The Faith and Reason of Father Georges Lemaître

Preprint for *Homiletic and Pastoral Review*, February 2009.

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The Big Bang hypothesis is widely known in popular thought as the best explanation for how the universe came to be. However, very few people know that a Catholic priest formulated this theory in the late 1920s. Reverend Monsignor Georges Lemaître, a Belgian scientist, challenged the conventional thinking of his colleagues, including Albert Einstein, and rejected the static universe hypothesis for a dynamic model. In the course of carrying out his research, he confronted illogical thinking which pitted faith against reason, and science against the Church. His legacy extends behind cosmology, to the nature of Truth itself.

Georges Lemaître was born on July 17, 1894 to Joseph and Marguerite Lemaître of Charleroi, Belgium. Georges attended his parish elementary school and later the local Jesuit high school. Notwithstanding the uniqueness of his personal vocation, Georges discerned his call to both the Priesthood and the life of the mind as a research scientist around the time of his high school graduation. Unfortunately, family financial problems prevented Georges from pursing his vocation immediately. Georges was admitted to the College of Engineering, but also took courses in philosophy at the Institut Superiuer de Philosophie, founded by the future Cardinal, Desire Mercier, Archbishop of Malines. Mercier's writings on the Priesthood confirmed and strengthened Lemaître in his vocational discernment. In July of 1913, Georges Lemaître earned his bachelor's degree in mechanical engineering and began work as a mining engineer.[1]

The German invasion of Belgium in 1914 interrupted Lemaître's engineering career and led him and his brother Jacques to join the Fifth Corps of Volunteers. Georges Lemaître's impeccable military service earned him three citations, including one analogous to the American Silver Star. Immediately following World War I, Georges Lemaître re-enrolled in the University of Louvain. Lemaître quickly earned a BA in Mathematics and a BA in Philosophy. In 1920, he completed the Ph.D. in Mathematics summa cum laude. Despite offers to begin an academic career, Georges applied to study for the Priesthood and was admitted to Maison Saint Rombaut, the major seminary of the Archdiocese of Malines. Again, during his leisure, he devoted himself to scientific reading, including the theories of special and general relativity. On September 23, 1923, Georges Lemaître was ordained to the Priesthood in service to the Archdiocese by his spiritual director, Cardinal Mercier.

The Archbishop permitted Father Lemaître to continue to pursue scientific endeavors and in 1923 he headed to Cambridge, Massachusetts as a research student in astronomy on scholarship from the Belgian government.[2] In addition to his research at Harvard Observatory, Lemaître earned a Ph.D. in Physics from Massachusetts Institute of Technology under the direction of H. M. Godwin.[3] Beginning his academic career in 1925, Lemaître was appointed associate professor of Mathematics at the College du Saint Esprit.

Father Lemaître's intellectual background was unique. His education was a synthesis of the classics, philosophy, and theology along with engineering, mathematics, and physics. Perhaps this powerful combination is what allowed his mind to formulate a concept as abstract and significant as the Primeval Atom hypothesis – his term for what we now colloquially refer to as the Big Bang. In the words of the mathematician, Father Gabriel Costa, Ph.D., commenting on the value of a formation in mathematics before studying theology, "There isn't much difference between infinity and eternity."[4] We live in a world of finite quantities. A mathematician must qualitatively

understand the significant difference between 10^{1000} and ∞ (infinity). As a theologian, similarly, one must be able to distinguish between a long life on Earth followed by a finite amount of time in purgatory, and *eternity in heaven or hell*.

In May of 1933, Albert Einstein was scheduled to deliver a series of lectures in Belgium. However, following the second lecture, Einstein announced that Lemaître would be delivering the final seminar, much to Lemaître's surprise. Einstein told the scientists that Lemaître "has interesting things to tell us" and following the seminar said simply, "very beautiful, very beautiful indeed."[5] That September, Lemaître accepted appointment as a visiting professor of Physics at the Catholic University of America. In 1933, Rev. Vecchierello, O.F.M. made an observation on this topic that is still valid today:

> It is a point of great interest nowadays, when there is so much loose thinking and still looser writing and talking about the non-existence of God, of the immortal soul, and of a host of eternal verities, to see a man who is both a priest and a scientist fraternizing on the most intimate terms with the world's most illustrious scientific geniuses. He not only associates with them, but he is their peer; and in that is the lie given to the old and empty charge that the study of science means the loss of belief in religion. Lemaître, of course, is usually an object of great curiosity – not so much to his co-religionists as to many not of the Faith who marvel at the 'phenomenon' of a Catholic priest being a scientist, yes, not only a scientist of the regular run, but a genius whose theories are most daring.[6]

The following year, Lemaître made a presentation to Cardinal O'Connell of the Archdiocese of Boston at the Roundtable of Catholic Scientists and was also awarded the Mendel Medal from Villanova College for outstanding service to science. The culmination of these and other honors landed Lemaître with the Francqui Prize which gave him about $390,000 in 2007 US dollars. Lemaître's dedication to his vocation continued to earn him accolades. On July 27, 1935, he was named an honorary Canon of the Malines cathedral by Cardinal Josef Van Roey. Later, on October 28, 1936 Pope Pius XI appointed Canon Lemaître to the newly reorganized Pontifical Academy of Sciences. By his Motu Proprio, "In Multis Solaciis," the Pope announced that the Church intended to be well informed on the current scientific revolution. Clearly, this was an implementation of the

first Vatican Council's decree that faith and reason are complementary.[7] Subsequently, Father John O'Hare, the president of the University of Notre Dame, hired Father Lemaître as a visiting professor. During that year, his course on cosmology was not only attended by graduate students, but also faculty members in the Physics and Mathematics departments.

Unfortunately, World War II, a conflict which would greatly disrupt Lemaître's life, was imminent. In May of 1940, Lemaître attempted to flee with his family to France but was flanked by German Panzer divisions. The Germans burned the University of Louvain to the ground just as they had done in the First World War and took many of his colleagues as prisoners. His apartment took a direct hit and Lemaître was sent to the hospital suffering from shock and multiple contusions.[8] After the war, always the devoted son, he went to live with his mother, taking care of her in old age until her death in 1956.

Aged by the war, Lemaître began to enjoy leisure time with his brother Maurice, Chief Engineer of the Belgian Railroad, and a talented musician. Lemaître played the piano and Maurice played the alto. He also enjoyed photography, traveling, and the study of the Chinese language. Father Lemaître obtained great joy from spending time with many nieces and nephews. His interest in travel was further developed by his appointment to the Belgian-Italian commission for cultural exchanges, which permitted him to vacation throughout Italy, including the Ligurian coast, Naples, Capri, Florence, Bologna, Ravenna, and Venice.[9]

During most of Lemaître's tenure in the Academy, Pope Pius XII occupied the Chair of Peter. The Pope delivered his famous speech, "Un'Ora," after he analyzed Lemaître's science with the intent of developing a philosophical argument that one could ultimately use to prove the existence of God. This event immediately stimulated theological and scientific debate on the relationship of science and religion. Pius XII had provided two arguments relying on science to confirm philosophical positions that included God. First, he mentioned the instability of the

universe. Pius XII thought it was logical that an immutable being had to have created the mutable physical world. Lemaître was not adamantly opposed to this line of reasoning. However, Pius' second idea was not as well received. The Pope said that the apparent organization that characterizes the entire universe was another indication. It appears that Pius XII's underlying assumption was that the supernatural act of divine creation began with the early stages described by the Primeval Atom hypothesis:

> …contemporary science with one sweep back across the centuries, has succeeded in bearing witness to the august instant of the primordial Fiat Lux, which along with the matter there burst forth from nothing a sea of light and radiation…Thus, with that concreteness which is characteristic of physical proofs, modern science has confirmed the contingency of the universe and also the well-founded deduction to the epoch when the world came forth from the hands of the creator. [10]

Statements such as these contradicted Lemaître's own strict distinction between the tools for investigating matters of science and matters of theology. "He realized quite fully the tentative and hypothetical character of scientific theories and for this reason alone, if for no others, opposed the use of such theories to support philosophical, theological, or faith statements." [11] As a result, Professor Lemaître wanted his scientific theories to be judged exclusively on their physical merit, keeping metaphysical implications completely separate.

Not surprisingly, Lemaître was alarmed when he was informed that the Holy Father would be delivering a speech to the Eighth General Assembly of the International Astronomical Union in Rome. On a trip to South Africa, Father Lemaître stopped at the Vatican to consult with two men, Father O'Connell, a science advisor to Pius XII, as well as the Cardinal Secretary of State. Lemaître's visit had the intended effect. The Pope's speech primarily praised the advances in astrophysics research in the last fifty years, making only a brief statement on the Big Bang, namely that "the human spirit, upon considering the vast paths traveled by galaxies, becomes in some manner a spectator at the cosmic events that occurred on the very morning of creation."[12] Pius XII never mentioned the Primeval Atom hypothesis again.

Pope John XXIII gave Father Lemaître the title of Prelate in the Papal Household, making him a Monsignor, on March 17, 1960. Monsignor Georges Lemaître was appointed president of the academy March 27 following the death of Father Agostino Gemelli. During his presidency, Lemaître recommended the appointment of twenty-nine additional scientists, greatly expanding the Academy. Additionally, President Lemaître organized a series of pertinent study weeks on pressing subjects, developed a series of publications to keep members in communication, and commissioned committees to collect and analyze cutting edge research that merited distribution to the membership.

Nonbelievers, seeing Lemaître in his clerical clothing, sometimes thought he lacked scientific credibility and sincerity. Some "believers" went so far as to say that Lemaître didn't accept the Book of Genesis. However, the good priest knew that it was difficult for the faithful to accept his theory because it appeared to put constraints on God. While addressing the Circle of Rome, Lemaître admitted that human nature prefers to believe there was a time before the beginning of the universe. How could there be a "time" when there was no time? This inclination makes it unnatural to accept the Primeval Atom hypothesis. He reminds these people that the circumstances at the beginning of the universe were fundamentally different than the world we live in now. [13]

Despite his unquestionable scientific credibility, Lemaître's Priesthood often led skeptics to question his theories, believing the Big Bang was "presented in a spirit of concordism with the religious concept of creation, and even received its inspiration from that religious concept."[14] Concordism is the belief that the Bible contains scientific information not known by people at the time of the writing of the Sacred Texts. Even Professor Einstein confronted Lemaître on this issue. Not surprisingly, Father Lemaître had an excellent response to such critics:

> Should a priest reject relativity because it contains no authoritative exposition on the doctrine of the Trinity? Once you realize that the Bible does not purport to be a textbook of science, the old controversy between religion and science vanishes….The doctrine of the Trinity is much more abstruse than anything in relativity or quantum mechanics; but, being

> necessary for salvation, the doctrine is stated in the Bible. If the theory of relativity had also been necessary for salvation, it would have been revealed to Saint Paul or to Moses….As a matter of fact neither Saint Paul nor Moses had the slightest idea of relativity.[15]

Godart and Heller succinctly characterize the relationship of philosophy and science, "There is an intricate feed-back between cosmology and philosophical views. On the one hand, cosmology emerged from philosophical imaginations of the universe as a whole. On the other hand, philosophical speculations, often took the inspiration and stimulus from the world-picture presented in the science of a given epoch."[16]

Monsignor Lemaître was very successful in achieving the goals of Vatican I and the charter of the Pontifical Academy. His methodological purity allowed him to share scientific discoveries with the Church, protecting Her from misinterpreting physical results while at the same time sharing the splendor of Her Truth with the scientific community in a non-threatening way. Throughout all of this, Lemaître knew that the very nature of his research led man to consider the theological implications.[17] Speaking to Catholic scientists, Lemaître said:

> The Christian researcher has to master and apply with sagacity the technique appropriate to his problem. His investigative means are the same as those of his non-believer colleague….In a sense, the researcher makes an abstraction of his faith in his researches. He does this not because his faith could involve him in difficulties, but because it has directly nothing in common with his scientific activity. After all, a Christian does not act differently from any non-believer as far as walking, or running, or swimming is concerned.[18]

But Lemaître also felt that Catholic theology guarantees the autonomy of science:

> He (the Christian researcher) knows that not one thing in all creation has been done without God, but he knows also that God nowhere takes the place of His creatures. Omnipresent divine activity is everywhere essentially hidden. It never had to be a question of reducing the supreme Being to the rank of a scientific hypothesis. [19]

Reaching out this time to his fellow churchmen, Lemaître said, "Does the Church need Science? Certainly not. The Cross and the Gospel are enough. However, nothing that is human can be foreign to the Christian. How could the Church not be interested in the most noble of all strictly human occupations, namely the search for truth?"[20]

Saint Augustine's famous line, "All Truth is God's Truth," was certainly shared by Monsignor Lemaître. Lemaître firmly believed that the goal of science was the search for the truth. The incorrect, modern perception of science is that it is nothing more than mental manipulations that enable humans to improve influence and effectiveness. In his own words at the Congress of Malines, Lemaître explained that:

> Man's highest activity is searching for the truth. It is the factor which distinguishes us from animals, and our specific activity is to grasp the truth in all its forms…Scientific research remains a task for a certain elite which has been exempted from the main concern of providing daily bread, and has laboriously acquired a special formation. This elite disposes of enormous assets collected by others, and uses them in laboratories, observatories, and so on, in order to fulfill, in the human collectivity, the truly human goal, namely the search for truth. [21]

In true Catholic spirit, Lemaître distinguishes between natural truth that "is proportional to the capacities of our intelligent nature" and supernatural truth that "never could have been reached by ourselves, and it was necessary that it would come down to us." [22]

Lemaître always differentiated between religious and scientific "levels of cognition" or "orders of reasoning." This can clearly be seen in his opposition to mixing physical and theological "levels" in the Big Bang hypothesis:

> We may speak of this event as of a beginning. I do not say a creation. Physically it is a beginning in the sense that if something happened before, it has no observable influence on the behavior of our universe, as any feature of matter before this beginning has been completely lost by the extreme contraction at the theoretical zero. Any preexistence of the universe has a metaphysical character. Physically, everything happens as if the theoretical zero was really a beginning. The question if it was really a beginning or rather a creation, something started from nothing, is a philosophical question which cannot be settled by physical or astronomical considerations.[23]

The wise Monsignor clearly pointed out that both the laws of physics and history did not exist before the Big Bang so the lack of knowledge about what came before isn't a temporary phenomenon but intrinsic to our science. If one makes the assumption that God indeed created the universe with the Big Bang, one cannot prove this scientifically.

Of course, Lemaître's separation of orders or levels does not deny the opportunity for religious belief motivating a scientist to pursue a promising hypothesis. This may very well be the case with Lemaître's own famous hypothesis. The Holy Scriptures clearly attest to a "beginning" which one would expect to be reflected in the natural world. Scientific proof only comes from consistency with empirical evidence. Therefore, the distinction of orders is only relevant in the context of verification.[24]

A hallmark of Georges Lemaître's approach to dealing with those uncomfortable with the science-religion relationship was reminding them of the fact that science is impartial to religion:

> The writers of the Bible were illuminated more or less – some more than others – on the question of salvation. On other questions they were as wise or ignorant as their generation. Hence it is utterly unimportant that errors in historic and scientific fact should be found in the Bible, especially if the errors related to events that were not directly observed by those who wrote about them…The idea that because they were right in their doctrine of immortality and salvation they must also be right on all other subjects, is simply the fallacy of people who have an incomplete understanding of why the Bible was given to us at all.[25]

Addressing the philosophical implication of the Primeval Atom hypothesis at Solvay in 1958, Lemaître states:

> As far as I can see, such a theory remains entirely outside any metaphysical or religious question. It leaves the materialist free to deny any transcendental Being. He may keep, for the bottom of space-time, the same attitude of mind he has been able to adopt for events occurring in non-singular places in space-time. For the believer, it removes any attempt at familiarity with God, as were Laplace's 'flick' or Jean's 'finger [of God agitating the ether]' consonant, it is consonant with the wording of Isaiah's speaking of a 'Hidden God,' hidden even in the beginning of creation. [26]

In Lemaître's thinking, "God cannot be reduced to the role of a scientific hypothesis."[27] Despite this, Lemaître goes on to say that "It does not mean that cosmology has no meaning for philosophy. Philosophy and theology, when kept in isolation from scientific thought, either change into an outdated self-enclosed system, or become a dangerous ideology."[28]

Monsignor Lemaître preferred the natural beginning of the universe compared to the "external push" that Pascal and Laplace used to incorporate God into creation. Specifically, he preferred the Savior mentioned in Isaiah because "even though he is hidden, you can still know

him."[29] In many ways he fought a battle against medieval approaches to cosmology influenced by otherwise good men that lacked the knowledge we have today, such as Archbishop Peter Lombard († 1160). Popular opinion then, and to a lesser degree now, is comfortable with a literal interpretation of Genesis.[30]

One can see in Monsignor Lemaître's homilies the classical analysis common in Catholic academic circles in the early twentieth century. His distinction between the scientific order and theological order are also representative of his time. Before even beginning his cosmological research, Lemaître wrote an essay in which he said, "The Holy Spirit, when speaking through the holy authors, does not want to teach man about the deep constitution of things we are looking at; such a knowledge would have no value for salvation."[31] Lemaître goes on to say, in true Augustinian form, that while both science and theology seek to explain the objective reality that we experience, they have different intentions:

> (The Biblical narration) describes the world in such a manner as it appears to every man, and not in a manner which could be conceived by men only when their persevering research has led them from the actual wavering of science to an unquestionable synthetic knowledge of the world, and to a clear notion of relationships between its different elements.[32]

The Monsignor pointed out, however, that "The Spirit knew perfectly the Universe, His work."[33]

Monsignor Lemaître truly believed in the mission of Catholic higher education: "Catholic education should be of the same degree as any other scientific education, and nothing should be neglected in the professional formation of teachers or in the renovation of pedagogical means so as we could afford to remain on the top of all progress."[34] In Lemaître's opinion, diligent theologians must stay abreast of scientific discoveries and seek to understand their implications. The following quote perhaps demonstrates a position held by Lemaître that theologians are more responsible for the church-science divide than the scientists:

> Perhaps the theologians themselves have a responsibility in the misunderstanding which places science against faith. An appearance of conflict originates between a traditional

> point of religious teaching and a new hypothesis which begins to establish itself on the basis of facts, they show a too easy tendency to wait till the last moment when the hypothesis would be definitely proved. They would have done much more useful work to have carefully investigated these points of the doctrine which seem to lead to conflicts…Anyway, their intelligent courtesy would be very much appreciated in scientific circles, and it would constitute an apologetic of the best type.[35]

The theological world seemed to respond to Lemaître's charge in the second half of the twentieth century. Unfortunately, theologians almost exclusively limited their investigation to the social sciences.

Perhaps Lemaître's greatest gift to the world is a Church-Science / Faith-Reason intellectual framework. In addition to its logical, practical benefits compared to an openly hostile science-religion approach, it also is filled with optimism and hope. This is best captured in Lemaître's address to the Catholic Congress of Malines:

> Both of them (the scientist-believer and the scientist-nonbeliever) attempt at decoding the palimpsest of nature with multiple imbrications in which the traces of the various stages of the world's length evolution has been overlapped and blended. The believer perhaps has an advantage of knowing that the riddle posses a solution, that the underlying writing finally comes from an intelligent being, and consequently that the problem proposed by nature has been posed in order to be solved, therefore, that its degree of difficult is presumably commeasurable with the present and future capacities of humanity.[36]

A distinctly Christian approach to science is expressed by Lemaître in his original work on the Primeval Atom:

> We cannot end this rapid review which we have made together of the most magnificent subject that the human mind may be tempted to explore without being proud of these splendid endeavors of Science in the conquest of the Earth, and also without expressing our **gratitude to One Who has said: 'I am the Truth,' One Who gave us the mind to understand Him and to recognize a glimpse of His glory in our universe which He has so wonderfully adjusted to the mental power with which He has endowed us**.[37]

Monsignor Lemaître would no doubt share the view of Pope Benedict XVI in his Regensburg speech when he recalled the words of the Byzantine Emperor, Manuel II, who stated that "Not to act reasonably, not to act with λόγος, is contrary to the nature of God."[38]

Unfortunately, a heart attack in 1965 severely weakened the priest. Monsignor Georges Lemaître passed into eternal rest on June 20, 1966. His funeral at the university church was

attended by both French and Flemish provosts (language differences had split the university), the French speaking faculty, the Belgian Cabinet, and the diplomatic corps.[39] According to one of his friends, Monsignor Lemaître would be remembered as a "very open person, cheerful, and optimistic in his outlook."[40]

Monsignor Georges Lemaître has made numerous, lasting contributions to the modern world; to quote Dirac, "The measure of greatness in a scientific idea is the extent to which it stimulates thought and opens up new lines of research. In these respects we must rate Lemaître's cosmology of the highest caliber."[41] Perhaps his greatest gift was the witness he gave as a Catholic Priest, living everyday the life of the mind and spirit doing cutting edge science along side his Priestly duties. In every regard, he was unique. His life gives testament to the fact that when one trusts in God, giving one's life as a total gift, the Lord does wonderful things.[42]

Acknowledgments

I would like to thank Dr. Kenneth Howell, Reverend Thomas Guarino, and Dr. Stephen Barr for their insightful comments and feedback in this research.

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