusal to give glory to God by being what we are. If I may be permitted to give you my own image of sin, it is this: sin is an ingrown toenail. It is something that refuses to grow normally, and turns in on itself.

Man can say "no" to a future offered by nuclear power and the other new technologies in one of two ways. He may simply turn his back on the opportunity, or he might accept it and divert the benefits for selfish aims, personal or group power, sense gratification and comfort. The real drive towards a deeper spiritual and conscious unity of mankind can be frustrated. And that would be sin.

Man can give glory to God only by being more deeply human. When his soul is stretched in greatness, he becomes more full of the Divine Presence. And he must still walk through this world pointing his finger and giving meaning to things. It is he who must point to nuclear energy and the other technologies and remove from them their ultimate ambiguities.

On the Domestication of Science

by:
Dr. John Matschiner

(This use of the expression The Domestication of Science was inspired by Fr. Donald Keefe's expression, "The Domestication of Worship." It is interesting to speculate how this may be an expression -- more than that, a concept -- with broad social and cultural implications.)

The expectations of society: health, wealth and success.

One of the ambitions of those who preserve sperm was to have on hand the material to recreate a genius. I suspect that that vainglorious notion has not entirely disappeared; but it is based on a poor understanding of history, not to mention biology and the social sciences. These people had not heard of, or did not believe in, the dictum that no one steps into the same river twice. But beyond that, as Socrates had his hemlock, Einstein today would probably experience the same ambivalence of a society pleased and yet frustrated by modern technology. The domestication of science, which began most noticeably after World War II, and now is nearly complete, brought science under the influence of a society that never understood it, tolerated it briefly, and now has sufficient control over it to define it. The result has been a new science called research, or research and development. Its banner is significance and its solidarity is based on mission.

Those who saw a threat to science in the beginnings of extensive national subsidy after World War II had little to say publicly. There eventually were articulate spokesmen in defense of science when that need became unavoidably obvious; but it is significant to note that, although these people successfully

interrupted the political effort to create a National Cancer Agency, for example, they did not stop the domestication process. Cancer research today is neither following a judicious plan such as might have been developed for a National Cancer Agency nor being conducted in a manner conducive to scientific discovery. Spiegelman could reasonably point out to the Nixon administration that trying to cure cancer with a National Cancer Agency would be like trying to go to the moon without knowing Newton's laws of gravity; but neither Spiegelman nor anyone else today can easily find the conditions necessary to do basic research. Philip Handler, president of the National Academy of Sciences, called the present state of affairs half-way technology. To understand what he meant, one has to see modern science policy as something analogous to what one might visualize if the attack on poliomyelitis had amounted to emphasis on developing a better, more effective, mass-produced and cheaper iron lung. Dialysis machines, organ transplants, engineered cells and chemotherapy are seen by scientists as interim technology.

How did the expectations of society toward science develop and how did they lead to the domestication of science? There is evidence that the process was straightforward enough. Before World War II scientists operated with more or less organization and more or less financial support; but regardless of the degree of organization or support, the emphasis was more on discovery than on significance, more on understanding than on product. In Europe, where science was largely subsidized by industry, the desire to capitalize on scientific discovery still did not contravene science. There were, however, two notable events in this country which may be cited as examples of the transition period which led to the domestication of science. The Manhattan Project was undertaken during World War II because it was thought that enough basic information was in hand to produce an atomic bomb. In another area of national interest, the March of Dimes sponsored a concerted attack on poliomyelitis. The success of both of these missions is history; and so is the post-war response of our government: the creation of an extensive national science subsidy.

At this point the relationship between science and society still seemed orderly enough, except perhaps to astute observers; and it continued so for over a decade. Transcripts of senate hearings published about 1960 finally began to show the unrest in clear and unmistakable form. "What," a distinguished congressman would ask of a distinguished science administrator (in session and on the record), "do you think about mustard plasters? My mother used them on us whenever we had a cold." Such entries were abstracted for the amusement of readers of Science in the early 1960's. By this time the cost of paying for American science was growing at a rapid pace. Budgets were often gratuitously funded at more than the requested amount. Research grants were easy to obtain, leniently administered and supplements were as near as the telephone. The dyad, science and society, was damaged and grown men were resorting to primal primary group instincts. Few scientists took the situation seriously and it was the Johnson administration that finally took the predictable steps of cutting science budgets and boldly manipulating the expenditure of those science dollars that were offered. Individuals in society were still frightened of heart attacks and cancer and pleased that their children didn't get as many of the previously crippling diseases of childhood. But that wasn't enough. A cultural lag had occurred in both science and society; and it was society that reacted first. Simply (and incompletely) put, the affluence which society experienced in technological benefits interrupted the idealistic cultural theme which had brought them about.

There have been many changes since the mid-1960's and noble efforts have been made to communicate and to understand; but the bottom line remains the same: the domestication of science. The stimulus of sputnik and the success of the space program added energy to an already spinning slingshot of technological achievement.

The expectations of science: support, support, and more support.

The notion of the dyad, science and society, implies a radical difference between the scientific community and the society of which it is a part. Under idealistic cultural conditions the difference may be implicitly accepted and not generally examined. But such is not the case during a period of conflict. What then are the characteristics of science, the community of science doers? How did their expectations of society develop and how did these expectations lead to the domestication of science?

Perhaps the most noticeable characteristic of the scientific community early on was its sense of lineage. Since science, as we have known it, is a relatively new thing, it was not uncommon for individuals to talk of identifying their place, or that of their mentors, in a line of accomplished scientists dating back virtually to the beginning of their discipline. The hierarchy of science was heavily determined by its sense of lineage. One of the effects of the growth of science was to diminish the importance of this status system; but it was the effect of federal training grants, over and above that of the growth of science generally, that diminished the sense of personal lineage even more dramatically. Although the peer review system awarded training grants to prestigious mentors wherever it could, the sheer numbers of projected trainees demanded awards to individuals and institutions that otherwise would not have been qualified. As the training program declined, Darnell and others finally proposed that federal training dollars for medical science should be restricted to 50 select universities or departments. The quality of training in a department, university or other institution had always been part of the status system of science, but it is interesting to note that this proposal emphasized the institutional aspect to the exclusion of the prestige of the mentor. Training grants are now virtually gone but in their wake there has been considerable loss of the sense of scientific prestige based on either lineage, mentor or institution.

What was the importance of lineage as a status system? Was it to ensure proper training and appreciation of science? Was it a way for young scientists to use recognized scientists for their own interests? Was it a way for recognized scientists to feather their caps? As a matter of fact, it was probably all three. Discovery is a complex and subtle activity usually unformulated in the minds of those who practice it. Furthermore, discoveries are rare and genius is rarer still, so it is not surprising that while competence, curiosity, and love of science may be important prerequisites, scientists need the esteem and reassurance of associates while they work. The thrill of discovery, which is widely acclaimed as one of the greatest pleasures of life, is eagerly and competitively sought. It is the chief reward of the scientist. But in the lonely search for discovery, the scientist needs reassurance that he or she is in fact capable. Nor does this need for reassurance disappear with discovery, because scientists, of all people who look at discovery, see the serendipity and the commonplace in their own work.

Another development which diminished the traditional status system of science occurred just after World War II. No one could predict that the discoveries in biochemical genetics during a relatively short period beginning about 1950 would coincide with the growth of national science funding. These discoveries were among the most socially influential discoveries in the history of science. We may not yet fully appreciate the way in which the elucidation of genetic mechanisms has led, partly by shock and partly by concluding from similarities to identities, to the covert assumption that the human is a

definable animal. That may be an aside, but whatever the full significance of these discoveries, science at least was changed by them. The following quote from an issue of Time magazine in 1971 probably summarized the situation best: (referring to Watson and Crick's famous development of the structure of DNA) "Together, in less than two years of work at Cambridge, these two spirited young scientists showed how it is possible to win a Nobel Prize without really trying." That wasn't just a Time-ism. That was the reaction many scientists had to the incredible way in which the story of biochemical genetics, or more generally, molecular biology as it came to be called, unfolded during those years. There didn't seem to be any sense to the information, or to the way in which it was appearing. Belief in the "Central Dogma" actually became for some the mark of an insider. In some situations, talking about molecular biology could be supportive, so scientists assumed superior cliques by formally talking together about the subject. In other more knowledgeable situations where that was not possible, the pressure of discovery sometimes surpassed support systems; individual scientists absented themselves from seminars, from their peers generally, and even abandoned their work. Again, the pressure was not absent in the discoverers: in 1959, Crick wrote: "In the comparative isolation of Cambridge, I must confess that there are times when I have no stomach for decoding." Compare this with the way, in 1954, he and Watson "had sat down in the Eagle at Cambridge" and drew up the standard list of 20 amino acids which we recognize to this day. In time the discoveries of molecular biology became more familiar and we entered a new phase of biological science, characterized by a curious disinterest in discovery. The new scientist seemed content to add detail to previously existing information, almost to the point of avoiding discovery.

Little of the history of molecular biology accords to the traditions of scientific lineage. Furthermore, there have been no enduring new lines of descent from these remarkable discoveries. Those which have appeared have generally been chaotic, institutional and sterile. Although massive funding provided the opportunity for confirmatory and extending laboratory work, particularly in the U.S., few landmark discoveries in molecular biology can be ascribed to American science dollars. Watson & Crick discovered the structure of DNA in England. Crick deduced the existence of transfer nucleic acid in England, Jacob and Monod discovered the concept of messenger nucleic acid in Paris. The first breakthrough in the genetic code by Nirenberg came in an American laboratory, but from relatively simple and inexpensive experiments. This is significant because funding has become an eagerly sought and generally accepted status symbol for scientists.

I have spoken of the domestication of science, of society expecting more and more from science and science depending more and more for support on sources outside of its own community. The examples come from my own observations as a biochemist, but I trust I speak accurately for science in a broader context. Others will have to judge that. Let me conclude with a statement by Eric Hoffer: "Intellectuals? Give them everything they want, everything except power." That statement makes no sense. If one understands power as influence over others, then to give intellectuals or anyone else everything they want is to give them power. The only way to withhold power is not to give them everything they want -- or even its promise. If that had been the case, perhaps we would not have seen the domestication of science. It was the prospect of unlimited success that led to the present state of affairs. It will be a recognition of limits that turns the wheel of history around again from a pragmatic to a more idealistic cultural theme.