Science and the Church: A Plea for Dialogue

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In his newest encyclical Fides et ratio John Paul II invites scientists to join philosophers and theologians in their search for perennial truth which transcends epistemological specificity of the one field of research and provides answers to the basic questions of human existence.1 In this process of enriching cooperation, on the one hand, science can help theologians to free their discourse from common sense schemes and facile anthropomorphisms. On the other hand, theology and classically understood philosophy could help scientists to free their research programmes from the illusion of false absolutes and to open their vistas to moral and aesthetic values, so important for human beings. I would like to express my profound satisfaction that this papal plea finds an immediate answer in this collection of papers presenting the place of the scientist in the life of the Church. I am deeply grateful to all contributors who answered Prof. Hodgson's invitation and shared their experience, so important for the mutual dialogue between the Academy and the Church. The necessity for this dialogue is even more evident in the context of deep intellectual changes in the contemporary culture. At the beginning of our century physics was regarded as an ideal of scholarly discipline and its discoveries were supposed to answer all questions interesting for [the] human species. In the early 1930's, when Otto Neurath, a representative of the Vienna Circle, wanted to transform psychoanalysis into [a] scientific discipline he looked for its analogies with theoretical physics and tried to introduce mathematical formalism into psychoanalytic stories.2 Sixty years later we could notice the opposite trend: in the critique of science inspired by postmodernism even physics is regarded as a collection of stories, fables and ballads.3 In this new intellectual climate there is a special need for intellectual solidarity which could resist the simplifications proposed in the similar anti-intellectual framework. Between illusions of the bygone scientism and the challenges of the unfounded critique of science there is a place for the enriching dialogue between representatives of the scientific community and the Church proclaiming the truth of the integral human existence.

The Genesis of the Intellectual Isolation

The long-lasting isolation between scientific, religious and humanistic cultures was by no means created by scientists. The founders of modern science were, in general, sensitive both to the metaphysical presuppositions of the adopted methods of research and to the social-cultural effects of their discoveries. Those who professed intellectual traditionalism could have been found much more easily among these representatives of art and philosophy who endeavoured to enlighten immature science by determining its moral and aesthetic goals. Sharing such an ap- proach, many followers of Goethe criticized Newtonian optics by repeating arguments that the artificial conditions of laboratory bservations destroy the natural beauty of light and strip physical phenomena of their natural charm. Similar objections resupposed that the new physics should contain the same moral and existential ingredients which belonged to medieval science.To justify this supposition it was not enough to quote authorities of the past and defend obsolete philosophical cosmology.

The present painful isolation is regarded by certain members of religious communities as a form of splendid and inevitable isolation. The perennial truth of religious doctrine is opposed by them to the ephemeral fluctuations of illusive scientific conjecture. Such an approach expresses nothing but a philosophy of easy resignation. One ignores in it the religious principles that define our attitude toward God who can be recognized in rational analysis of natural phenomena. This attitude, constituting the very essence of religious insight taught in both the Old and the New Testament, characterises the practice of the early Church as well as the contemplative insight of St. Francis of Assisi.

A consistent and well-considered theological justification of Christian concern for natural science may be found in treatises worked out by the influential School of Chartres in the 12th century. It was William of Conches who categorically denied attempts to oppose theology and the study of nature. In his arguments, God the Creator of the human intellect and of the order of nature is to be glorified through our understanding of the natural order. Theological recognition of the importance of physical regularities was based on the Vulgate translation of the Epistle to the Romans (13: 1): *quae a Deo sunt, ordinata sunt* whatever is from God, is ordered. For many reasons the Platonic picture of the cosmic order described in the Timaeus appealed to the imagination of theologians who belonged to the School of Chartres and inspired their works on the harmony of natural and

supernatural values. The beauty of this harmony was impressively depicted by Alain of Lille. In his description of nature, which is subordinate to the divine Mind that brings order out of chaos, we find the anticipation of both Blake's poetry of nature and St. Francis' cosmic mysticism.

In the religious hymns of the School, fascinating descriptions of nature unite both physical and theological perspectives. This integration does not yield uncritical physical theology, but instead provides a beautiful description of cosmic harmony that embraces aesthetic, moral and existential values. Germs and light, human love and physical laws are united together in Alain's philosophy of nature. His philosophical and physical descriptions disclose the theological dimension of nature presenting the physical world as the domain of the presence of the immanent God.

The image of nature proposed by the Chartres School met violent opposition from some medieval scholars. William of Saint-Thierry, for instance, attacked the very idea of uniting biblical doctrine with the pagan philosophy of the Timaeus. In spite of the categorical protests of William's followers, the School provided intellectual patterns in which harmonious synthesis replaced the isolation of various cultural traditions. With these patterns of new harmony, the world of natural phenomena was no longer an agent of alienation. It appeared, on the contrary, according to Bernard Palisey's later comment, as the beautiful book of heaven and earth offered to every man."

The Genesis of Modern Separation

In the process of evolution of modern science, deep metamorphoses occurred in the relationship between scientific and philosophical-theological component of scientific theories. When Copernicus worked on *De revolutionibus*, he was convinced that scientific truth finds its complement in religious teaching. Science and religion seemed for him two domains consistent in defining truth, basic human existence; he argued that it is [the] philosopher's duty "to seek the truth in all things, to the extent permitted to human reason by God." In his Preface to the *On the Revolutions*, this Polish astronomer expressed his belief in the basic unity of scholarly and religious cultures when he addressed the Pope and informed him:"in this very remote corner of the earth where I live, you are considered the highest authority by virtue of the loftiness of your office and your love for all literature and astronomy...".4

The dramatic events that followed the condemnation of Copernican theory in the process of Galileo resulted in both a new hierarchy of authorities and new approach to the relationship between scientific and religious values. The deplorable sentence of 1633 should not be thought of as a result of internal conflict between theology and science, but merely as a socially conditioned event that disclosed the supremacy of canon law over theological reflection in the post-Tridentine Church.5

The affair of Galileo can hardly be approached as a conflict between theology and modern science, because the new science presupposed important theological tenets. Both in his *Dialogue* and in *The Assayer* Galileo contended that the mathematical description of physical processes is possible because of the existence of the Divine Geometrician who determined the nature of physical phenomena. This vision of mathematics grounded in God is defended by Salviati, the port-parole of Galilean views, when in the *Dialogue* he follows Plato in arguing that the human intellect "is to participate in divinity" on account of its grasp of mathematical knowledge.6

The book of Scripture and the book of natural revelation are complementary. The experimental study of nature is necessary for our intellectual development because, as it was argued by Cardinal Baronius, the intention of the Holy Spirit is to teach us how one goes to heaven, not how the heavens go. Galileo repeats the Cardinal's statement in his letter to the Grand Duchess Christina of Lorraine. He goes back even further to the teaching of the early Church to quote Tertullian who argued: "that God is known first through Nature, and then again more particularly by doctrine; by Nature in his works and by doctrine in his revealed word."

After accepting such principles, Galileo points out internal inconsistencies in the standpoint of these authors, who attempt to justify theologically their lack of confidence in modern science. Such a standpoint cannot be consistent, since on the one hand its adherents believe that God has endowed us with senses and intellect, while on the other hand they hold that the use of our cognitive powers should be suppressed. Rejecting similar inconsistency, Galileo defends the thesis of the essential unity between scientific and religious truth. This unity stems from the fact that "the Holy Bible and the phenomena of nature proceed alike from the divine Word," i.e., the Logos that is present both in the Gospel and in the mathematical conjectures of the Pythagoreans. There are no reasons to mourn over the Aristotelian model of the cosmos as an organism. Its theological significance seems ambiguous, at least of those versions which located the throne of Lucifer in the center of earth. Such an approach resulted in the model of a devil-centered universe, and its apology can hardly be based on theological premises. Only a lack of creative imagination could have facilitated its categorical defense that nourished distrust toward new routes of human intellectual pursuit.

The opposition against the new direction of scientific thought stemmed not only from religious traditionalism but also from cultural humanism, the doctrine very influential in the time of the Renaissance. John Donne was not alone in his complaints when he lamented that the "new philosophy calls all in doubt" and eliminates even the element of fire from the cosmological picture of the world. Paintings that presented Copernicus in hell, chained to the throne of Lucifer,provide adequate testimony to the cultural protests against the scientific revolution which called into question the central position of Man in the universe. *A Cypress Grove* , published in 1623 by William Drummond, furnishes gloomy descriptions of the sickness unto death induced by rejection of the Aristotelian order and acceptance of the new science. "The new philosophy" destroyed the cozy universe in which everything was described in anthropomorphic terms akin to our natural intuitions. The image of volcanos erupting with anger and the picture of an alive earth giving birth to metals were replaced by an abstract mathematical description of the world, the world hard, cold, colorless, silent and dead.

It is interesting that this shocking new picture of nature received an approval in so short a period of time. At the beginning of the 18th century, in Alexander Pope's poems one can find a new vision of human culture based upon Newtonian physics. At the end of the same century, in 1794, two poets, Johann Goethe and Friedrich Schiller, met each other during a session of the Jena Scientific Society. The new alliance between modern science and humanist culture was particularly attractive for those humanists who did not try to understand the new physics, but were deeply satisfied with quoting Pope's compliments to Newton, which said that after Newton everything became clear end evident.

As a matter of fact there were many problems unclear in Newton and after Newton. Physicists as well as philosophers discussed them in detail. Even Goethe, like the last Mohican among the poets, tried to humanize the theory of optics by rejecting the views Newton had expounded in the *Opticks* . In this new cultural and intellectual climate, it was much easier to express one's admiration for modern science than to try to understand it. When Richard Bentley worked on his sermons in which Newton's *Principia* was to be discussed theologically, he consulted the mathematician John Craig, asking him what books should be read to understand the work. In response he received a bibliography consisting of 40 publications which were to elucidate the mathematical jargon used by Newton in his exposition of the tenets of the new physics. Bentley, a philologist, despaired after receiving the bibliography, in the short time that be had at his disposal it was impossible to read the books that Craig had recommended.

Regardless of the fact that the objective value of Bentley's philosophy seems at least dubious, his attempts to create a new synthesis of scientific, philosophical and theological truth inspired a new style of intellectual openness to novel scientific theories and brought creative revisions to the traditional image of the world. This style was particularly fostered by Robert Boyle, the English chemist, physicist and theologian. When dying in 1691 Boyle expressed in his will that each year a series of sermons should be preached to interpret new scientific discoveries from the standpoint of Christian faith. Some historians repeat the witty comment that nobody thought seriously about a conflict between religion and modern science before Boyle suggested

reconciling them. The overactive search for scientific confirmation of religious beliefs led to the skeptical denial of earlier theological interpretations and to the acceptance of the philosophy of deism, then in vogue. The main problem for theology arose, however, not from overrating new scientific theories but rather from ignoring them and combining theological insights with the outdated Aristotelian cosmology.

Scientists' Research and Philosophers' Amazement

In the evolution of modern science, the new scientific patterns brought by the growth of relativistic cosmology and quantum mechanics contributed to overcoming the earlier illusions of epistemological empiricism. One of the features of nature that arouses particular interest of theoretical physicists is its susceptibility to mathematical description. This feature seems even more intriguing when we realize that very often certain branches of mathematics were developed with absolutely no regard to their practical application. Appolonius of Perga, for instance, presented in 200 B.C. his theoretical analysis concerning the cross-sections of a cone. This was, however, of no interest to astronomers of that time, as they were convinced that planets were revolving circles and epicycles. It was only 18 centuries later that Johannes Kepler discovered that orbits of planets are elliptic in shape and that their mathematical description can be found in Apollonius' works. A similar situation emerged in the case of non-Euclidean geometries, matrix theory or group theory. At the desk, man created a new language, treating it in purely theoretical categories, and then it unexpectedly appeared that nature conducts a dialogue with us using this particular language. If we discovered an African tribe and found that its members recited fragments of Joyce's Ulysses, such a fact could not be considered obvious and natural. Perhaps the people who do not know English or are always critical about Joyce, would not find anything strange about that situation; a sequence of English or English-like words would be for them only an unintelligible jabber. A similar situation occurs among humanists who express their astonishment that the possibility of mathematical description of physical processes should be of major cognitive importance. The mathematical character of nature by no means concerns such trivial facts adding together all consecutive sunsets or different colors of rainbow. It manifests itself in a non-chaotic character of certain physical processes. The universe might have been a sequence of uncoordinated events, and then it would have been impossible to distinguish in it the stable relations and universal laws that are easily described in simple mathematical formulae. If, for instance, in Newton's law of gravity the d[en]ominator had a coefficient 2.001 instead of 2, our physics would have appeared much more complicated. If, in addition to the mass of bodies, when measuring the gravitational potential, we would have had to consider a progressive or reactionary character of societies in which the research was being done, the complication would have been still greater. It is not difficult to imagine a world in which the laws of physics would change together with political declarations or moods of overly sensitive people. So far, however, our world has been a world of relative stability and order, in spite of difficulties with mathematical description of our evolving emotions or of the motion of leaves blown by the autumn wind.

This element of relative stability and order, rationality and harmony, appears both amazing and mysterious. It is because of its presence, a variety of physical processes can be described with identical mathematical formulae, no matter whether the processes take place in Moscow, Peking or New York. As the recent studies of chaos point out even apparently uncoordinated "chaotic" processes can be described mathematically; contrary to earlier opinions "it turns out that an eerie type of chaos can lurk just behind a facade [of] order and yet, deep inside the chaos lurks an even eerier type of order."7

The musing of scientists upon the harmony and mathematical character of nature share some elements with mystical experiences. Certainly, the experience of such harmony does not exclude the awareness of the existence of violent disharmony and of laws of jungle in nature. The disharmony may be, however, explained by pointing to its immediate causes. The harmony leads us to a secret reality of rational structures which escape the attention of laymen but evoke passionate interest of specialists. When describing such a passion Albert Einstein wrote: "What a deep conviction of the rationality of the universe and what a yearning to understand, were it but a feeble reflection of the mind revealed in this world, Kepler and Newton must have had to enable them to spend years of solitary labor... It is cosmic religious feeling that gives a man such a strength. A contemporary

has said, not unjustly, that in this materialistic age of ours the serious scientific workers are the only profoundly religious people."8

The development of modern theoretical physics, the cosmological analyses concerning the so-called anthropic principle or the fluctuation of quantum vacuum, all show the harmony of the universe. The harmony described in the language of mathematical symmetries is much more expressive in modern handbooks of physics than in Leibniz's metaphysical comment, on the preestablished harmony. This results in opinions that all discoveries in theoretical physics are in fact discoveries of hidden symmetries which in a different language were already described by Plato or the Pythagoreans.9 In the context of similar opinions, the question arises whether the mathematically described order of nature cannot be treated as a manifestation of God's immanence in our world. Such [an] approach has been particularly developed in the works of Teilhard de Chardin who, in his *Hymn of the Universe* , writes about the Divine as "that which in everything is above everything." This formula joins the traditional doctrine of God's immanence and transcendence. In another fragment of this hymn, the French Jesuit writes of God who is "so much remote in ... immensity and so much deeper in the intimacy of... indwelling than all things else" and who unites "together the immensity of the world and the intimate depths of my being."

When approaching nature as a field of discovering God, who is the closest although infinite, Teilhard wrote in *Le Milieu Divin* about "divinity appearing at the heart of the universe." This philosophy raised as many objections as fascinations. When the widely know reviewers suggested to consider Teilhard's *Phenomenon of Man* a book of the century, Sir Peter Medawar replied in *The Mind* that the book was nothing but a collection of nonsenses evoking in its readers a feeling of disgust.10 Many reasons could be given to explain such a great divergence of opinions. The presentation of optimistic hypotheses as basic truths, connecting poetry with scientific theories and overdone speculations, is [are] not the least important. Such features could highly impede the apprehension of these elements of Teilhard's philosophy which seem to be most valuable and inspiring. These elements contain both mathematical description of cosmic order and the mystical experience of cosmic beauty. The synthesis of these two factors discloses a possibility of bridging the gaps that exist between the humanities and the natural science, between technological pragmatism and religious contemplation.

In our search for the hidden unity of nature, it is easier tocontemplate the beauty of an autumn pasture than to recognize the amazing beauty of Einstein's field equations. These two distant fields of experience contain the same element of en- chantment by a mysterious harmony that manifests itself both in the subtle poetry of everyday situations and in the sophisticated simplicity of mathematical relations.

The recognition of the reality of the former would result in a half-truth if we completely ignore the amazing psychological force of the latter type of experience. It has been the very experience that fascinated the Hellenic admirers of logos and inspired Kepler's comments on symmetry of snowflakes; its expression may be found in the Old Testament's Book of Wisdom and in Plato's ontological investigations.

At the beginning of Western rational thought, Hellenic philosophers raised the ultimate questions of the arche, substance, basic principles of being. Philosophy, continuing the tradition of pre-Socratic wisdom, became an important element that unifies various cultures end epochs in the same search for rational explanation of the human world. Philosophical and theological searching for ultimate presuppositions of the scientific interpretation of the world create a new perspective of unity between domains that were separated because of simplifying theories of knowledge. In this new perspective, as it was stressed by John Paul II, "the Church [...] calls upon herself and the scientific community to intensify their constructive relations of interchange through unity. [...] Each of you has everything to gain from such an interaction, and the human community which we both serve has a right to demand it from us."11

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