



Lent is over now and we are dwelling in Resurrection time! Maybe even the snows of winter are over and we can move into spring. Maybe the song of the dove will be heard throughout the land.

Easter as you know is really an embarrassment of riches. The preacher knows that, like Christmas, Easter can never be approached except by bits and pieces. One bit, of course, circles around the resurrection of the body — Christ's body and our bodies. I for one am a firm believer in Christ's bodily resurrection — a proposition not always acceptable to all scripture scholars. But it is certainly acceptable to all who take the trouble to read the Scripture and pray over it.

What has that got to do with anything in the life sciences/faith apostolate? Everything! If Christ did not rise bodily from the dead, if the tomb is not empty, it is a waste of time to worry about the body and its meaning. It would have no meaning. If the way we enspirit matter is meant for this life only, then it has no intrinsic meaning and no future. It's as if we are imprisoned in the body for a time and then liberated to live a higher existence. That is not the teaching of Christianity in the Creeds or in the tradition where the teaching talks about "the resurrection of the body."

Father Don Keefe mentioned at our October, 1998 workshop that "within Christianity, spirit does not mean immaterial; it means immortal. It means free from death. Christ becomes a life-giving spirit by his resurrection. Spirituality then has to do with the prospect of eternal life, not the prospect of immateriality." We look forward to acquiring a spiritual body, one not governed by and limited by sickness and death. But the body's main quality will not be immateriality. I can't imagine immaterial bodies; whereas immortal bodies, while entirely new to the human imagination, are in the mind of God and heart of God. That is what has been promised to us.

But now, let me wish you belatedly a glorious and wonderfully joyful feast of the Resurrection. God bless you all.

*Robert Brungs, S.J.*

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



## ANNOUNCEMENTS

1. Just a reminder if you are planning to join in celebrating ITEST's *30-Something Anniversary* in Chicago this summer: early registration (before May 31) is \$125.00 — after June 1 it is \$150.00. Please do not forget the deposit of \$25.00. This will be credited to you at the Celebration as a part of your registration. Attendance is not restricted to ITEST members and their families; all who are interested in participating in an enjoyable and beneficial week are most welcome. Mark your calendar for August 1-5, 1999 for the meeting on *The Genome: Plant, Animal, Human*.
2. Congratulations to long-time ITEST member, Yoshio Oyanagi, Physicist and Professor at the University of Tokyo, who has been named by John Paul II to be a consultant to the *Pontifical Council for Culture* for a five year term. Professor Oyanagi is the only scientist from the field of twelve consultants nominated with him.
3. Bill Durbin, ITEST member and Professor of Ecclesiastical History at the Washington Theological Union, announces a week-long summer workshop in Washington, DC on science and religion from June 28 through July 2. Among the participants will be noted lecturers, John Haught, Joel Primack, Francis Collins and others. More information may be found by accessing the WTU website ([www.wtu.edu](http://www.wtu.edu)) or by contacting Bill Durbin at [durbin@wtu.edu](mailto:durbin@wtu.edu)
4. The ITEST Board has been considering various timely topics for our October, 2000 workshop, among them, the theology that will be needed or helpful in approaching questions of life science/faith dialogue. This would be a particularly helpful continuation of our August, 1999 meeting. If you have any suggestions for topics and presenters, please contact the ITEST offices. If you feel you could contribute to a particular effort by preparing an essay, let us know.
5. The edited book of proceedings on *The Family of the Future/The Future of the Family* from our workshop in October '98 should be delivered to all 1998 dues-paid members toward the end of April. We think that the essays and the edited discussions have much to add to the understanding of the problems and issues confronting "the family" not only today but into the 21st century as well.
6. MEMBERSHIP DUES: Many of our members often send an extra \$5 or \$10 or more with their dues as a gesture of generosity. Although it is our custom to send personal notes of thanks to those who contribute generously to ITEST, we understand that not everyone can contribute a large donation to support the ITEST mission. In any case we want to thank those too who can send only "a widow's (widower's?) mite." Thank you! We appreciate it.

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### Two Modes of Thought: Science and Religion

Donald P. Merrifield, S.J.  
Chancellor: Loyola Marymount University

*[Although a member of the University administration, Fr. Merrifield has not lost interest in faith/science. Biology, anthropology and evolutionary psychology have always attracted him more than physics in which he did his graduate studies. In the following article, deliberately provocative, he attempts to explore how Stephen Gould's "non-overlapping magisteria" model might be valuable to Christian believers. He welcomes critical response. His e-mail address is [dmerrifi@lmumail.lmu.edu](mailto:dmerrifi@lmumail.lmu.edu).]*

Being at once a believing Christian and also trained as a scientist, I am forever exploring new ways to express the relationship between science and religion. One way of dealing with the apparent clashes between the scientific worldview and that of religion is to simply put them in two totally separate areas of discourse. This has recently been most interestingly presented by Stephen Jay Gould in the chapter entitled "Nonoverlapping Magisteria" in his book, *Leonardo's Mountain of Clams and the Diet of Worms: Essays in Natural History*. Essen-

tially, in his view, presented in response to a new statement on evolution from Pope John Paul II, science deals with "the empirical constitution of the universe" and religion searches for "proper ethical values and the spiritual meaning of our lives." In this context, Gould sees the Bible not as "literal truth," but as "illuminating literature, based partly on metaphor and allegory." Is this so different from the frequently quoted remark of a cardinal in the time of Galileo: "The Bible does not teach how the heavens go, but how to go to heaven?"



Since, in Gould's terms the "net of science covers the empirical universe: what it is made of (fact) and why does it work this way (theory)," there is no possibility of conflict with the "questions of moral meaning and value" which are religion's responsibility. Of course, there are a number of evolutionary psychologists who may well differ with this and attempt to put value and meaning over in the realm of science. There are as well, even outside of the fundamentalists in all religious camps, other believers who are not at all ready to give up all "facts" to science! In fact, I have received a criticism of Gould's approach by a Catholic theologian who asserts theology involves both "facts," presumably empirical, and "theories" which explain them. I, not a theologian, wonder if it is "facts" or "faith" which the theologian seeks to explain, following the Anselmian definition of theology as "*fides quaerens intellectum*" or "faith seeking understanding."

Another easy separation of science and religion, favored by Anne Foerst, who is at MIT working in the study of computers and God, is to identify scientific explanation with "logos" and religious with "mythos." This is, as I see it, not too different from Gould's division. Again, not all religious people are willing, it seems to me, to use "mythos," and much less the English term "myth," to cover religion even if religion is seen as "values and meaning rooted in metaphor and allegory." I greatly doubt that most believers, including theologians, would feel inclined to restate religion's claims in the language of Gould on values and meaning, conceding all empirical observations about the universe to science.

When I have tested the "nonoverlapping magisteria model" on some very well educated Catholics, for example, I found some asserting that "the Resurrection of Jesus" was an empirical fact and even the creation of the world by God. One even maintained that the presence of Jesus in the Eucharist was indeed "a fact!" Of course, Catholics are not easily going to say that the Creator, the Resurrection and the doctrine of the Eucharist are "myths."

However, it is confusing to say articles of faith are empirical facts in order to maintain they are "realities," introducing another category. It might be possible to speak of "religious realities," based, however, in faith, of which Gould does not speak. Of course, the sciences do not hesitate to study religious faith and religious experience and seek to explain them in psychological and sociological terms. Indeed, theologians use scientific approaches when they do textual criticism or biblical archeology, as well as in more tangential areas, as in the dating of the Shroud of Turin.

Parenthetically, I might mention one approach to science

and religion worthy of consideration, that of Edward O. Wilson, in his latest book *Consilience: The Unity of Knowledge*. He seems to intend the absorption of religion by science, moving beyond Gould to the "explanation" of "values and meaning" by the genetics of the development of the human brain. The scientific enterprise, itself, of course, can also be so investigated as a mere evolutionary adaptation. However, its claimed objectivity is not really damaged by a deeper understanding of the evolving personal and social environment in which it is done. So, I believe, as well, that the investigation of the evolutionary aspects of religion does not threaten the validity of the values and meaning that it sustains.

In the Catholic tradition and some others philosophical analysis discovers "realities" and "truths," which, however are not empirical facts or theories in the scientific sense nor are they articles of faith. This might indeed be a third, nonoverlapping magisterium. In this area might be included the question of the existence of the human soul and, indeed, traditionally, the existence of God. Of course, a goodly number of scientists do hold with an almost evangelical fervor that science has indeed wiped out these "hypotheses!" They are, I would agree, unnecessary additions within the methods and limits of a scientific worldview. However, the problem is that science itself becomes a religion or a philosophy once it becomes "The Total Explanation" and the cosmos becomes, by definition "all there is." Whether this is so is obviously outside the possibility of scientific investigation as such.

So, at this moment, I am pondering what in the content of my own religious faith I regard as empirically factual, which I understand as being in principle accessible to scientific investigation, historical, archeological, textual, or other. Is the death of Jesus on the cross such a historical fact rather than a belief, the belief, or myth, being that He died for our sins? What are we to say of the miracle stories in the accounts of Jesus and, indeed, in the history of the Church? Much has been done to interpret many of these as "mythos." However, most Christian scholars are not ready, I believe, to see all the tales of these extraordinary events simply as examples of "illuminating literature." Some would maintain that alleged miracles could be scientifically investigated and that they would, hopefully, be found to be "without any possibility of scientific explanation."

For Catholics, an added dimension is the teachings over the years of the Church, which in many areas seem to be proposing empirically investigable facts as doctrine, such as, for example, the virgin birth of Jesus, which is, of course, based in scripture. The mind of the Church does not seem to allow this to be seen as "mythos," but clearly as "logos," including as a fact to be believed, not only



that Mary remained a virgin but that there were no other children. It does not seem that any empirical data is included in the case of something like the Assumption of Mary, for the *terminus ad quem* is extraterritorial, as it were. However, implied certainly is that her body is not to be found in any earthly tomb! The doctrinal affirmations about divine revelation itself may touch upon the empirical, as well, even for those traditions which do not have angelic dictation or golden tablets.

What thoughts do others have in this area of considerable concern in particular for scientists who are believers? It seems that the ongoing dialogue, with believers showing an openness even to that which may seem doctrinaire or hostile from members of the scientific community, cannot but clarify religious claims and methodology, as religious and, maybe more importantly, philosophical reflections may help put a scientific worldview in prospective. Carl Sagan's self-explanatory Cosmos may need farther explanation, as indeed the

popular images and explanations of "God" continually need purification. I find that religious people are still clinging to "the God of the gaps," as J. T. Robinson called this explanatory God who comes to our rescue in those areas in which science has thus far no explanation.

The very fact that science works so well is part of that overall mysterious that surrounds our human experience and leads some to believe in an ultimate reality which is not simply the cosmos. We only touch upon this "freshness deep down things," to quote the Jesuit poet, Gerard Manley Hopkins, through myth, allegory and the experience of moral goodness, even if scientists think they can explain human goodness away through analysis of genes and neurons. Usually, I have found, such investigators have themselves marvelously developed moral sensitivity which, for me, is much more than their genetic history might explain! Mystery does remain, as Wittgenstein averred: "Not *how* the world is, but *that* it is is the mystical."

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## FAITH, SCIENCE AND SACRAMENTAL REALISM

Father Donald J. Keefe, SJ  
St. Joseph's Seminary, Dunwoodie

*[Father Donald Keefe, professor of dogmatic theology at Dunwoodie, has written extensively for ITEST. The following is a reprint of his paper presented at the October, 1991 ITEST Workshop, A Seminar with Father Stanley Jaki. Comments may be directed to Father Keefe at his e-mail address — djkeefesj@mindspring.com]*

ITEST has been concerned over the more than two [now three] decades of its existence with the interplay of Christianity, experimental science and technology. Insofar as memory serves, the emphasis of the ITEST conferences over those years has been rather upon the impact of technology on a Christian culture than on the classic issue of the relation of the knowledge which is the Christian faith to that which is had by way of experimental science. Apart from the confrontations of those persons who are committed to an evolutionary origin of the universe with those who are committed to its creation out of nothing, which have enlivened discussions of academic freedom over the recent past,<sup>1</sup> and apart from the disagreements developed over the past half century and more among physical cosmologists concerning the role of causality in physics, the faith-science relation has not in fact lately generated a great deal of discussion among scientists or theologians even on the informal level.

There are signal exceptions, however, to this disinterest; due very largely to the books, articles, lectures, and broad influence of Fr. Stanley Jaki, OSB, the long-suppressed discovery by Pierre Duhem of the medieval origins of the first of the laws of motion is becoming well known, while Fr. Jaki himself, who has long since achieved a world re-

putation at once as a Catholic theologian and a historian of science, has for many years been pointing out the indispensability for the physical sciences of the Jewish and Christian belief in the divine creation of the universe.

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***I will argue that it is precisely this sacramental realism that permits the optimism which characterizes the experimental sciences, and which underlies their experimental mode.***

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It would be impertinent in me to treat here of his work, given that he will be here to do so in person, and that the prospect of his presence among us during this Conference has drawn most of you to it. Instead, I wish to propose and to develop an ancillary viewpoint, one which owes more to a reading of Fr. Jaki's work than I can easily identify, but which also concentrates more particularly than does his work upon the pertinence of Catholic sacramental realism to the physical and specifically the experimental science.

I will argue that it is precisely this sacramental realism that permits the optimism which characterizes the experi-



mental sciences, and which underlies their experimental mode. Such an assertion requires some considerable unpacking.

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The physical sciences exist by their common refusal to permit any received or desired theoretical integration of experimental data to foreclose the continuing quest for the experimental verification of the theory in possession. The classic instances of this refusal to permit abstract theoretical constructs to triumph over historical fact include the discovery by Michelson and Morely in 1887 of the constant velocity of light, and by Max Planck in 1900 of the constant quantum of energy. These discoveries forced the transcendence of the Euclidian geometry and the Newtonian mechanics by Einstein's special and general theories of relativity, and by the wave or quantum mechanics developed for the most part by Planck, Bohr, Einstein, Schrödinger, Heisenberg, and Dirac. Since then, the quest for a unitary theory which might embrace relativity and quantum mechanics, somewhat as Maxwell's equations synthesized the classical physics of the middle third of the nineteenth century, has been unavailing. Recently, the interest in, or perhaps better, the fascination with fractals and the non-linear differential equations which describe them has again underwritten the incapacity of theory to comprehend the data disclosed by the experimental method of physics.

The resulting paradox is well illustrated by the notion, recently popularized, of a "science of chaos."<sup>2</sup> The paradox had been anticipated after a fashion by the disagreement, extending over more than fifty years, concerning the proper interpretation of quantum mechanics: on this point the tension between the determinist views of Einstein and the so-called Copenhagen interpretation of Heisenberg's uncertainty principle is still alive.

Recently our conferences have been enlivened by discussions of the implications of John Bell's experiments of some quarter century past, which on quantum mechanical grounds seem strictly to require that the notion of causality be dropped from the epistemology of physics. Fr. Jaki has written cogently to the refutation of this conclusion, and I shall leave it for him to address. My interest here is not directly in such issues, whose competent discussion require a training beyond that which is mine as a theologian; rather I wish to use them as illustrative of a dilemma common not only to physics, but also to theology, to law,

to linguistics, to historiography, in brief, to all those fields of scholarly inquiry which traditionally rely upon historical experience, and which employ theoretical constructs at once to unify the experimental data and to suggest the pertinence of further experimental inquiry.

The reliance of rational inquiry upon *historical* rather than ideal criteria is relatively novel in intellectual history; it is only in the Western world, in the cultures formed by the Judaeo-Christian religious tradition,<sup>3</sup> that the experimental sciences have flourished by reason of that recourse to experimental verification of understanding. Fr. Jaki has written a great deal stressing the significance of the massive ten-volume study written by Pierre Duhem early in this century.<sup>4</sup> The latter five volumes of this work, whose publication were delayed by an atheistic French academic establishment for nearly forty years, point out the anticipation of the first law of motion, which underlies all of experimental physics, by John Buridan, a fourteenth century scholar who taught for perhaps fifty years at the University of Paris. A nominalist who identified intellect and will, his name is better known from its association with a dilemma foisted on him by his adversaries, and known to philosophy as that of Buridan's Ass; you may recall that it finds an indecisive donkey starving to death between two equally attractive stacks of hay. But Buridan was better than that; his excogitation in the late Middle Ages of the notion of "impetus"<sup>5</sup> had been forgotten for centuries when Duhem's magnificent historical scholarship recovered it.

Buridan had been driven to the derivation of this novel idea by the Judaeo-Christian postulate of a created universe whose diverse motions were also contingent and consequently had beginnings in time, instead of being inherent in materiality as such as Aristotelianism had supposed. Buridan's inference of a temporal beginning from the fact of the creation of the physical world placed him in this respect within the Augustinian camp, whose view of creation had been developed earlier by St. Bonaventure in the course of a controversy with St. Thomas.<sup>6</sup> St. Thomas had defended the rational possibility of the creation of what amounts to an Aristotelian universe, one without a temporal beginning, in which motion is interpreted as an dynamism or *appetitus* necessarily intrinsic to material substance insofar as light or heavy. St. Thomas therefore denied that the contingency of creation required a beginning, and thus that it implied the particularity and contingency of motion and so of time.

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*But insofar as science is truly concerned for knowledge as novel, as the product of a learning from history, which is to say, insofar as it is concerned for experimental verification, the scientific inquiry presupposes a free coherence in the objective physical world.*

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In this thirteenth century controversy between the defenders of an Aristotelian quasi-animism and the Franciscan-Augustinian emphasis upon the novel implications of a truly contingent creation, there is remotely foreshadowed an undeveloped and unsuspected tension between the necessitarian rationality uncritically accepted by medieval Aristotelianism,<sup>7</sup> and the doctrine of creation with its implication of the contingent substantiality of creation *ex nihilo*, and therefore of radically contingent truth. This tension is further latent, still obscured by an uncritical scholastic investment in Aristotelian logic, in the Scotist insistence against the Thomists, upon a noncategorical and therefore intuitive and free intelligibility immanent in the concrete singular thing or event (*haecceitas*), which Aristotelianism denied and which denial is implicit in some aspects of Thomism.<sup>8</sup>

This tension persists to our own time. On the one hand, there is effective in many academic disciplines, including physics and theology, the hardy conviction that whatever is objectively true can be shown to be necessarily true; on the other there is a common-sense, commonplace and communally lived commitment to a host of realities whose objectivity is vital to us, and which are very clearly free, neither necessary nor random.

This paradox pervades all scientific inquiry, which must be at once free and methodologically controlled. The freedom of such academic inquiry is more than academic, for it underlies the possibility of any learning whatever. It is too little remarked that this freedom of inquiry is not merely a personal immunity from constraint, a "freedom from": it is also at the same time, and far more significantly, a responsibility, a "freedom for" a truth which one's inquiry cannot control and which is therefore fascinating, intrinsically interesting because possessed of an inexhaustible — because free — intrinsic truth. The freedom of the inquiry cannot but connote a freedom in the object, which presents itself to inquiry as continually novel, as finally and radically unpredictable, and so as continually interesting, for it is also responsive to the presupposition of all inquiry, that its object is coherent and intelligible independently of the knower; in the end, this requires as well that the intelligibility of the object of the inquiry be free, for it could not otherwise be known to be independent.

The question of the cause of an immanent and necessary intelligibility, i. e. , whether that cause be the immanent rationality of the mind, or the immanent rationality of the cosmos, is incapable of resolution and finally banal because falsely posed: it could make no difference whatsoever whether one's rationality were a mere participation in and submission to a universal logos, or in the alternative it were the autonomous imposition of an ideal order immanent to the mind upon an objectively meaningless chaos: no experiment could determine the issue. In either

case, there would be no novel truth to discover, nothing to learn from historical experience, and no scientific inquiry could proceed.

But insofar as science is truly concerned for knowledge as novel, as the product of a learning from history, which is to say, insofar as it is concerned for experimental verification, the scientific inquiry presupposes a free coherence in the objective physical world. Because it presents itself as continually and always interesting, as always novel, always free, this free coherence can never be systematized, never reduced to formulae. Were that reduction to occur, it would show the object of inquiry not to have been free in the last analysis, and its intelligibility consequently to be no more than a reflex of the method of an inquiry discovered to be self-ruled and autonomous, submitted to no extrinsic criteria, rather than freely governed by a free object transcending the free inquiry as an answer transcends a question.

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*While it is evident that from the merely random, nothing can be learned, it is perhaps less immediately evident that the random is supremely without interest, in the sense that it neither arouses nor can arouse curiosity.*

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The debate occasioned by Einstein's refusal of the Copenhagen interpretation of quantum mechanics by which a methodological indeterminacy (the uncertainty principle) is projected upon reality to become ontological, provides an illustration of this impasse of a rationality self-enclosed within its own logic. Einstein preferred an unfree and determinate rationality — "God does not play dice" — to the objective disorder presupposed by the Copenhagen school's projection of the methodological indeterminacy principle of quantum mechanics upon the objective physical world.

While it is evident that from the merely random, nothing can be learned, it is perhaps less immediately evident that the random is supremely without interest, in the sense that it neither arouses nor can arouse curiosity. Of course, it can evoke the Faustian desire to impose order upon the putatively disordered: it is thus that much of modern science is no longer a *quaerens intellectum*, but a *quaerens potestatem*: a search not for understanding, but for power. However, Einstein's refusal of such chaos is itself also an a priori and ideal projection of a method governed by the Enlightenment postulate of autonomous and finally necessitarian rationality: he proposed no alternative to the Copenhagen school of quantum mechanics other than just such an impersonal and unfree rationality, reductively that of a pantheism.

But the physical sciences can afford neither limb of this



*aut chaos aut determinismus* dilemma; either would suppress the possibility of experimental method. Oddly, this result seems to be accepted, even proclaimed, by the scientific community: e. g. , the goal of physics is seen by many physicists to be a universally comprehensive theory which will make all further learning trivial.<sup>9</sup>

One must then reject the foregoing rationalist dilemma — in which much of the contemporary discussion is locked — according to which one is forced to choose between reality conceived as a jungle, or as a cage. This puzzlement arises out of the supposition that an *ideal* nonhistorical method controls the discovery of truth in physics, which is in consequence itself ideal and nonhistorical. But, in order to continue to experiment, in order to continue to learn from the the experimental examination of the physical data of the concrete *historical* world, one must postulate that the significance of that world is historical and free rather than ideal and necessary.

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***This, the rationalized and dehistoricized problem of the one and the many or, otherwise put, of the unity of historical substance, defeated the highest reaches of pagan philosophy; neither Plato nor Aristotle resolved it.***

However, when one refuses the fatalist presupposition underlying most of the contemporary physical cosmology, the question cannot but arise as to the ground, the source or cause of the free intelligibility of the objective physical order which any experimental curiosity not only takes for granted but apart from which it cannot be sustained. This intelligibility is clearly not derivable from the phenomena: such derivation, whether by induction or deduction, insofar as logical would not be free. Neither is that free intelligibility derivable from the immanent laws of human reason; insofar as such laws are discoverable and may be thought to be sufficient, they also must impose a priori a logical necessity upon the data, which again would negate their freedom and novelty. Further, the impossibility of such an autonomously coherent rational order has been established by the publication of Kurt Goedel's theorem some sixty years ago.<sup>10</sup>

But Goedel's proof of the impossibility of such autonomously coherent rationality does not establish the existence of an alternative free historical rationality. It is not at all obvious that, for all its indispensability to experimental learning, there is or can be a free order of reality. Neither is it easy to imagine what a free coherence might be, for in the first place, as free, it can have no a priori possibility; nonetheless, the imagination inevitably enters upon an attempt to discover such a prior possibility of freedom within the immanent possibilities of autonomous rationality. For illustration of this fatal flaw, need only recall the schoolboy debates over the reconciliation of

divine omnipotence and human freedom, which invariably turn on schemes for the reduction of reality to necessity by establishing its prior possibility: the imagination simply cannot conceive of a creation *ex nihilo*, without any prior possibility; in fact, much of medieval thought resolutely denied its possibility while at the same time affirming it: witness St. Thomas denial of any relation from the Creator God to his creation, despite his affirmation of the personal unity in Christ of humanity and divinity.

However, inasmuch as such efforts to rationalize freedom by its reduction to necessity are clearly futilities, we need not pursue them.

It remains that the greatest minds of the pagan world never so much as considered the possibility of a free truth, and philosophers of the Christian and post-Christian traditions seem to be in no better case in their own speculation, for over and again, they also return to the perennial pagan problematic, that of relating, under a heading of rational necessity, the indispensable unity of unity, goodness and truth, to the multiplicity and mutability of the physical world. This, the rationalized and dehistoricized problem of the one and the many or, otherwise put, of the unity of *historical* substance, defeated the highest reaches of pagan philosophy; neither Plato nor Aristotle resolved it. But that philosophical tradition accepted a priori the necessity of truth, while for the bi-millennial Western intellectual tradition, the pagan and determinist version of the perennial problem of the one and the many has been transposed and transvalued, however little this may be recognized by those who depend upon that tradition.

This transformation of that classic and permanent problem of metaphysics does not arise simply because its solution now must embrace a physical universe whose radius is some ten or fifteen billion light years; while that consideration enlarges its range of implication it does not change the nonhistorical character of the ancient philosophical dilemma. It is rather the very meaning of the problem of the one and the many that has been transformed by the postulate of the freedom of their relation, a postulate which is no more than a technical expression of the Judaeo-Christian tradition of the good creation. The objective truth of creation is historical, for the actuality (not the possibility) of free truth, of free reality and free objectivity that is the good creation must be historical, which is to say, given and received in a free event.

Historical truth is not an idea, not merely information. It is the free presence in history of an event of free *historical* synthesis of the one and the many, viz. , of a free, objective, substantial reality, and it is appropriated personally and responsibly in a free historical praxis, which is always in a posture of worship. This historical truth is affirmed in the Jewish and Christian faith in the good creation, and is personally appropriated in the worship of the Lord of the



covenant.

The autonomous reason cannot anticipate, without a turning away from its supposed autonomy, the historical actuality of a revelation of the good creation which is a concretely intelligible and free gift, a gift of truth that is historically — which is to say, freely — and objectively immanent in the world by a presence which is also a free reception of the gift. Autonomous rationality can know nothing that is not immanently necessary; it cannot recognize a free gift of a free truth, i.e, a revelation, and retain its autonomy. Those who recognize the gift by and in the free acceptance and free affirmation of the revelation thereby have refused autonomy by accepting a truth they cannot control, which is criteriological for their own now free reality, their own free knowing, and consequently for their own historicity.

Once having been received, the revelation cannot be removed from history, whether one personally accepts the revelation or not. Consequently, it is not any longer possible simply to dismiss or ignore the Christian revelation of a free universe for, willy-nilly, we are all its intellectual debtors regardless of our attitude toward it. The notion of an objective freedom, a free historical objectivity which transcends all that the mind can reach without violating, but actually sustaining, the coherence and integrity of the mind's inquiry, has made its way, changing the human community politically, culturally and economically, and we have recently been witnesses to the irreversibility of that change. It is irreversible only because it is objective; even when that free objectivity is refused for some ersatz confection of autonomous thought, the objective reality remains as it was created, and as it has been revealed to be: free and to be freely and responsibly appropriated.

But in the scientific world, the world of learning, the change of the meaning of the one and the many, together with the affirmation of the freedom of their relation, is commonly resisted; for many in the scholarly world, freedom still savors of mere unqualified power, any multiplicity in which is simply irrational; the problem posed by such multiplicity as may surface in the academy is there ever and again resolved by theories which submit historical multiplicity and spontaneity to an ideal, a priori, nonhistorical and unfree monadic unity, whether of the physical world, the polity, the economy, or culture. From Plato to Marx to J. S. Mill, John Dewey, and the contemporary liberation theologians, this submission of history to eschaton then becomes the subject matter of a manipulative and universal education, intent upon inculcating the necessity of flight from all the horrors of a world which, were it free, must escape the salvific calculus of those who know.

Most of us have become familiar with this elitist atmosphere, paradoxically considered to be the very air of academic freedom, without much consideration of an alternative. Having been taught from our youth the conventional wisdom of the academy, of the knowledge elite, we have taken for granted the reality of at best a tension, of at worst a dichotomy amounting to contradiction, between faith in the revelation of a benevolent Creator and belief in "science," between the postulated vagaries of freedom and the postulated methodological determinacy of truth. The result of this commonplace conviction has been the effective quarantining of the scientific world, whose intellectual life is simply remote from that spirit which has shaped the free societies of the West, whose freedom is so attractive to those people whose range of responsibility has heretofore been constrained to the vanishing point by the utopian visions of the elitist establishment, the privileged nomenclatura, that was the Communist Party.

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*Having been taught from our youth the conventional wisdom of the academy, of the knowledge elite, we have taken for granted the reality of at best a tension, of at worst a dichotomy amounting to contradiction, between faith in the revelation of a benevolent Creator and belief in "science," between the postulated vagaries of freedom and the postulated methodological determinacy of truth.*

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This removal of science and its practitioners from the historical concreteness of the free world has of late been becoming methodologically explicit. Less and less do the modern physical cosmologists deal with the universe of man; more and more they assume the role of the pagan divinity, who as wise is absolutely so, alien from and adverse to the historical world.<sup>11</sup> Yet once again, to assume this posture is to despair of learning from the world; it bespeaks the death of experimental science, and merits no further attention here.

It must be accepted that the experimental sciences are engaged with an inquiry into a truth which is objectively free; this means that science lives by a free commitment to the free order, the free resolution, of the One and the many in history, in the free physical world. This order is covenantal, the order of the historical good creation proclaimed by the Judaeo-Christian revelation, in which the authority of the One is supportive, not suppressive, of the responsibility and freedom of the many. The covenant is, concretely, the event of the revelation of the free presence of the one God as Trinitarian, for only as Trinitarian, as the Father sending the Son to give the Spirit, is the covenant actual, and God freely present, irrevocably, in the human world, in human history.

The necessity of an intra-divine resolution of the problem of the one and the many if there is to be a resolution at



all is manifest: autonomous reason can provide no relation between the absolute unity of being or of God and the mutability and multiplicity of the historical world. Any resolution of the problem, which is to say, any valid historical knowledge, any free analogous predication of being, any affirmation of concrete truth, must then be gift, a matter of freedom and so of revelation; only this can permit that analogy between unity and multiplicity which permits one to speak at all. Otherwise, all understanding is falsified by the standing contradiction between the absolute unity of the One, the Good, the True, and the fragmentation and diversity of being, truth and goodness in history. This isolation of the absolute and the historical is the sum of pagan melancholy. If it be conceded that a resolution of this dichotomy must be a matter of revelation, it cannot be so as mere information, which could only be intrinsically contradictory; rather, the One-many relation must be historical, an event, not merely a word.

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***It must be accepted that the experimental sciences are engaged with an inquiry into a truth which is objectively free; this means that science lives by a free commitment to the free order, the free resolution, of the One and the many in history, in the free physical world.***

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The Franciscan mediators of the Augustinian theological tradition have long since recognized the grounding of creation (the concrete One-many relation) in Christ's revelation of the Triune God: only if within God unity and relativity are reconciled can a good creation be intelligible. Briefly, the divine Unity, as Trinity (the Father sending the Son to give the Spirit) is freely, which is to say covenantally, related to the good creation; God is then revealed to be absolute not in the rationalized and monadic sense ordinarily associated with that term by Neoplatonizing theologians.<sup>12</sup> The revelation that the Unity of God is Trinitarian then permits a re-understanding of unity across the board: e.g., the human substantial unity is then also tri-relational: it is the marital imaging of the Trinity. This unity is at once free and holy, for it is actual only as worship.

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***The pagans mourned that time devours its children; we rejoice that the Lord of history redeems them.***

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It is then not too much to suppose that the unity, truth and goodness of the entire creation is of this order: continually new, continually revelatory of God, in short, sacramental,<sup>13</sup> and that this unity is present in the world in freedom, not by the sort of imposition of God on the historical world exemplified, for example, by the mythical accounts of the amours of Zeus, but by their Christian conversion, the historical narrative of the covenantal *fiat* of

the *Theotokos*.

But that the revelation of the Trinity suffices for the needs of scientific inquiry is not immediately obvious; insofar as such inquiry depends upon a free creation, it would appear that the freedom which is grounded in religious commitment is merely subjective, a matter private to the believer and even if capable of a public appropriation, yet incapable of grounding the *free objectivity* of the world of our daily encounter. Is one really to suppose, on the basis of the presumed truth of the Christian revelation, that the sticks and stones and quarks of the physical universe are immanently free? Does not this do violence to the language itself?

We have come of late to recognize, albeit obscurely, that some such dignity as an immanent and utterly unique and irreplaceable truth, goodness and beauty does attach to each of the elements of our world. The ecological movement is not without its aberrations, but its instincts are sound, for they presuppose that the world is good, and that all the living things which inhabit it (fetuses apart, some would say) have a unique worth which we are bound to respect; it supposes that the material resources of the world, animate and inanimate, are not mere objects, but that in some way they evoke our respect. We should not waste the mines nor lay waste the forests and the fields nor poison the air and the earth, nor drain sewage into the rivers and lakes, and there is more in this conviction than mere aesthetics, for these are not merely private matters *de gustibus*, but rather are testimony to a public morality, a public responsibility for a common world, whose objectivity cannot be that of an object merely, for it evokes our responsibility.<sup>14</sup>

But must one not suppose, with all of liberal theology, that whatever is given in history grows old, and becomes finally inaccessible? Is it not axiomatic that time is the devourer of all things, and have we not long since grown accustomed to the supposition that a devoutly historicist historical criticism has the last word in exegesis, in church historical studies, and in theology generally? The standard illustration of such truism is the liberal isolation of "the Jesus of history" from the "Christ of faith:" the historical-critical method of modern theology has rendered the former unavailable, the latter ineffable. How then to speak of the historical mediation of the Judaeo-Christian revelation of the Lord of the Covenant? This problem once was proper to Protestantism; it is now accepted as their own by the bulk of Catholic theologians, who are by that acceptance involved in what is for the Catholic tradition a false problem, one that does not, nor can, arise within the Catholic faith in the Lord of history, for within Catholicism that Lordship is exercised sacramentally, finally Eucharistically.



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*This celebratory Christian knowledge, this historical faith, this optimism, is more than piety, more than personal faith, more than an idiosyncratic dogma arbitrarily imposed, for it asserts that the objective truth of the world and of humanity is free, because it is given us in Christ.*

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Most theologians of whatever confessional allegiance are familiar with the St. Thomas' theological account of the Eucharistic presence of the risen Christ. He describes it as a presence *per modum substantiae*, which is to say that this presence is achieved not by the accidental empirical manifestations of temporal and spatial location (e. g., moving the consecrated species does not move the risen Christ) but that nonetheless it is really achieved, because achieved not accidentally but substantially, by the signing of the accidents of the consecrated bread and wine, which cause to be present, non-empirically, non-accidentally, the risen and sacrificed Lord. Without entering into the matter of the adequacy of the Thomas metaphysics for the task to which they were put, it is sufficient here to observe that St. Thomas' theology of the Eucharist is loyal to and is governed by the liturgical and doctrinal tradition, which he attempts to account for in terms of his metaphysics of substance and accident.

He is then a witness to the Catholic liturgical tradition, and an uncommonly clear one. The affirmation that Jesus is the Lord, and the "This is my Body, this is my Blood" of the Eucharist are strictly linked in that tradition, for Christ is present to history as the Lord of history, which is to say, it is by the Eucharistic sacrifice that he is in our fallen history as the Lord, the Redeemer, transcending and giving it that significance by which history is known to be salvific, and no longer to be understood as the sorrowful wheel of Mediterranean and Indian paganism. As Lord of history, the Son sent by the Father to give the Spirit, he makes all things new; immune to the erosion and negations of fallen history, he relates, orders, its past and its present to the event of its consummation in the Kingdom of God, a consummation which is the center of history, its ordering and salvific cause, the One Sacrifice by which we are redeemed by the free appropriation, in worship, of that history as our own. The pagans mourned that time devours its children; we rejoice that the Lord of history redeems them.

This celebratory Christian knowledge, this historical faith, this optimism, is more than piety, more than personal faith, more than an idiosyncratic dogma arbitrarily imposed, for it asserts that the objective truth of the world and of humanity is free, because it is given us in Christ. The Catholic faith in Christ is then the free, public response to and the appropriation, at once personal and communal, of the free revelation of the factual, the

objective order of reality, to which we have access only by a freedom which is equivalent to worship; the covenantal worship of the Lord of the covenant, the Lord of the history which the covenant in his Blood redeems and orders to our salvation. Only by the praxis of that free commitment do we have access to objectivity. To affirm this is to turn the conventional wisdom on its head, and yet that affirmation alone can underwrite the historical optimism of experimental science.

1. The understanding sought by the kind of scientific inquiry implicit in, e.g., modern physics does not bear upon the phenomenal order; it seeks an explanation of the phenomena which transcends them while saving them.
2. This understanding cannot be given a coherent ideal expression: Goedel's proof of the impossibility of a non-trivial immanently coherent mathematical construct or theory shattered that ambition sixty years ago.
3. The sole alternative to the impossible ideal mathematization of the empirical world is the subordination of the mathematical summation of data to continual historical verification, as a question remains a question by its subordination to an answer, in such wise that the one is never confused with the other. This confusion is inevitable unless neither the question and the answer are ideal: both must be historical, free rather than mere necessary implications of an autonomous rationality.

We have seen that the experimental sciences which are the glory of our secular civilization require such an order, such a concrete free intelligibility in history. The question before us is whether there is any other basis upon which its reality may be grounded than that which Catholic sacramental realism provides.

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*Torrance's insight into the problem of the free historicity of the epistemology of the physical sciences and of theology is exact as well as brilliantly set out and illustrated, but without the Eucharistic immanence of the New Covenant no solution to the dilemma set by historical inquiry, whether scientific or theological, is possible.*

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The credibility of an affirmation that there is some other basis requires that it be set out. I think that this has never been done. Perhaps the most perceptive non-Catholic writer on this subject is Thomas F. Torrance of the University of Edinburgh, whose most recent entry into the topic, *The Christian Frame of Mind*,<sup>15</sup> is, if I may quote my recent book, an admirable and insightful attempt to find an integrating principle of order which would so unify the inquiries of the physical sciences and of theology as to make them both expressions of a *fides quaerens intellectum*. Having explicitly rejected Eucharistic realism (at p. 31)



Torrance recognizes that there must be found within the order that is created in Christ a free event which grounds this free order of intelligibility (at p. 79) — but having banished sacramental (nonempirical) realism from his consideration, he can provide no ground which does not, *qua* empirical and therefore time-bound, ineluctably vanish into the past, posing then the dilemma he would resolve: either the principle is ideal, which cannot serve his purpose, or it is historical, and because he has not seen that history is a theological category, the event as historical must be turned over, not to free appropriation by faith, but to the historical academy in the manner of Lonergan's surrender of the historical tradition of the Church to "philology," or the event is one of a purely private subjectivity, and again cannot serve his purpose, for the faith's *quaerens intellectum* is public, because ecclesial. Torrance's insight into the problem of the free historicity of the epistemology of the physical sciences and of theology is exact as well as brilliantly set out and illustrated, but without the Eucharistic immanence of the New Covenant no solution to the dilemma set by historical inquiry, whether scientific or theological, is possible.<sup>16</sup>

With this comment we may come to an end. The propositions before you are simple enough, and sufficiently developed for their discussion:

(1) The experimental method of the sciences requires a free historical objectivity.

(2) There is no free, intelligible, objective order in history other than that which is covenantal and Eucharistic.

The consequence of these propositions is also simple:

(3) The objectivity of the experimental criteriology inherent in the scientific method, insofar as experimental and therefore historical, is sacramental and radically is Eucharistic.

(4) In sum, the world of experimental science is open to our inquiry only because it is objectively holy.

#### ENDNOTES

1. For a current instance, see the exchange between the author, Eric Lerner, and a reviewer of a recent work, *The Big Bang Never Happened: A Startling Refutation of the Dominant Theory of the Origin of the Universe* (New York: Random House, 1990), in the New York Times Book Review, Sept. 1, 1991, p. 4.

2. James Gleick, *Chaos: Making a New Science* (New York: Penguin Books, 1987).

3. The term "Judaeo-Christian" is employed, rather than simply "Christian" or "Catholic," not to enlist Jews and Protestants into the Roman Catholic liturgical/doctrinal tradition, but to stress that the dividing line, conversion to a free truth, a free objectivity, is the revelation of the One God of the Covenant.

4. *Système du monde: Histoire des doctrines cosmologiques* (Paris: A. Hermann, 1913-1959) I: *La cosmologie hellénique* (1913). II: *La cosmologie hellénique (suite). L'astronomie latine au Moyen Age* (1914). III: *L'astronomie latine au Moyen Age (suite; 1915)*. IV: *L'astronomie latine au Moyen Age (suite). La crue de l'aristotélisme* (1916). V: *La crue de l'aristotélisme (suite; 1917)*. VI: *Le reflux de l'aristotélisme; les condamnations de 1277* (1954). VII-IX: *La physique parisienne au XIVe siècle (1957-1958)*. X: *La cosmologie du XVe siècle; écoles et universités au XVe siècle* (1959).

5. It had been supposed by the Aristotelianism of the day that a body in motion was sustained in it by the action (*antiperistasis*) of the surrounding medium, in the sense that a projectile such as an arrow would be at once drawn and pushed forward by the air through which it passed. By "impetus" Buridan understood a force imparted by the mover to the moved, proportional to the speed and mass of the object moved. The concept of impetus invited the measurement of the force by experimental means.

6. Cyril Vollert, S.J., Lottie Kendzierski, and Paul Byrne, eds., *St. Thomas, Siger of Brabant and St. Bonaventure On the Eternity of the World (De aeternitate mundi)*; trans. with an introduction (Milwaukee: Marquette University Press, 1964).

7. Aristotelianism is commonly said to have been "received" in the Latin West during the thirteenth century. This is certainly true with respect to the bulk of Aristotle's writing, but the impact of Aristotle's logical works had been felt in the West much earlier, first by way of the Neoplatonic "old logic" of Boethius and Porphyry, then as "dialectic" or "new logic" during the Carolingian and early medieval Eucharistic controversies, and finally through the Neoplatonizing interpretations of Aristotelian metaphysics by Moslem and Jewish scholars whose translations into Latin in the thirteenth century restored the profound link, long forgotten, between the familiar Aristotelian logic and the unfamiliar Aristotelian metaphysical analysis of the immanent intelligibility of substance in terms of its *necessary* intrinsic causes; on this see David Knowles, O.S.B., *The Evolution of Medieval Thought* (New York: Random House, A Vintage Book, 1962). The threat of this rationalization of metaphysics, through its reduction to intrinsically necessary causes, to the historical realism of the Christian faith was recognized by St. Thomas in his controversies with the Averroists such as Siger of Brabant; it also fueled the resistance of such Franciscan theologians as John Peckham to the Aristotelian analysis exemplified above all others by St. Thomas. St. Thomas' own conversion of the metaphysical analysis to the doctrine of creation may be seen to have been flawed by the same determinist presuppositions he criticized in the Averroists: while the contingency of creation entered into his metaphysical analysis of created substance at the level of existence-essence, it did not enter into the equally substantial form-matter and accident-substance analyses. This mistake permitted him to deny contingency (beginning) in the matter of temporal duration as controlled by his still-determinist form-matter and accident-substance analyses.

8. For instance, the Thomist moral theology rests upon an abstract definition of human nature as rational animality, ignoring the masculine-feminine polarity, and intends to ground the historical morality of the Ten Commandments on that definition. A considerable amount of ink is currently spilled over the resulting problem of monism vs. dualism in anthropology: e.g., the Catholic Biblical Association Report of its Task Force on the Ordination of Women, "Women and The Priestly Ministry: The New Testament Evidence," *Catholic Biblical Quarterly* 41 (1979) 608-613, 616, reprinted as "C.P.A. Task Force Report: Women in the



Church," *Origins* 9 (1979) 450-454, and the Catholic Theological Society of America Task Force Report on the Ordination of Women, C.G.S..*Proceedings* 33 (1978) 271-272; reprinted as "The Ordination of Women," *Origins* 8 (1978) 86-88.

9. Sheldon Lee Glashow provides a particularly clear expression of this odd ambition in "Toward a Unified Theory of Physics," *Michigan Quarterly Review* 23 (Spring, 1984).

10. Ernest Nagel and James R. Newman, *Gödel's Proof* (New York: New York University Press, 1958).

11. In many of his more recent books and articles, Stanley Jaki has pointed to this scientific hubris, which presumes an ability to construct a universe, or an infinity of universes, on grounds which evoke a passage from FitzGerald's *Rubâyât*:

*And fear not lest Existence closing your  
Account and mine should know the like no more;  
The eternal Sâki from that Bowl has poured  
Millions of Bubbles like us, and will pour.*

The *Rubâyât* of Omar Khâyyam. Translated into English by Edward FitzGerald. A complete reprint of the First Edition and the combined Third, Fourth and Fifth Editions, with an Appendix

containing FitzGerald's Prefaces and Notes. Edited with an Introduction by Louis Untermeyer (New York: Random House, 1947) at 79.

12. H. U. von Balthasar, *Clerical Styles*, 329, citing Bonaventure's observation (*Hexaameron* 1, 12-13 (V 331ab): "Christologus verus metaphysicus."

13. A sacrament is a work of the risen Christ, in which the salvation effected by his One Sacrifice is mediated to those for whom he died by a sign whose efficacy does not depend upon men but upon him. The central sacrament is the Eucharist; the others (e.g., baptism) are directed to it as aspects of the Eucharistic worship of the risen Lord.

14. This theme is especially the subject of Hans Urs von Balthasar's work, *The God Question and Modern Man*; trans. Hilda Graef; foreword by John Macquarrie (New York: Seabury Press, 1967).

15. Thomas F. Torrance, *The Christian Frame of Mind: Reason, Order and Openness in Theology and Natural Science* (Colorado Springs: Helmers and Howard, 1989).

16. *Covenantal Theology II* (Lanham, MD: University Press of America, 1991), at 142.

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## REFLECTIONS ON THE MISSIONS OF A CATHOLIC SCIENTIST

Professor Lucien Morren  
Honorary President  
Secretariat for Scientific Questions of Pax Romana

[*Lucien Morren has been a member of ITEST almost since the beginning of the group. He has written extensively and some of his papers have been printed in the ITEST Bulletin. His address is Avenue du Grand Cortil 15A, Louvain-la-Neuve, B-1348 Belgium. This is reprinted from papers presented to SIQS, St. Albans, England, 1998.*]

A Catholic scientist has firstly, like any Christian, to be as faithful as possible a disciple of Christ according to the teaching of the Church. But, being a scientist, he has specific missions to fulfil and it is, of course, these missions which are considered here.

The present cultural environment confers on the role of the Catholic scientist a particular importance. As we all know, our civilisation is shaped by science and by scientifically-led technology. But these also have a far-reaching influence, even in the religious sphere. Although a few first rank academicians may find in the marvels disclosed by science a stepping stone to spiritual considerations, there are hundreds of scientists as well as many of our contemporaries who remain under the influence of current prejudices, namely that science and religion are in opposition, even incompatible. Such an attitude is called scientism.

A century ago, scientism was more ambitious, claiming that science would secure happiness for mankind. Since such ambitions have vanished, one sometimes hears that scientism is dead. But our experience is that there still remains a very strong residue of scientism, and this, of

course, has an impact on the missions we consider.

The first residue of scientism is the restriction of the exercise of reason to one type of scientific rationality. This is a crucial point for it is at the root of two major but quite different deficiencies regarding the relations between science and faith:

- faith is then deprived of any sound foundation;
- scientific rationality should then govern Christian doctrine.

Let us consider these two deficiencies in turn.

### 1. *Faith and its Foundation*

Classically, faith should rest on three pillars, grace, free will and reason; these are a divine gift and two human capacities. But since freedom and reason are both implied, scientific rationality is here to be discarded for it claims to be not only autonomous but constraining. For instance, there is no question of freedom in the demonstration of a theorem of geometry! One is then led to restate the



functioning of reason in matters of faith and this requires us to re-establish the distinction between the rational and the reasonable, an old distinction but one that modern Western culture tends constantly to wipe out. Spontaneously, a Westerner thinks that science provides the only rational way to knowledge, which means a privilege granted to scientific rationality.

Rehabilitating the reasonable (or practical reason) is thus a theological necessity. In contrast to the rational, it leaves room for freedom. For instance, relying on a well-known friend is perfectly reasonable but no one can compel you in this respect.

Now, in religious matters, the adhesion to faith passes through what may be called the "knowledge by signs" and a religious sign may be defined briefly as a fact or event bearing a spiritual significance. Divine grace illuminates a well-disposed free mind on the meaning of these facts or events, providing a reasonable foundation to faith. But never in a constraining way: a sign is proposed, never imposed. And the knowledge by signs is so important because God intervenes in history through a series of significant actions or events culminating in the life, death and Resurrection of Jesus Christ.

## 2. *Scientific rationality and Christian doctrine*

If scientific rationality is admitted as the sole valid way to acquire knowledge, then it should also determine what is credible or not credible in Christian doctrine. There are certain minds, and among them a few Catholic scientists, who adopt such a position. Are they conscious that they invert the Galileo affair? For in this affair, it was the theologians who wanted to govern science. And, at present, for the upholders of the position I just mentioned, it is the scientists who should govern theology! In other words, one determines what God may or not do and this proves simply the loss of the very sense of transcendence.

A Christian cannot award a monopoly to the sole "logic" governing a closed rationality, he cannot have a one-track mind. He must open his mind to the "logic" governing the Gospel which derives from Love. On many occasions in the Gospel, Christ heals on the Sabbath day showing that, for Him, Love has primacy over the law. In his time, the great law was of course the Judaic one. But the lesson is for all time and today should it not apply, occasionally, to scientific laws as well?

Arriving at this stage, I beg you to understand me correctly. What I just said is not at all a depreciation of science. I am myself a scientist and I admire the fabulous scientific progress in our century. Moreover, being also a Christian, more precisely a Catholic, I recognise the necessity of adapting the presentation of the Christian message to the

culture of our times. But this adaptation must respect our basic credo, otherwise it is not an adaptation but a deformation. And my experience shows, unfortunately, that several proposals of cultural adaptations do in fact sacrifice the very core of Christianity. My experience shows also that the authors of such so-called adaptations manifest, but not always, a frightful lack of balance between their very high cultural level in profane matters and their level in religious matters which sometimes remain even childish. And this observations leads us to the missions of a Catholic scientist.

## 3. *Four missions of a Catholic scientist*

The first mission, which should be extended to all adult Christians, has precisely an educative character. It consists in keeping a sufficient balance between the cultural level in profane and in religious matters. In our cultural environment, this is necessary for securing an harmonious living together of science and faith within our single mind.

The Catholic scientist will then be prepared to accomplish the second mission which is one of information. He should spread around him what he has acquired, either by personal contacts, in particular among his colleagues, or maybe by lecturing or writing.

A third mission should be to put his competence at the service of the Church and of society. How many problems raised by recent scientific developments are of such a complexity that they require an interdisciplinary approach? Quite often, such problems have an ethical character but are new and require fresh studies. The Church is directly involved in many of them. I do not say any more about these matters since our President has largely dealt with them.

Finally, is a Catholic scientist not in a position enabling him to exercise a fourth ecclesiastical mission which is [one] of praise? Modern science has revealed potentialities of nature which were previously unknown but which are now a source of wonder. Today, those who have kept the sense of admiration may fulfil the Cantic of the Creatures sung by Francis of Assisi who celebrated the beauty and the goodness of "Brother Sun" but could not add to his joy:

Be praised O Lord for thermonuclear fusion which permits us to live and to know you. (And we may add):

Be praised O Lord for the semi-conductors whose properties permit the marvels of the computers and communication by satellites.

Be praised O Lord for the affinities which permit chemical and other gatherings which are the far images of Love!



## INTRODUCTION to a Meeting of the Secretariat for Scientific Questions

Dr. Peter Hodgson  
 President of the Science Secretariat  
 Corpus Christi College, Oxford

*[Dr. Peter Hodgson, an ITEST member for the past several years, is President of the Science Secretariat of Pax Romana. He can be reached at Dr. P.E. Hodgson, Corpus Christi College, Oxford, OX1 4JF, United Kingdom.]*

The SIQS was responsible for arranging a meeting held in St Albans, England on 24 September 1998 as part of the Pax Romana Conference that continued during the following three days. The theme of the Day was "The Place of the Scientist in the Life of the Church." In order to stimulate thought and discussion the following reflections were circulated to members before the meeting.

Science and its associated technologies influence our lives in many ways from the material to the ideological, and this raises many pressing moral problems that are the concern of the Church. Scientists have long recognised that we have a responsibility to ensure that sound information is available. In the last century J.C. Maxwell wrote that "... we are daily receiving fresh proofs that the popularisation of scientific doctrines is producing as great an alteration in the mental state of society as the material applications of science are affecting the outward life. Such indeed is the respect paid to science, that the most absurd opinions may become current, provided they are expressed in language, the sound of which recalls some well-known scientific phrase. If society is thus prepared to receive all kinds of scientific doctrines, it is our part to provide for the diffusion and cultivation, not only of true scientific principles, but of a spirit of sound criticism, founded on an examination of the evidences on which statements apparently scientific depend."

People look to the Church for guidance on moral problems, and this can be given in different ways. Theologians can articulate general principles, but to be useful these must be applied to particular problems and this requires a detailed knowledge of the factual situation. It is often a matter of complexity and difficulty to do this, and it can only be done with the specialised knowledge of the scientists. Continuing co-operation between theologians and scientists is necessary to build up a reliable body of knowledge on contemporary problems.

It is for the bishops and the episcopal conferences to decide whether to make a statement on a particular problem. It is sometimes maintained that bishops should confine themselves to enunciating general principles, leaving their application to others. Alternatively, they can themselves say how the principles should be applied, and this requires a detailed knowledge of the actual situation which they may not be able to supply by themselves.

There are many reasons why a statement might be desirable. Thus, for example, Government decisions are often made on grounds of short-term selfish expediency for short-term economic gain and with an eye on the next election, with scant regard for moral principles. It is the mission of the Church to insist that human rights be respected, that Government policies should take into account the effects on other countries and on future generations. Thus episcopal statements have been devoted to nuclear warfare, the care of the environment, pollution of the earth, nuclear power stations, aid for poorer countries and similar issues. It may be desirable to sensitise people to the possible implications of current practices, or to warn against unsuspected dangers. All such statements require careful preparation both on the theological and scientific levels, and this can only be done by a commission of carefully-chosen experts.

These problems are made more difficult by political pressures. Thus a popular contemporary concern is the environment, and numerous organisations have been established to promote the care of the earth. Often they are driven more by emotion than by reason, and have hidden political agenda. It is then very likely that well-meaning people give their support to policies that are eventually harmful. So far, Church statements on the environment have confined themselves to broad generalities, and so they have little effect.

Sometimes a problem arises suddenly, and an immediate response is expected. This can only be provided if the problem has already been studied in depth for some years; it is just not possible to produce a satisfactory response on the spur of the moment. Any statement must be completely sound both theologically and scientifically; if it is not then it simply invites derision.

It is particularly important to be clear about what the scientist can and cannot do. First of all, what do we mean by a scientist? Certainly we mean someone who has devoted several years of study to the science leading to a bachelor or masters degree, followed by some years of research. Anyone venturing to speak as a scientist should be willing to show that he is qualified to do so. It is too often the case that the knowledge required is underestimated. In this connection Duhem remarked at a Conference that "If we want to handle with competence and fruitfully the



questions which are of the domain common to metaphysics and to positive science, let us begin by studying the latter for ten, for fifteen years; let us study it, first of all in itself and for itself, without seeking to put it in harmony with such and such philosophical assertion." Later on, he described his experiences in a letter: "My opinion was asked concerning the scientific part of the problem. Then, I told squarely all those good Catholic philosophers that if they obstinately continued talking of science without knowing of it a single word, the freethinkers would hold them up for ridicule; that in order to speak of questions where science and philosophy touch one another, one must have done ten or fifteen years study of the pure science, and that, if they had not become men with deep scientific knowledge, they must remain silent."

Such knowledge and experience, though necessary, is not sufficient. Most scientists have a detailed knowledge of quite a small area of science, often remote from practical concerns. Their specialised studies should however have taught them what science is, how scientific conclusions are established, what are the difficulties and pitfalls, what questions can sensibly be asked and what sort of answers can reasonably be expected. If a scientist is asked a question beyond his competence it is tempting to respond, especially if one has quite other reasons for preferring a particular answer. Scientists are frequently asked for their opinions on a variety of topics, and it requires a strong will to say that one does not know. Public statements signed by a large number of scientists are often suspect because it is unlikely that they will all have the requisite specialised knowledge to be able to form a useful conclusion.

It is relatively easy to make a general statement such as 'we must care for the earth' that is so general as to be practically useless. The more specific a statement the more useful it is, and also the more prone to error. It is particularly useful to make a statement that draws attention to a public need that is ignored by politicians of all parties because it is likely to be politically unpopular. The Church can take the long view, unaffected by short-term political considerations.

One of the difficulties of many of the most important problems is that we do not know enough to reach a definite conclusion, and so we have to make decisions on the basis of inadequate knowledge. It is easy to say that we must make more studies until we are certain, but this is dangerous because by then it may be too late. The best action in such cases is a matter of informed judgement.

Few of those who write on these questions have adequate knowledge, and it is notable that the strength of the assertion is inversely proportional to the depth of knowledge. Many of these questions are highly controversial,

and vociferous pressure groups propagate their views. Sometimes there are obvious commercial interests behind their activities, and they sometimes employ people with some scientific knowledge to give their propaganda a spurious authenticity. It then often requires considerable specialised knowledge to see the deficiencies in their arguments. Such people never listen to contrary arguments; they are not interested in finding the truth. As a result, there is no progress in the discussions; the same statements are made again and again, even when they have been refuted a thousand times.

A theologian who decides to analyse a particular problem needs to be aware of these pitfalls before he begins his work, for otherwise he will accept assertion as fact and thus produce worthless judgements. Likewise a scientist who decides to speak on a particular problem needs to study it in detail for many years.

To illustrate these general statements it is useful to consider a few particular cases, beginning with global warming. It is established that the atmospheric concentration of carbon dioxide in the atmosphere and other so-called 'greenhouse gases' is steadily increasing, and it is suggested that this will lead to a gradual rise in the earth's temperature of about 1 to 3 degrees per century, which in turn will lead to the melting of the Antarctic ice cap, a rise in sea level of about 50 cm. and the inundation of low-lying countries. If this is true, the consequences are so serious that there is a major moral obligation to tackle it as energetically as possible.

The effects of the increase in the level of greenhouse gases is however still controversial. There are highly plausible arguments both for and against global warming, and a full analysis requires a wide range of specialised skills. At present the weight of informed scientific opinion is that global warming is probable enough to be taken very seriously. The next question is what to do about it. This requires a quantitative study of the sources of the greenhouse gases emissions so as to see which are the largest, and whether they can be reduced, eliminated or replaced. For example, an important emitter of carbon dioxide is coal power stations, so we can ask if they can be replaced by other types of power stations that do not emit carbon dioxide, and are not unacceptable on other grounds. This is evidently a rather technical discussion that nevertheless has important repercussions on human society.

In addition to such practical concerns, modern scientific discoveries have profoundly changed our view of the world. The cosmologies of the Hebrews and the Greeks are gone for ever, and with them much of our theological imagery. No longer can we believe that hell is in the centre of the earth, or heaven up in the sky. Our earth is a satellite of a rather ordinary star on the edge of a galaxy



of billions of stars, and our galaxy is itself one of billions. that have evolved from a primordial explosion about fifteen billion years ago. This is the universe revealed by modern science, and theologians need to be aware of it and take it into account in their writings, as Aquinas used the philosophical terms of Aristotle in expressing his theology.

Modern scientific discoveries are sometimes believed to have philosophical implications, and this also affects the way we think about the world. Often it turns out that these are no more than presuppositions that have been used to interpret scientific results, and that these are not the only ones that are possible. Thus, for example, it is widely believed that quantum phenomena show that the world is indeterminate, acausal and non-local, but further examination shows that this is attributable to philosophical presuppositions. A realist interpretation is also possible and in this context the quantum implications disappear.

Secularist attacks on the Church frequently use stories purporting to show the antipathy of the Church to science. Thus Galileo is presented as a martyr of science, forced by the Inquisition to recant his heretical scientific discoveries, Bruno was burnt at the stake and Huxley routed Wilberforce in the debate on evolution. The full analysis of these events puts them in an entirely different light, and this is primarily the task of the historian. Scientists have important contributions to make, and certainly need to be aware of the conclusions.

These are some of the areas where the scientist can contribute to the life of the Church, and they are the concern of the Church as a whole. They thus have a place in the teaching in schools, universities and seminaries, and in books, journals and newspapers.

Many of the subjects taught in schools are affected by science and its applications. Science teachers need to be aware of the Christian roots of modern science and the outstanding contributions that Christians have made to its birth and development. Thus for example in physics and astronomy one can mention Copernicus, Kepler, Galileo, Newton, Faraday, Fresnel, Fraunhofer, Herschel, Volta, Ampere, Ohm, Oersted; in chemistry Lavoisier and Dumas; in biology Pasteur and Mendel and in mathematics Bessel, Cauchy, Gauss and Hermite. The religious instruction classes encounter scientific questions when considering the interpretation of the Bible, and the place of the Church in the contemporary world.

University studies are more specialised, but Catholic universities could provide courses on many of the subjects mentioned. In secular universities it is the task of the Catholic chaplaincies to ensure that the Catholic students are adequately instructed in matters related to science.

The same applies to technical colleges and other higher education institutions.

It is vitally important that future priests are well-instructed in matters related to science. Many of them already have some basic scientific training and opportunities should be provided for them to maintain and develop their knowledge. It is generally not practicable to provide instruction in science itself, but ways of teaching the relations between theology and science need special attention. In the course of their parish duties, priests will be asked questions about the relation of science to faith, the Galileo affair, evolution, genetic engineering and similar subjects, and they should be prepared to give an answer or at least to know of books to which the enquirer can be referred.

All these activities require suitable written material in the form of books, articles and study guides. These need to be available in schools, and in chaplaincy and seminary libraries. There are many such books in print, but they are rather seldom used. Instead, one often finds the latest glossy paperbacks by writers who make it their lifework to undermine Christianity. With a few exceptions, the Catholic Press is a disaster area, with editors that seem to have no understanding of how to treat scientific matters. Serious scientific studies are conspicuous by their absence and for the most part instead of providing objective analyses they simply repeat the secular analyses of the mass media. If a serious article is published, it is almost always followed the next week by intemperate attacks by people who lack the most elementary knowledge of the subject, and the author is often denied the right to reply. It is impossible to make any progress in this way or to provide the information and guidance that is so badly needed.

The many Papal Addresses form a most valuable source of authoritative guidance on matters related to science, though they are often shamefully neglected. Thus one of the most comprehensive analyses of energy problems, including nuclear power, is almost completely unknown, and was ignored by the Catholic Press. These valuable studies should be widely disseminated, if necessary in abridged and simplified form.

These are a few of the questions that are the subject of our SIQS Day in September. We need first of all to examine the situation in detail, and then decide what can be done about it. There are undoubtedly great differences between different countries, and quite possibly the above remarks are quite unrepresentative.

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## NEW MEMBERS

**HOFFMEISTER, MD**, Jeff; 291 Towncrest, Beaver Creek, Ohio, U.S.A., 45434; Physician; Qualia corporation; Biomedical engineering, radiology; (937)-427-2649; FAX (937)-431-1465; E-MAIL khoffmeister@qualia-computing.com.

**HUTCHINSON, FSE**, Sister Agnes; Via San Pietro Campagne 54, Assisi (Perugia), 06081, Italy; Franciscan Sister of the Eucharist/Professor; Perugia University; 011-3907-581-2583.

**MERRIFIELD, SJ**, Fr. Donald; 7900 Loyola Boulevard, Los Angeles, California, 90045-8310, U.S.A.; Chancellor; Loyola Marymount University; Science and faith; (310)-338-4461; FAX (310)-338-4450; E-MAIL dmerrifi@lmumail.lmu.edu.

**TRAYNOR, FSE**, Mother Frances; Via San Pietro Campagne 54, Assisi (Perugia), 06081, Italy; Soil Scientist/Editor; Perugia University; Food research; 011-3907-581-2583.

## CHANGE OF ADDRESS

**BELT**, Mrs. Louise McKeon; 18318 Rieger Road, Wildwood, Missouri, 63005, U.S.A.; Law; Organic farming, pro-life; (314)-405-1870; FAX (314)-405-1875; E-MAIL lmcbelt@aol.com.

**BRUN, PhD**, Rudolf; 3006 Tanglewood Park W., Fort Worth, Texas, 76109, U.S.A.; Professor; Texas Christian University; Christian doctrine of Creation; (817)-924-1230; FAX (817)-924-4869; E-MAIL r.brun@tcu.edu.

**BRUSICH, Mark J.**; 402 Hallady St., Seattle, Washington, 98109-2153, U.S.A.; Computer consultant; Oracle Corporation; Catechetics, theology, liturgy, chemistry; (206)-281-0935; FAX (206)-281-0957; E-MAIL mbrusich@us.oracle.com.

**CONNELL, CSJ**, Sr. Rosemary; 4410 A Laclede, St. Louis, Missouri, 63108, U.S.A.; Director of Peace & Justice Office; Sisters of St. Joseph; Ecology, genetics; (314)-535-6337; E-MAIL srccsj@aol.com.

**DURBIN, JR, PhD**, William A.; 1401 Blair Mill Road - Apt. 1705, Silver Spring, Maryland, 20910, U.S.A.; Church Historian; Washington Theological Union; Reason & faith; Science & theology/religion; (301)-585-5018 (h); (202)-541-5248 (w); E-MAIL durbin@wtu.edu.

**HERWICK, MD**, Robert P.; 49 Meadow Hill, Tiburon, California, 94920, U.S.A.; Physician; University of California Med. Ctr.; (415)-362-2238; FAX (415)-362-7745; E-MAIL rph@ucsf.edu.

**KRACHER, PhD**, Alfred; Iowa State Univ.- Geological Sciences/253 Science I, Ames, Iowa, 50011-3212, U.S.A.; Geochemist; Iowa State University; Extraterrestrial life, mythology; (515)-294-5439; FAX (515)-294-6049; E-MAIL akracher@iastate.edu.

**LAWRENCE, Edwin G.**; 1606 N. 2nd Street, #4, Edwardsville, Illinois, 62025-1000, U.S.A.; Professor; Southern Illinois University - Edwardsville; Philosophy; (618)-656-7153; E-MAIL elawren@siue.edu.

**LAWRENCE, SJ**, Deron; 3737 Westminster Place, St. Louis, Missouri, 63108, U.S.A.; Jesuit Scholastic; Wisconsin province; Ecology, bioethics, theology; (314)-652-8862; E-MAIL deronsj@yahoo.com.

**MURPHY, RSM**, Sr. Mary Ellen; 9471 Annapolis Road, Lanham, Maryland, 20706-3020, U.S.A.; Scientist, geo-chemist; Goddard Space Flight Center; Space science; (301)-286-6674; FAX (301)-286-1681; E-MAIL murphy@lepvax.gsfc.nasa.gov.

**O'HIGGINS, SJ**, Fr. Kevin; Milltown Institute of Theology & Philosophy, Milltown Park, Dublin, 6, Ireland; Professor of Philosophy; Milltown Institute of Theology & Philosophy; E-MAIL kohiggins@s-j.ie.

**PETERS, Dr. Karl E.**; 700 Melrose Avenue - H2, Winter Park, Florida, 32789, U.S.A.; Philosopher of Religion, Professor; Rollins College; God and Evolution, epistemology; (407)-646-2168; FAX (407)-646-2517; E-MAIL kpeters909@aol.com.



**PRZYBYLOWICZ, OSF**, Rose Marie; 335 South Kirkwood Road, St. Louis, Missouri, 63122, U.S.A.; Treasurer General; Franciscan Sisters of OLPH; Sewing, reading, gardening, plants; (314)-965-3700 Ext. 3036; FAX (314)-965-3710; E-MAIL [rosemarieosf@stlnet.com](mailto:rosemarieosf@stlnet.com).

### **E-MAIL CHANGES**

BURCH, SJ, Fr. Thad	E-MAIL <a href="mailto:burch@mu.edu">burch@mu.edu</a>
DUVEEN, Dr. Anneta	E-MAIL <a href="mailto:adkolbe@aol.com">adkolbe@aol.com</a>
EIRICH, Mr. Anthony	PHONE (773)-274-1353
EYMAN, Fr. Brian	E-MAIL <a href="mailto:breyman@MSN.com">breyman@MSN.com</a>
JESURAJA, Professor A.	E-MAIL <a href="mailto:keren@md3.vsnl.net.in">keren@md3.vsnl.net.in</a>
KAMPWERTH, PHJC, Dr. Virginia	E-MAIL <a href="mailto:belvmaterd@connectinc.com">belvmaterd@connectinc.com</a>
KRIEGSHAUSER, Mr. Herman	E-MAIL <a href="mailto:herman@brick.net">herman@brick.net</a>
LUGO, Sr. (Dr.) Elena	PHONE (787)-265-5400
MARTINO, Dr. Rocco	E-MAIL <a href="mailto:rmartino@cyberfone.com">rmartino@cyberfone.com</a>
MEIJKNECHT, Dr. Ton	E-MAIL <a href="mailto:t.meijknecht@oli.tudelft.nl">t.meijknecht@oli.tudelft.nl</a>
NUGENT, Dr. James	E-MAIL <a href="mailto:jsnugent@netscape.net">jsnugent@netscape.net</a>
POUCH, Dr. Greg	PHONE (309)-726-2137
SAVINO, FSE, Sr. Damien Marie	E-MAIL <a href="mailto:savinosm@corphq.utc.com">savinosm@corphq.utc.com</a>
SLY, Dr. William	E-MAIL <a href="mailto:slywshouse@worldnet.att.net">slywshouse@worldnet.att.net</a>
SMOLARSKI, SJ, Fr. Dennis	PHONE (408)-554-4174
UDIAS, SJ, Fr. Augustin	E-MAIL <a href="mailto:figeo12@sis.ucm.ed">figeo12@sis.ucm.ed</a>
VANEY, SM, Fr. Neil	E-MAIL <a href="mailto:vaney@msm.co.nz">vaney@msm.co.nz</a>

### **IN MEMORIAM**

Fr. Julian Rubio, S.J.  
Mr. Roman Saliwanchik

We also ask your prayers for ITEST members who are ill. May they feel the restoring hand of the Lord.

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**221 North Grand Blvd.**  
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