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For Your Calendar:

The March 19-21, 1982 Workshop-Conference will deal with the issue 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, development, and theology, and biology/environment. To date we can report that the economic issues will be discussed by Dr. Ervin Laszlo (UNITAR-United Nations); Technology by Drs. Steven Puro and/or Jean Robert Leguey-Feilleux (Saint Louis U.); Biology/environment by Dr. Thomas Berry (Riverdale Center for Religious Research); Theology by Dr. Duane Priebe (Wartburg Theological Seminary). We are still not certain who will treat the geopolitical and developmental issues.

The October, 1982 Conference is in the planning stage. It is hoped that this Conference will be held in the Wisconsin or Minnesota area. The tentative topic is "The Meaning of Health."

ITEST Notes:

We are issuing still 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. Essays up to twice the length will be considered.

We are eager to maximize the value and effect of the semi-annual ITEST meetings. For most of the membership (those who can't be present at the meetings) this means maximizing the use of the Proceedings. Do you have any ideas about accomplishing this goal? If so, please share them with us. One way, of course, would be to react to these meetings via the Newsletter. This, of course, can be in a negative or positive mode; but we would like the comments to be substantive.

Most important at present is an item that will be the subject of planning by the ITEST Board of Directors for the next several months. The year 1983 will be the 15th anniversary of ITEST's corporate establishment. We should like to present an integrated year-long program to celebrate this event. We'd like you to let us know what you would like to see us do. If we don't hear anything from our membership, the total input will have to come from the Board of Directors. The Board would agree that that would be unfortunate. We do need your ideas on the most profitable (and enjoyable) way we can celebrate this corporate milestone. Be as utopian as you wish. It will be the Board's task to get things to fit within the budgetary restrictions.

Other News:

As you recall, the March, 1981 Workshop was on the issues involved in the patenting of recombinant DNA and of the products of genetic engineering. Since then the scientific magazines (and the newspapers)

have been full of reports in the area of "genetic engineering". For example:

-- a grant of about $60 million from a German pharmaceutical company to Massachusetts General Hospital for research in this area and the training of the company's personnel

-- a similar grant of about $6 million by an American chemical company to an eastern university

-- a contract between Monsanto Chemical and Genentech to produce better cattle

-- a prediction by Boston Biomedical Consultants that monoclonal antibodies will earn companies $500 million per year by 1987

-- another prediction by a Chicago investment firm that a $50-100 billion a year global market could result from applications of gene-splicing technology to agriculture

-- announcement in newspapers of the successful transfer of genes from one animal species to another - from rabbits to mice to their offspring

-- last year, Congress decided that universities would do better as entrepreneurs than the government in exploiting patents on inventions developed from federally funded university research. Legislators approved a bill that shifted the right to own the patents from the government to the universities, as well as other nonprofit institutions and small businesses holding government contracts. The law has been generally lauded for providing uniformity to federal patent law that previously differed from agency to agency. (Science, 11 Sept., 1981, p. 1234).

-- a National Institutes of Health (NIH) committee approved on 9 September a preliminary proposal that would eliminate federal regulation of recombinant DNA research. The Recombinant DNA Advisory Committee voted 16 to 3 to change the current mandatory restrictions on gene-splicing experiments into voluntary guidelines and to remove penalties for violations....

The proposal also eliminates a requirement that universities organize local committees to oversee gene-splicing experiments. The NIH panelists do not expect that the 200 existing committees will be disbanded. (Science, 25 September, 1981, p. 1482).

-- the first wave of biotechnology companies aimed mainly at the medical and pharmaceutical market. Now, industry is moving to apply genetic engineering techniques to boost production and profits in agriculture.

The major initiatives have come from chemical, oil, and pharmaceutical companies that are expanding their own research capabilities or investing in the new "agrigenetics" companies that are proliferating. One result is stiff competition for the relatively small number of academic researchers with the requisite skills (Science, 18 September, 1981, p. 1339).

It should be clear that the industrialization of genetic engineering has hit the ground running.

Talibang Pisika

(The following excerpt is taken from the monthly newsletter of SPP (Samahang Pisika Pilipinas), March, 1981. It was sent to us from Dr. Dan McNamara, S.J., Chairman, Department of Physics, Ateneo de Manila, Philippine Islands. In the cover letter, Dan stated: "The background concerns the desire of the governmental science agency (NSDB) to fund only applied science projects and the revolt against this by a young Ph.D. who feels government support for pure research must be strengthened if young people are to be attracted to a career in science. The problem in my mind comes partly from the officials in NSDB who are more educators than scientists. Hence the enclosed article.)

As we close out the school year 1980-81, the hottest news item must be the on-going debate between the Samanhang Pisika and the NSDB over the role of the latter in the development of science in the country. The present reporter has no desire to add yet another rebuttal to rebuttals but might offer a somewhat different viewpoint or perspective to the issue. As seen from this point, the Gordian knot of at times acrimonious debate is not the question of how much money for technology of for "pure" science, nor of who gets how many pesos and centavos for what, but rather how do education and research peacefully co-habitate when both are poor relatives whose expenses for the bare necessities of life alone far exceed their ability to pay? Can they both be tolerated in the same house, especially when one seems to be only concerned with staying in her own room and beautifying herself all day. Why doesn't she get out and do an honest day's work, at least to support her less sophisticated sister, if for no other reason? After all, if she really is as sophisticated as she makes herself out to be, why not come to the aid of her younger sister and, for that matter, of the whole family?

It is quite understandable that the pater familias (NSDB in this case) should be concerned about such recalcitrant off-spring and really be perplexed as to why they do not get along better. Yet as the debate has progressed, this reporter feels that maybe both sides could learn from the example of one science department involved in education in South Korea. I visited Professor Kim of the Physics Department of Sogang University in South Korea this past year and stayed with him for two weeks. We discussed the role of physics in development and in particular of research physics (Professor Kim has a Ph.D. from the U.S. His field of interest is particle physics and quantum electro-dynamics). He told me that at least in his experience the role of governmental support for his own interest in physics research was minimal. It has only been in the last few years, he said, that the already existing community of research scientists in South Korea has received government backing. The impression I got was that the government is finally ready to back an already proven fact. At any rate, this being the case, I asked him how it was that physics was able to grow and prosper during the last 15 years in Korea. The main contribution, he felt, was the fact that there were graduate students who went abroad during those years who were willing to come back. Not all, by any means, but at least some were willing to return. "And why was that?" I asked. "Because of their allegiance to the faculty members who personally asked them to return", he replied. And I might add, their allegiance to the exciting research which they saw was possible under these professors.

That is one example taken from a country which obviously in 1950 was far behind us in science and technology. It was a country divided and at war. South Korea, by the end of the war, was left on its own, separated from the industrial North with no industry of its own and only agriculture to support it. In twenty-five years they have industrialized and so I think their example is instructive. For them,

at least through the eyes of this one professor, their research in science and the development of a sound educational program for all levels of schooling have been integrated through the scientists themselves who are also involved in education. The monetary inducement of industry was not there for a student considering a career in the university after his Ph.D., the security of a government position was not there, but what the students did see and what drew them back to the country and the plans of higher education was an enthusiastic faculty committed to their discipline and so doing whatever research they could. The ultimate integrating factor between educational growth in science and research at the university level proved to be the scientists themselves.

In my mind, this example is clear. We of the Samahan need to let the students see our dedication to science. In the long run this may be the lasting effect of the current debate -- no matter who "wins" or "loses". The potential scientists out there in the schools may come to appreciate there are serious scientists who are raising issues because they are concerned about the state of science in the country today and about the future of science. With this awareness on the part of these now student-scientists, may we not hope that their dedication in turn will be the vital link in science and technology for the future of the country?

A Roman Assembly

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I have been asked by several ITEST members briefly to describe my impressions of the Plenary Assembly of the Vatican Secretariat for non-Believers, which was held in Rome in late March and early April of this year. The topic for the Assembly was "The Relationship between Science and Unbelief in the Present Situation." There were 6 Cardinals, 20 Archbishops and Bishops and 10 of the consultants of the Secretariat present at this meeting.

The topic itself demands some explanation. On the surface that title may sound very pejorative. But the linking of science and unbelief carried no assumptions that "science is godless", or anything of that nature. The title was truly an interrogative, namely, is there any data to suggest that there is a linkage between science and either belief or unbelief. The topic, then, simply reflected the mission of the Secretariat, namely, an understanding of the phenomenon of unbelief and dialogue with unbelievers. During the course of the Assembly, even the name of the Secretariat was discussed during the meeting. Some of the members felt that that name had a quite pejorative ring to it. Others felt that the title was merely descriptive and not pejorative. In any event, I believe it can be stated that there was no negativity in the Assembly's approach to the Secretariat's name or to this particular topic.

Rather than going into the details of the discussion, I shall confine myself to my perceptions of the attitudes of those in attendance, because I think that these attitudes are more important to those of us who are involved in science/theology work than would be a discussion of a discussion.

The openness of the meeting was manifested very early in the proceedings when the Pro-President of the Secretariat, Archbishop Paul Poupard, moved to open the floor to those consultants who were present. There was no dissent to this motion. Consequently the consultants were encouraged to speak out freely as they saw fit. As one of the Cardinals stated, it would be foolish for the members to speak to issues that the consultants knew better, especially since the members were present to learn as well as make decisions.

By the time the Assembly was completed, the Cardinals and Bishops had shown very clearly that they were quite aware that contemporary scientific and technological advance carried great significance for the life of the Church. They were very eager to learn what is going on at present and what is most likely to happen in the near future. They were very interested in the significance of this advance. None of these churchmen has a science background, yet each is gravely aware of the Church's mission to a world increasingly dominated by science and technology. They were not anti-scientific and showed no evidence of any despair over our ability to keep some measure of human control over the technological future. If anything, they attributed too much virtue to science and scientists.

It is both encouraging and discouraging to note that this group of bishops is far ahead of the theological community in awareness of these issues. The present-day mythology always contrasts the far-seeing, contemporary theologians chafing under the small-minded curialists. That simply is not the case in terms of the challenges facing the Church from the very significant developments in science and technologies. In Catholic theological circles, at least, serious theological consideration of science/theology issues has yet to happen, with the exception of a few theologians. The bishops as a group cannot be expected to resolve the theological issues raised by contemporary science and technology. Still, their openness to and interest to these questions bodes very well. Unless the theological community soon shows an interest in these crucial issues, the task may fall to those doubly-faithful Christian scientists, namely, those with a deep fidelity both to the canons of their science and to their faith. Perhaps that would not be all bad.

The Catholic Church is nowhere near where she ought to be in terms of an engagement (used neutrally) with science and technology. Nonetheless, the Church is in a much better position than she was only two or three years ago. The attitudes of the Secretariat members is a clear indication of that. There has been a significant awakening which seemed to me to be a sure sign of hope. Let me conclude by stating that I came away from this meeting with a substantial sense of encouragement. The problems are, of course, vast, but at last we seem to be beginning. And it was a very positive start.

The following is an excerpt from the paper of Mr. Roman Saliwanchik presented at the March, 1981 ITEST Workshop on "The Patenting of Recombinant DNA".

Contrary to the concerns of some, the patenting of a living microbe is neither a patent on life itself nor carte blanche with regard to patenting higher forms of living entities. Patenting "life itself" is not an issue to rational minds. On the other hand, patenting higher living forms, such as farm animals, cannot be dismissed as a possibility.

Remember, the patent system is a legal system designed to help inventors and the public. It does not function solely to make inventors the legal owners of all their patentable inventions. If anything, the patent system is more public-oriented than inventor-oriented. This is especially apparent in the area of microbiological and genetic engineering inventions because fulfillment of the Patent Act requirement of a "full disclosure" of an invention, in return for a patent, requires the deposition of a microbe culture. This culture then becomes available to the public upon the grant of a patent.

Perhaps the import of this patent law requirement is not fully appreciated by those not working in the microbiological field. To those in the field, however, it means access to a valuable entity, which, in the absence of the patent system, would not even be known to the public, much less be accessible to the public. Possession of the microbe allows a member of the public to experiment with the microbe, and, hopefully, invent an improvement which might also be patentable. Thus, public disclosure of the patented invention, in a way which enables persons skilled in the art to practice the invention, is a patent law requirement which, indeed, promotes the progress of science and the useful arts!

Again remember, the patent system is here to help inventors and the public, not to deprive the public of anything to which it previously had access. In other words, the patent system does not take from the public something already in the public domain. A patentable invention must not only be novel, but it also must be unobvious from that which is already known. These are strong requirements, and they insure the right of the public to practice or enjoy what is already in the public domain.

The Bergy and Chakrabarty microbes were both new and unobvious. Clearly, they were both useful; and clearly, the public benefits from the disclosure of these inventions and the resultant access to the microbes.

Disclosure of microbiological inventions by depositing cultures with recognized culture repositories is a well-developed procedure designed to fulfill the stringent full-disclosure requirement of the patent law. Whether this patent law requirement can be met in genetic inventions involving higher living forms will be answered on a case-by-case basis, at least initially.

Presently, inventors of genetic inventions involving vectors such as plasmids, can rely on the procedures developed for microbiological inventions. Plasmids can be transformed into a suitable microbial host, and the host can then be deposited in a culture repository. This procedure enables a member of the public to practice a patented invention by allowing access to the host and then retrieving the plasmid vector from the host.

In a like manner, genetically-altered microbes, for example, a microbe which can produce insulin or interferon, also can be deposited to fulfill the full-disclosure requirement of the patent law.

When we go from microbes to higher living forms, for example, farm animals, then new procedures may have to be developed to fulfill the full-disclosure requirement. Problems of meeting the full-disclosure requirement would appear in new chicken, turkey, or horse inventions. We can expect such problems to be solved.

The following is an excerpt from the paper of Mr. Richard Cusack presented at the March, 1981 ITEST Workshop on "The Patenting of Recombinant DNA".

One of the major problems going public in the bio-sciences --speaking strictly from a communications point of view -- is the language itself. To the layman, it is somewhat terrifying, a trifle intimidating. Only when you browse through a technical description of a human cell, for example, from a non-technical point of view, can you appreciate what I mean.

There are little words like ribosomes. And mobile pouches called golgi.

Lysosomes, there's one.

There is also the rough endoplasmic reticulum - a network of channels I'm told, which carries protein from attached ribosomes to other parts of the cells. And so on.

One is required to stop and look up words every two minutes or so. Very intimidating. Very disheartening.

Newsweek, incidentally, made an heroic effort to simplify its inquiry into human cells in August 1979. I think it was successful from their point of view. But I think the take out idea may have been less than successful from your point of view.

One had the feeling after reading it that this was a highly technical subject best left to highly technical people to fathom. Much too arcane for the average man to hazard a comment on, guess a direction, an implication.

"Research in cell biology," concluded Newsweek, "promises to alleviate the human condition and as an intellectual challenge has few equals."

Period. End of article.

I agreed, as I remember, and flipped to a story about Coppola's war epic which was being heralded on the next page.

Nowhere in an otherwise thoughtful piece did I get the feel for the implications of the research. There was no "big picture" presented or hinted at, no sense of the notion that something revolutionary was going on - novel in history.

I'm not at all suggesting deception -- nothing like that -- perhaps the researchers who wrote the piece simply weren't tuned in to what's going on. They were swamped with an avalanche of paper in an overcommunicated society and didn't have time to open their ITEST mail.

What I'm not getting from the press, TV, film, newspapers or anywhere is an idea that you have been aware of for some time now: namely, that the center of science has shifted from physics and chemistry to the life sciences.

That this shift will have an enormous impact on the human person...that it will call into question no less than the definition of man, and that this constitutes a revolutionary change in the purpose for technology and for humans.

When you isolate that paragraph and think about it -- really think about it -- even meditate on it -- you wonder why there isn't a media blizzard underway. My God: here we are tinkering with the human species and Life hasn't done a centerfold yet. Playboy has yet to interview Dr. Watson and "60 Minutes" is content to photograph prisons, politicians and klansmen -- unmindful of the story of the century.

With the new biological tools now being created, it may be possible in time to direct our own future growth as a species. Incredible.

I can't believe the media is blind or stupid. I have to conclude nobody knows about it yet. But perhaps you will conclude that something should be done about this, at least to clear the air about what's up for grabs.

The following is an excerpt from an intervention by Fr. Donald Keefe, S.J. at the March, 1981 ITEST Workshop on "The Patenting of Recombinant DNA".

I'd like to try to respond to the moderator's suggestion that we put together the moral concern, which brings us together, and the particular expression of that concern, namely, the patent process and its implications. The patent process says something very ancient in American law. As I recall, it is written into the Constitution itself. It projects a somewhat optimistic vision of the world. It supposes that human enterprise is a value, that it should be rewarded, that its net effect upon the human condition is good rather than evil.

Over against this in our constitutional system is the Commerce Clause, which in recent times has been put into the service of a kind of a vision of an administered world, a world in which the various perils to be avoided are avoided by an essentially bureaucratic organization of human conduct. These two visions, as was explored in our recent conferences on governmental regulation, are at some odds with each other. For example, the anti-trust legislation, which has been developed on the basis of the Commerce Clause, seems to be directly opposed to the quasi-monapolistic grants of rights which patents are.

Thus we have a quandary. Should we, in this country and in the western world generally be optimistic about the future and keep to the sort of principles that seem to underwrite the patent process? Or is the ever-increasing necessity, as it appears from many viewpoints, of an administered world -- one made safe, therefore, and one which is fundamentally fearful of a future which is uncontrolled -- is this vision the one that we should consider to be the more Christian? It seems to be the function of such intelligence, as we can bring to bear on these problems, to justify one or other of these mutually exclusive visions of the future. I believe that in their exclusivity they exhaust the possibilities. I'd like to explore this analysis a little further.

Our understanding of our existence in time generally conforms to three paradigms. That existence can be thought to be simply, radically meaningless. It is therefore in need of a meaning which would be imposed from the outside or else it is fundamentally engaged in the pursuit of some sort of cataclysm, a grand finale, a Gotterdammerung, some sort of ultimate disaster which inevitably approaches. This kind of pessimism, I suspect, finds expression in such films as Jaws, The Towering Inferno, etc. --

these petty apocalypses that attract a great deal of attention today, and which seem to resonate to something in the culture.

Over against this is the mechanist's view of the future. This has a kind of a zero sum optimism: everything will work out alright, if we are very, very careful. In this kind of a world freedom is an absurdity. It is a problem, something to be minimized. You try to limit the consumption of whiskey. You don't drive fast automobiles. You do various things which restrain the boisterousness of the human condition. In this kind of a vision, the ultimate evil, sin, is any kind of conduct that eludes the rationalism of the mechanism. This kind of an administered world -- to use the standard phrase -- has great attraction for some kinds of minds, and less for other kinds of minds. There is an alternative which would protect the freedom of the meaningless world: whatever you do doesn't make any difference, so you might as well do it. This would protect the structure of the mechanized world in which things, however limited, seem to have at least the possibility of being understood.

There is a third rationale, a third paradigm. This is the supposition that the future is not meaningless, but rather mysterious. It is not mechanistic, but mysterious. That is to say that we are in search for a meaning in which the synthesis of truth and freedom is a guarantee, sustained not by us but by God. This then is a covenanted world whose guarantee is a human guarantee, indeed, but not one given simply by humanity. Then we are immediately engaged, not in philosophy or in science, but in the theological inquiry. From the Christian viewpoint, the human future, and the ultimately human character of the objects of our knowledge, is guaranteed by the fact that this world is created in Christ. Often this is a sort of religious expression which has no real content. "Created in Christ" sounds nice and pious, and we can all agree to it; but we don't look at it very profoundly.

What it really means, if I am not entirely mistaken, is that the very structures of the world are measured by what a human being is. It is not then accidental that our minds are in some sort of odd consonance with the materiality that we investigate. It is not strange that the processes in time and space, into which our physicists inquire, find some sort of response in our own thought processes. This would seem to be the basis of whatever optimism motivates the scientific intelligence. Scientific curiosity moves into an ever-increasing and ever-expanding inquiry, which the scientist is utterly confident will not be disappointed or frustrated. It is the kind of optimism that underlies the business entrepeneur who feels that energy, intelligence, ingenuity, and such honesty as may be forced upon him or her, will ultimately contribute to the welfare of humanity as such; in other words, that the business enterprise is as valid and as legitimate as any other work of a human hand.

This kind of optimism, then, would seem to have something to do with upholding, for instance, patent rights. It would also seem to offer an answer to those who can point to the indefinitely numerous dangers which any advance in science brings forward. If, indeed, the sciences and their products, are to be understood and exploited according to a rationale, then the mysterious character of the sciences and of the world they explore, is abdicated in favor of some redistribution of the world's resources in terms, then, of some decision of practical intelligence which is no more than the redistribution of power.