

**‘MORE THAN A HYPOTHESIS’: THE DISCOURSE BETWEEN
CATHOLICISM AND ORGANIC EVOLUTION, 1859-2019**

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Declaration

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Summary

This thesis reviews and critiques the discourse between Catholicism and organic evolution over a period of one hundred and sixty years, from the first publication of Charles Darwin's famous book, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (henceforth abbreviated to *Origin*), in 1859 up to 2019. The main contention in the thesis is that there was significant and continual discourse between Catholicism and evolution during the entire one hundred and sixty years between these two dates. The terms Catholicism and evolution, as used and discussed in this thesis, are defined in the Introduction.

The inductive methodology employed involved the critical review of a representative selection of the literature dealing with dialogue between Catholicism and evolution over this period. In addition to books and articles on the topic, the thesis also examined relevant statements from Popes and Catholic spokespeople. One of the richest sources, however, and one hitherto arguably underused was a collection of documents from the Pontifical Academy of Sciences.

Since the publication of Darwin's *Origin*, evolution has become more and more central to biological studies. Organic evolution has provided a new lens through which we view all life on this planet. Moreover, virtually all agree that nothing in biology makes sense in the absence of evolution. This thesis shows that very soon after the appearance of *Origin*, Catholics joined in the widespread debate not only about evolution itself but also about natural selection, by which process, Darwin contended, new species come into being. Catholicism was no less engaged in seeking to reconcile organic evolution with Christian revelation and Catholic doctrine.

The material on which the main thesis is based is organised into four chapters, the first three covering the nineteenth, twentieth and twenty-first centuries respectively. The fourth chapter examines the contribution of the Pontifical Academy of Sciences in some detail and ends with a section devoted to conclusions. Catholics not only wrote about evolution but also were among those who, through their own research helped develop evolutionary studies reach the respected niche they enjoy in science today. Some gifted Catholic scientists, like Gregor Mendel and Eric Wasmann, by their own achievements put, as it were, a Catholic stamp on evolution. Though the anti-modernist campaign of Pope Pius X cooled Catholic enthusiasm for evolution during the early decades of the twentieth century, it was, nevertheless, quietly but effectively fostered by figures like Henry De Dorlodot and Teilhard de Chardin.

The second half of the twentieth century began with a formal statement from Pope Pius XII in the encyclical, *Humani Generis*, stating that evolution was a credible hypothesis which explained the development of the human body from animal forbears and that it was acceptable to Catholics. Pope John Paul II went much further when he declared in 1996 that evolution was 'more than a hypothesis'. From then on Catholic scholars began to work enthusiastically for the integration of the theory of evolution with Catholic dogma and spirituality.

In the ongoing challenge to reconcile new truths revealed by evolutionary science, it has been shown that the Pontifical Academy of Sciences is a valued and effective structure. With its headquarters in the Vatican and some of the most renowned scientists in the world as life members, it is an enviable source of the best scientific opinion and one that is constantly available to the leaders of Catholicism. This thesis shows that not only is evolution not an enemy of Catholicism but that it provides a key to understanding the mechanism by which God, the ultimate Creator, works in this universe.

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‘MORE THAN A HYPOTHESIS’: THE DISCOURSE BETWEEN CATHOLICISM AND ORGANIC EVOLUTION, 1859-2019

Introduction

This thesis reviews and critiques the discourse between Catholicism and organic evolution over a period of one hundred and sixty years, from the first publication of Charles Darwin's *Origin of Species* in 1859 to 2019. The phrase ‘More than a hypothesis’ used in the title of this thesis is taken from a notable speech of St John Paul II in 1996 to the Pontifical Academy of Sciences (PAS).¹ It is regarded by Roman Catholics as one of the most important statements made by a Pope about organic evolution. This is not, however, to overlook even more explicitly supportive statements about the same topic subsequently made by Roman Pontiffs.² John Paul II's 1996 statement, however, coming as it did towards the close of a century laden with new scientific insights, has not only doctrinal but also emotional significance for Catholicism. This will be explored in more detail in chapter 2 of this thesis.³

As a working definition of Catholicism, we have adopted that of Richard McBrien, as given in his popular book, *Catholicism*:

Catholicism refers to a community of persons (the human dimension), who believe in God and shape their lives according to that belief (the religious dimension), who believe God to be triune, and Jesus Christ to be the Son of God and the redeemer of humankind (the Christian dimension), who express and celebrate that belief in the Eucharist and who recognise the Bishop of Rome to be 'the perpetual; and visible source and foundation of the unity of the bishops and of the multitude of the faithful' (the ecclesial dimension).⁴

For the word ‘evolution’, we will adopt the definition given by world-famous

¹ Pope John Paul II, Address to PAS, ‘The Origins and Early Evolution of Life’. 22/10/1996, par. 4. Retrieved 14/12/2021 from www.pas.va/content/accademia/en/magisterium/johnpaulii/22october1996.html.

² Pope Francis, Address to PAS, 27 October 2014. Retrieved 31/01/2020 from http://www.vatican.va/content/francesco/en/speeches/2014/october/documents/papa-francesco_20141027_plenaria-accademia-scienze.html.

³ See pp. 69 ff.

⁴ McBrien, R., *Catholicism*. London: Geoffrey Chapman, Third edition, 1994, p.6; see also O’Collins, G., *Catholicism: A Very Short Introduction*. Oxford: Oxford University Press, 2017, *passim*.

biologist, Douglas Futuyma, which was also adopted by *The Stanford Encyclopaedia of Philosophy*. It reads: 'Evolution is the process by which changes in the genetic composition of populations of organisms occur in response to environmental changes'.⁵ Alternatively, a popular biology textbook in the United States defines evolution more technically as 'any change in the frequency of alleles within a gene pool from one generation to the next'.⁶ Both definitions mean the same thing, though the ordinary reader may prefer the first one.

Since the publication of Darwin's *Origin*, evolution has become more and more central to all biological studies. Most biologists now agree that the concept of organic evolution has provided a new lens through which we view all life on this planet. The great Ukrainian-born geneticist, Theodosius Dobzhansky (1900-1975), wrote in 1973 that nothing in biology makes sense in the absence of evolution.⁷ Without evolution, all biological discoveries are a series of notable but unconnected facts. Since then, rather than losing its importance as the underpinning paradigm in biology, evolution has become more and more important in understanding the virtual 'Tree of Life'.⁸

Framework

Our discussion of organic evolution takes place within the context of contemporary understanding of the material universe. This understanding suggests that our universe is approximately 13.7 billion years old and that it originated with the so-called Big Bang. The

⁵ *The Stanford Encyclopaedia of Philosophy*. Retrieved 16/12/2019 from <https://plato.stanford.edu/entries/evolution/#DefiEvol>; see also Futuyma, D. J., 'Evolutionary biology today and the call for an extended synthesis', *Interface Focus*. 18 August 2017. Retrieved 20/12/2021 from <https://doi.org/10.1098/rsfs.2016.0145>.

⁶ Curtis, H. and N. S. Barnes, *Biology*. New York: Worth Publishing Company, 1989. ISBN 978-0879013943.

⁷ Dobzhansky, Theodosius, 'Nothing in biology makes sense except in the light of evolution'. *American Biology Teacher*, 35 (3), March 1973, pp. 125-129.

⁸ Zimmerman, Michael, 'Why Evolution is the Organising Principle for Biology'. *Phi Kappa Phi Forum*, Education Data Base, Spring 2009. p. 5.

Big Bang theory was first proposed by a Catholic priest and astrophysicist, Mgr Georges Lemaitre (1894-1966), in 1927, and it is still the prevailing explanation of the great cataclysmic event which led to the formation of our cosmos.⁹ Pope Francis accepts this as the best current explanation. In 2014 he said, 'The Big Bang theory, which is proposed today as the origin of the world, does not contradict the intervention of a divine creator but depends on it.'¹⁰

Though the universe is approximately 13.7 billion years old, our planet earth is calculated to be 4.5 billion years old.¹¹ The origin of life is currently estimated to date from 3.77-4.28 million years ago.¹²

This thesis is organised into four chapters, each with an introduction at the beginning, sub-heads to facilitate the organisation of the material and a conclusion at the end. The titles of the Chapters seek to give an idea of the general theme of each one and are as follows:

Chapter 1: The Nineteenth Century: Grasping a Dynamic Idea

Chapter 2: The Twentieth Century: Towards Adopting a New Perspective

Chapter 3: The Twenty-First Century: Accommodating a New Perspective

Chapter 4: The Pontifical Academy of Sciences: Evolution in The Academy

⁹ Kung, H., *The Beginning of all Things. Science and Religion*. English translation by Bowden, J. Grand Rapids, M.I.: W. B. Eerdmans Publishing Co., 2007, pp. 9-10.

¹⁰ Pope Francis, 'Address to the Plenary Session of the Pontifical Academy of Sciences', 27 October 2014. Retrieved 16/12/2019 from http://www.vatican.va/content/francesco/en/speeches/2014/october/documents/papa-francesco_20141027_plenaria-accademia-scienze.html.

¹¹ Redd, N. T., 'How old is the Universe?', retrieved 17/12/2019 from <https://www.space.com/24054-how-old-is-the-universe.html>.

¹² Marshall, M., 'How Life on Earth Began', retrieved on 17/12/2019 from <http://www.bbc.com/earth/story/20161026-the-secret-of-how-life-on-earth-began>.

Chapter 1: The Nineteenth Century: Grasping a Dynamic Idea

Introduction

Organic evolution, sometimes called Darwinism or Neo-Darwinism, came to be a major branch of modern science following the publication in 1859 of Charles Darwin's famous book, *The Origin of Species*,¹ hereafter abbreviated to *Origin*. Almost from the day of publication, this book has come to be regarded as the bible of organic evolution and its author the founder of this branch of science. Very soon after the appearance of *Origin*, Catholics joined in the widespread debate not only about evolution itself but more particularly about natural selection, by which process, according to Darwin, new species come into being. From then on to the end of the century, and, as we will see later, to this day, Catholics have played an active part in the dialogue about evolution and how Christian revelation and Catholic doctrine can accommodate it. While it would be true to say that this dialogue began in Great Britain (including Ireland), Catholic scholars from countries in mainland Europe and in the United States have also taken a full part. This chapter explores the nature and content of the Catholic contribution to this dialogue up to the end of the nineteenth century.

1.1 Evolution: The Launch of a Dynamic Concept

Though some would say that widespread interest in organic evolution began with Jean-Baptiste de Monet, Chevalier de Lamarck (1744-1829),² the man who gave his name to the current version of this new science was Charles Darwin (1809-1882).³ Lamarck published his most famous book, *Philosophie Zoologique*, in 1809 and proposed a scientific explanation

¹ Darwin, C. R., *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. London: John Murray, 1859.

² Bjorklund, M., 'Lamarck, the Father of Evolutionary Ecology'. *Trends in Ecology & Evolution*, October 2019, Vol. 34, No. 10, p. 874.

³ Organic evolution is frequently called Darwinism or Neo-Darwinism. This thesis prefers the term organic evolution because of the materialism that has come to be associated with the term Darwinism.

of evolution, an idea that had been in circulation since the time of the Greeks.⁴ The specifics of Lamarck's explanation of evolution were underpinned by what some regard as a metaphysical theory. This was the belief that life possesses an innate property to improve over time, so that progression from lower to higher organisms would continually occur, always following the same path of transformation from simpler to more complex organisms.⁵ A somewhat similar evolutionary theory was formulated a century later by the French philosopher, Henri Bergson (1859-1940), in his book, *Creative Evolution*.⁶

Lamarck formulated his theory in two laws. The first law stated that, by continued use, an organ in animals becomes greatly strengthened and enlarged to an extent which is proportional to the amount of its use. On the other hand, if there is continued disuse of an organ, over generations, it becomes weaker and deteriorates, finally disappearing. The second law states that when an animal thus acquires modifications in response to the environment, all these modifications, providing they are present in both male and female, are passed on by reproduction. While the first law was and is accepted by virtually all biologists, the second law was disproved in 1809 by the German biologist, August Weismann (1834-1914). In a well-known experiment, Weismann cut off the tails of several generations of mice, yet they continued to have litters in which the baby mice had tails of normal length.⁷ In recent times, however, the new science of epigenetics, about which we will say more later, has shown that acquired characteristics are inherited in some instances.⁸

⁴ Osborne, H. F., *From the Greeks to Darwin; the Development of the Evolution idea through twenty-four centuries*. NY & London: Charles Scribner's Sons, 1894, 1936 ed., p. 52.

⁵ Ayala, F. J., *Darwin's Gift to Science and Religion*. Washington, DC: Joseph Henry Press, 2007, p 34.

⁶ Bergson, H., *Creative Evolution*. New edition. Basingstoke: Palgrave MacMillan, 2007, *passim*.

⁷ Stansfield, W. D., 'Acquired Traits Revisited'. *The American Biology Teacher*; Reston, Vol. 73, Issue. 2, (Feb 2011): pp. 86-89; Gauthier, P., 'Does Weismann's Experiment Constitute a Refutation of the Lamarckian Hypothesis?' *BIOS*, Vol. 61, No. 1/2 (Mar.- May 1990), pp. 6-8. <https://www.jstor.org/stable/4608123>

⁸ Sandsfield, W. D., 'Acquired Traits Revisited', *The American Biology Teacher*; Reston Vol. 73, Issue. 2 (Feb 2011), pp. 86-89.

Charles Darwin (1809-1882), son and grandson of medical doctors, was born more than half a century after Lamarck. He first studied medicine at the University of Edinburgh but transferred to the University of Cambridge after a year. There he studied theology but did not become an ordained minister of the Church of England. At Cambridge, however, he made friends with John Stevens Henslow (1796-1861), Professor of Botany, and Adam Sedgwick (1785-1873), Professor of Geology, and with their encouragement developed a great love for natural history. Under their tutelage, he also began to read widely in biology and geology, taking every opportunity to join other enthusiasts in natural history field trips. The turning point in his career came when he embarked on a five-year long voyage in the British Admiralty research ship, *The Beagle*, charting the South American coastal waters during the years 1831-1836. A keen observer, he filled many notebooks with detailed descriptions and drawings of his observations and discoveries. He also collected numerous specimens in the fields of geology, palaeontology, botany and zoology. A man of independent means, he devoted the next twenty years of his life to formulating a theory of evolution, drawing examples from his South American personal experience. He formulated his theory of evolution in the early 1840s and outlined his ideas on the origin of species and natural selection in a long essay in 1844. Though he shared this essay with some friends, he hesitated to publish it, knowing that his theory would not be popular with either the established Church or the scientific establishment. Meantime, he continued to refine his theory.⁹

In 1858, however, he received a letter from Alfred Russell Wallace (1823-1913) which galvanised him into action. Wallace was an explorer and naturalist who had done extensive studies of flora and fauna in both the Amazon River basin and the Malay Archipelago. Wallace had also made large collections of his findings and had begun to

⁹ Van Wyhe, J., 'Charles Darwin: Gentleman Naturalist. A Biographical Sketch'. Retrieved 15/10/2020 from <http://darwin-online.org.uk/darwin.html>.

speculate on a theory of evolution involving natural selection. In 1858, he wrote to Darwin, enclosing a scientific article for possible publication. Darwin was startled to find that Wallace had the same insight as himself concerning the role of natural selection in evolution.¹⁰

After consultation with his friends, including Sir Joseph Hooker (1817-1911) and Sir Charles Lyell (1797-1875), Darwin decided to present two papers to a meeting of the Linnaean Society in London. One of the papers was the one sent to Darwin by Wallace, while the other was the unpublished essay, which Darwin had written in 1844, outlining his ideas on natural selection. This meeting was held on 1 July 1858. The two papers were subsequently published in the journal of the Linnaean Society.¹¹

Darwin then began working overtime on the preparation of his famous book, *On the Origin of Species by Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (hereafter abbreviated to *Origin*), which was published in London by John Murray and Sons in November 1859.¹² The first edition was immediately sold out and it has been reprinted many, many times. It would probably be true to say that from its first appearance, Darwin's *Origin*, has ever since, though not without occasional controversy, been central to any discussion about organic evolution.¹³ The book is now available online.¹⁴

1.2 What is Evolution?

A simple way to explain evolution is to say that it consists of two 'big ideas' joined

¹⁰ Ayala, *op. cit.*, p. 44.

¹¹ Darwin, C. R. & Wallace, A. R. 1858. 'On the tendency of species to form varieties; and on the perpetuation of varieties and species by natural means of selection'. *Journal of the Proceedings of the Linnean Society of London, Zoology*, 3(9): pp. 45-62.

¹² Darwin, C. R., *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life*. London: John Murray, 1859.

¹³ Alexander, D, *Creation or Evolution. Do we have to Choose?* London: Monarch Books, 2008.

¹⁴ Darwin, C. R., *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life*. London: John Murray, 1859. Retrieved 19/12/2021 from <http://darwin-online.org.uk/content/frameset?pageseq=1&itemID=F373&viewtype=text>.

together. The first is the continuous generation of diversity in species. Today we know that this is caused by mutations in the genome, something that can occur during the process of reproduction. Though neither the term mutation nor its significance was known to Darwin, he was well aware of their visible effects in the phenotype, since some of these variations ultimately help in the processes of survival and reproduction. The second big idea is natural selection, whereby genomes generating organisms with slightly better survival rates and more offspring tend to be the ones passed on to succeeding generations. The reverse is also true. Genomes generating organisms with slightly or significantly worse survival and fewer offspring are less likely to be passed on. Therefore, evolution is a two-step process. In the first step diversity is generated; in the second step, the diversity is tested by natural selection.¹⁵

Darwin's theory of natural selection provided the best explanation of the process of evolution and is still, with some refinements, the standard explanation today. However, since it takes numerous generations of a species before the effects of natural selection can be seen, some people, failing to appreciate that this process takes place over what is called 'deep time', have failed to appreciate the full significance of the theory.

Darwin's description of natural selection, though less concise than our modern one, is, nevertheless, an example of a dynamic idea expressed in simple language:

Can it, then, be thought improbable, seeing that variations useful to man have undoubtedly occurred, that other variations useful in some way to each being in the great and complex battle of life, should sometimes occur in the course of thousands of generations? If such do occur, can we doubt (remembering that more individuals are born than can possibly survive) that individuals having any advantage however slight, over others, would have the best chance of surviving and of procreating their kind? On the other hand, we may feel sure that any variation in the least degree injurious would be rigorously destroyed. This preservation of favourable variations and the rejection of injurious variations, I call Natural Selection.¹⁶

¹⁵ Alexander, *op. cit.*, p. 73.

¹⁶ Darwin, *op. cit.*, 1859, pp. 80-81.

A modern definition of natural selection goes as follows:

Natural selection is the differential reproduction of alternative genetic variations, determined by the fact that some variations are beneficial because they increase the probability that the organism having them will live longer or be more fertile than organisms having alternative variations. Over the generations beneficial variations will be preserved and multiplied; injurious or less beneficial variations will be eliminated.¹⁷

The first time *Origin* came centre stage in the scientific world was at the annual meeting of the British Association for the Advancement of Science at the University of Oxford on 30 June 1860. Though Darwin was absent owing to illness, Thomas Henry Huxley (1825-1895), a Darwin supporter and well-known biologist, was in attendance. While Darwin's book was not the focus of deliberations, the topic of evolution through natural selection came up in the course of discussion. Bishop Samuel Wilberforce (1805-1873) of Oxford, a notable scholar and orator, took part in the discussion and expressed his disagreement with Darwin's thesis. Moreover, in reply to an observation by Huxley, he is alleged to have asked Huxley whether it was through his grandfather or his grandmother that he claimed descent from a monkey. Huxley is reported to have replied that he would not be ashamed to have a monkey as an ancestor but that he would be ashamed to be connected with a man who used his great gifts to obscure the truth. Since no minutes were kept of the discussion, the exact words used are in doubt, though several participants vouch for the essentials of the story. The incident, however, is indicative of both the central position which Darwin's thesis had assumed in scientific discourse and the way the response of the educated public was split in its regard.¹⁸

¹⁷Alexander, *op. cit.*, p. 81.

¹⁸ 'The Great Debate'. Museum of Natural History. Retrieved 15/10/2020 from <https://oumnh.ox.ac.uk/great-debate>; see also Franklin, R. W., 'The Oxford Movement and science: the Word in scripture and nature in the nineteenth-century Catholic Revival' in *Like a two-edged sword, the Word of God in liturgy and history: essays in honour of Canon Donald Gray*, Norwich, England: Canterbury Press, 1995, p 161-177. ATLA0001233198. ISBN: 9781853111150.

1.3 Catholic Dialogue Begins

Soon after the publication of Darwin's *Origin*, there were two significant reviews of it in the Catholic press. These were by Richard Simpson (1820-1876) in *The Rambler*¹⁹ and by Rev John Morris (1826-1893) in *The Dublin Review*.²⁰ Later, John Cuthbert Hedley OSB (1837-1915), subsequently bishop of Newport, also wrote on evolution more than once, including reviews of Darwin's *Origin* and his less famous book, *The Descent of Man*.²¹

Though Simpson found Darwin's thesis lacking scientific rigour, he praised *Origin* for its impressive assemblage of relevant facts. He also found Darwin's approach to be symptomatic of positivist metaphysicians, who denied that a physical consequence could be the result of metaphysical or divine action. The positivists, he said, were simply denying the existence of spirit. Simpson drew a useful distinction between Darwin's hypothesis and the facts on which that hypothesis was based. Simpson also put his finger on the key to understanding why Catholics could and did accept evolution but not necessarily natural selection. Natural selection removed the hand of God and in its place substituted chance. He believed that generative powers did exist in nature, but they were not the result of chance but had been put there by an all-powerful and loving God.²²

While Simpson conceded that the Church had no supernatural guidance in matters of physical science, he nevertheless contended that it was of the very nature of the Church's belief that faith and intellect were not exclusive functions. He went on to stress that dialogue between science and revelation had to be ongoing. Indeed, he felt that it was a never-ending

¹⁹ Simpson, R., *The Rambler*, March 1860, p. 365 ff.

²⁰ Morris, J., Review of *Origin of Species*. *The Dublin Review*, Vol. XLVIII, May-Aug. 1860.

²¹ Hedley, J. C., 'Evolution and Faith', *The Dublin Review*, Series 17, July 1871, pp. 1-40; reproduced in Butler, C., ed., *Evolution and Faith with other Essays by Bishop Hedley*. London: Sheed & Ward, 1931, pp. 1 ff.

²² Simpson, *op. cit.*, pp. 366-370.

task.²³ Overall, Simpson's review though not hostile failed to be supportive.

Rev John Morris, secretary to Cardinal Wiseman and subsequently to his successor, Cardinal Manning, became a convert to Catholicism while at the University of Cambridge. He was a prominent priest in the archdiocese of Westminster for seventeen years before joining the Jesuits in 1867. In his review of Darwin's *Origin* in *The Dublin Review* in 1860, he, like Simpson, noted Darwin's array of impressive evidence to support his hypothesis. Morris, however, found the idea of natural selection 'gratuitous' and 'repulsive'. He was unwilling to see adaptation to the environment or the struggle for existence made into a 'universal law'. He was unwilling to permit Darwin's theory of natural selection to contradict the Genesis account of creation.²⁴ As we will see later, Morris' attitude to *Origin* was somewhat representative of English upper-class Catholics, such as Lord Arundel and Edwin de Lisle MP.²⁵

Hedley, who had previously been editor of *The Dublin Review*, published an article on evolution in that journal in 1871. It consisted of a review of Darwin's two books, *Origin* and *Descent*, together with a brief mention of St George Mivart's *Genesis of Species*. Hedley seemed not so much concerned with the truth of Darwin's theory as whether it was compatible with Catholic faith and could be held by Catholics. There is, consequently, little discussion about the details of Darwin's theory but much discussion of the position of the Fathers of the Church on evolution.²⁶

Hedley begins by emphasising that the special creation of the soul of the first man is a dogma of Catholic faith and that Catholic teaching informs us that the soul of every

²³ *Ibid.*, pp. 375-76.

²⁴ Morris, J., *op. cit.*

²⁵ *Vide* pp. 23 ff below.

²⁶ Hedley, *op. cit.* 1871.

subsequent human being is also created directly by God. This automatically implies that Darwin's theory that the soul of man had developed by natural processes from the souls of higher animals had to be ruled out as inadmissible. He suggested that the theory of evolution in itself does not call into question the fact of creation or of a creator. Rather, it is the means by which this evolution is brought about that is of concern. The theological issue at stake, he suggested, is whether the theory of evolution is compatible with the account given in *Genesis* of the entire process of formation of the universe out of nothing. The biblical cosmogony portrays the process as a series of direct interventions by God, creating in turn the universe, the vegetable and animal kingdoms and then man.²⁷

Hedley stressed that, though the theory of evolution had been aggressively used by materialist scientists as a weapon of anti-theistic propaganda and the theory itself may have been successful in undermining religious beliefs in some cases, there was nothing inimical to theism in the theory. The difficulty did not arise with the theory but with *Genesis*. The key question was whether the evolutionary story was compatible with the early chapters of the foundational book of the Bible. He put the problem in the form of a question:

Is it allowable, in spite of the text of Holy Scripture, to assert that all living beings, both plant and animal, sprang from one primordial form, - or even to go so far as to say - what, however, Mr Darwin does not say - that even this primordial organism is evolved out of the inorganic?²⁸

Hedley was a clear thinker and his question admirably summarised what many Catholics wished to know. However, they had to wait until 1950 for a reply, which was then given by Pope Pius XII in his encyclical, *Humani Generis*. This will be discussed later in Chapter 2.²⁹

²⁷ Hedley, *op. cit.* 1871.

²⁸ Butler, *op. cit.*, p. 12.

²⁹ *Vide* p. 64ff.

Some thirty years after writing his first article on evolution, Hedley published another article in *The Dublin Review* under the title, 'Physical Science and Faith' in which he returned to the topic of evolution. This time, while deploring the fact that materialistic evolutionists were exploiting the theory of evolution for anti-theistic purposes, he still maintained his own earlier position in respect of evolution:

Evolution leaves it open to theists to insist, as they must insist, not only that the fact of creation implies motive tendencies in things if they are to develop, but that a creative interference of a special nature has intervened, at least in the instance of the rational soul, and also (it seems most probable) when animal life first appeared, and when the body of the first man was formed. Subject to these reservations, theists can reasonably, and without sacrifice of faith, adopt the theory of evolution... As regards the human soul, however, there is no liberty for a Christian. We must hold that each human soul is individually and immediately created by God.³⁰

By 1898, Hedley was convinced that the majority of educated Catholics had accepted the theory of evolution in a general way, though not the principle of natural selection:

The Catholic student who carefully studies the subject will probably conclude that he would be shutting his eyes to scientific truth if he did not admit evolution as a useful probable explanation and co-ordination of the facts. As to the metaphysical deductions, made by unbelieving scientists, in the regions of theology and mental science, he can be a good evolutionist without giving up one iota of his faith or his Catholic philosophy.³¹

The main part of Hedley's 1898 article was taken up with a review of Rev John A. Zahm's book, *Evolution and Dogma*, which at that time was under investigation by the Holy Office.³² In the course of the article in question, Hedley had praised Zahm and repeated his previous position that it was possible to accept both evolution and a creating God. He did, however, express reservations about some of Zahm's biblical interpretations in the following terms:

³⁰ Hedley, J. C., 'Physical Science and Faith', *The Dublin Review*, 1898. Discussed in Butler, J. C., Hedley, *Evolution and Faith with other Essays*, ed. Butler, C., London: Sheed & Ward, 1931, pp. xxii-xviii.

³¹ *Ibid.*

³² Appleby, R. S., 'Between Americanism and Modernism: John Zahm and Theistic Evolution'. *Church History*, Vol. 56, No. 4 (Dec. 1987), 487-490.

On the subject of scripture, it can hardly be said that Dr Zahm, however useful his studies may be to the ordinary Catholic, really gets to the heart of certain questions which at present are awaiting definite statement. It is not enough ...to assert in general terms (as does Dr Zahm) that revealed truth and dogma are compatible with the most perfect intellectual freedom.³³

Unfortunately for Hedley, a persistent and aggressive anti-evolution position had been taken up by the influential Jesuit journal, *La Civiltà Cattolica*, which was believed to be very influential with the Vatican. News of Hedley's article in *The Dublin Review* was picked up by the editor of *La Civiltà Cattolica*, Salvadore Brandi, who denounced Hedley for supporting and propagating the views of Zahm.³⁴ Brandi later admitted that he had not read Hedley's article but had trusted blindly in a story in *The Tablet* which had published a favourable comment on Hedley's article, without mentioning the reservations which Hedley had actually expressed. Though no action was taken against Hedley³⁵, Brundell suggests that his reputation at the Vatican was somewhat sullied by Brandi's attack on him.³⁶ Hedley, however, was keen to have it known that the Vatican had not censured him. In a letter to a clerical friend, he observed 'no article or portion of any article of mine has ever been censured by the Holy See.'³⁷

1.4 Mivart and Supporters

St George Jackson Mivart (1827-1900) was the most prominent, and also arguably the most controversial Catholic evolutionist in the second half of the nineteenth century. Born in London in 1827 and a convert to Catholicism at the age of seventeen, he established himself as a physician and distinguished zoologist and became part of the scientific establishment in

³³ Hood, A., 'Bishop John Cuthbert Hedley. A Century On' Retrieved 24/09/2020 from <http://www.monlib.org.uk/papers/ebch/2015hood-hedley100.pdf>.

³⁴ *Ibid.* p. 9.

³⁵ *Ibid.*

³⁶ Brundell, *op. cit.*, p.92.

³⁷ Hood, *op. cit.*, p. 7.

London. He was a graduate of King's College, London, a Fellow of three scientific Societies, the Zoological, the Linnaean and the Royal, in addition to being the recipient of a PhD degree from Pope Leo XIII and a Doctorate in Medicine from the Catholic University of Louvain. He met T. H. Huxley in 1859 and attended his lectures at the Royal School of Mines, after which they became friends. Later, they drifted apart, possibly owing to Huxley's bitter and outspoken anti-Catholicism.³⁸ When Mivart adversely criticised Darwin's *Descent of Man* (1871), however, Huxley and other members of the Darwin circle turned against him. Darwin himself was very hurt and attributed the adverse criticism to Mivart's bigotry.³⁹

Darwin, nevertheless, took Mivart's criticism of his theory as set forth in *Origin* seriously and devoted a special section in the sixth edition (1872) of the book to answering each point methodically. Mivart had conveniently listed his objections in the first edition of his *Genesis of Species*⁴⁰. In an article in *The Contemporary Review*, Mivart explains his reasons for writing this book:

My *Genesis of Species* was written with two main objects: my first object was to show that the Darwinian theory is untenable and that natural selection is not the origin of species. This was and is my conviction purely as a man of science, and I maintain it upon scientific grounds only. My second object was to demonstrate that nothing in Mr Darwin's theory, as then put forth, and *a fortiori* in evolution generally, was necessarily antagonistic to Christianity.⁴¹

Mivart was a prolific author, producing more than two dozen books and a great

³⁸ One of Huxley's more memorable comments about the Catholic Church was: 'In addition to the truth of the doctrine of evolution, indeed, one of its greatest merits in my eyes, is the fact that it occupies a position of complete and irreconcilable antagonism to that vigorous and consistent enemy of the highest intellectual, moral, and social life of mankind--the Catholic Church.' TH Huxley, *Darwineana* V, 1871, retrieved 03/09/2020 from *Collected Essays Project Gutenberg E-book*.

³⁹ *Encyclopaedia Britannica*, 'Saint George Jackson Mivart', retrieved 24/09/2020 from <https://www.britannica.com/biography/Saint-George-Jackson-Mivart>; Johnston, G. S., *op. cit.*, p.130.

⁴⁰ Mivart, St G. J., *On the Genesis of Species*. London: Macmillan & Co., Ltd., 1871.

⁴¹ Mivart, St G. J., 'Evolution and its Consequences'. *The Contemporary Review*. Vol. 19, (Dec. 1871), p. 168.

number of articles for about a dozen different journals.⁴² Though he was a convinced evolutionist and agreed that natural selection was a factor in this process, he felt that there were other, as then unknown, forces also involved. He believed that though man's body evolved from an earlier hominid, his soul was created by God and infused into the body of the first *Homo sapiens*.⁴³

Mivart, in addition to his books and numerous articles in English and American journals, was either the author or the subject of more than three score letters or articles in the Catholic weekly newspaper, *The Tablet*.⁴⁴ In the light of this, it may be helpful to read his own version of the reasons for his frequent appearances in print:

When the evolutionary movement began, I should only have been too glad to remain quietly in my corner, listening to wise words from men of light and leading amongst the clergy. Indeed, I longed to see the faith justified, and its learned assailants ignominiously driven back by my ecclesiastical superiors. Yet not only did I listen in vain, but I read a good many clerical manifestations, which, it seemed to me, could only make matters worse and worse, while I saw that none said things which, in my view, much needed saying. Thereupon I published my articles in *The Month*, followed by my *Genesis of Species* and my *Lessons from Nature*.⁴⁵

Mivart then said that he would have remained silent after this, had not an Irish priest, Rev Jeremiah Murphy, attacked his religious orthodoxy. In an article, 'Evolution and Faith', in the *Irish Ecclesiastical Record* of December 1884, Murphy insisted that Catholic teaching was unequivocal in relation to the creation of Adam and Eve.⁴⁶ He stated, 'the theologians

⁴² The magazines to which Mivart contributed included: *The Quarterly Review*; *The Month*; *The Dublin Review*; *The American Catholic Quarterly*; *The Catholic World*; *The Fortnightly Review*; *The Forum*; *Natural Science*; *The Eclectic Magazine*; *Popular Science Monthly*; *The Annals and Magazine of Natural History*; *The Irish Ecclesiastical Record*; *The American Catholic Quarterly*.

⁴³ Mivart, *op. cit.*, 1871, pp. 20-23.

⁴⁴ *Vide The Tablet*, 19/4/1879; 21/2/1885; 7/3/1885; 16/5/1885; 18/7/1885; 9/7/1887; 8/10/1887; 4/2/1888; 2/11/1889; 3/12/1892; 10/12/1892; 11/2/1893; 18/2/1893; 24/6/1893; 4/11/1899; 11/11/1899; 6/1/1900; 13/1/1900; 3/2/1900; 10/2/1900; 3/12/1900.

⁴⁵ Mivart, St G. J., 'A Retrospect', *The Tablet*, 20/5/1893, p. 764.

⁴⁶ Murphy, J., 'Evolution and Faith', *The Irish Ecclesiastical Record* (hereafter *IER*), 3rd Series, Vol. 15, (Dec. 1884), pp. 759-766.

and teachers of the Catholic Church assert with the most extraordinary unanimity the immediate formation of the bodies of our first parents'. He went on, 'consequently we are not free to hold the evolution theory, even with reference to the body of the first man.'⁴⁷

Murphy's article in the *Irish Ecclesiastical Record* sparked off a notable controversy and, arguably, was one of the factors that set Mivart on a path which proved increasingly challenging and provocative to the hierarchy and the Vatican. In addition to inserting a letter in *The Tablet*,⁴⁸ Mivart also wrote a more extended article for *The Nineteenth Century* in which he described his response:

I felt bound to speak again. Having taught that biological science and Catholicity were, for certain reasons, in complete harmony, I could not honestly allow those reasons to be so repudiated, without trying to show cause against their repudiation. Accordingly, I published in *The Nineteenth Century* for July 1885, my article entitled *Modern Catholics and Scientific Freedom*.⁴⁹

The editor of *The Tablet*, at this stage, intervened, devoting a leader to the topic. It pointed out that earlier in the pages of the same journal, Rev Robert Francis Clarke (d. 1906) had shown that authorities in biology and theology had come to the conclusion that Catholics are free to hold that the body of the first man had naturally evolved by the same ordinary secondary laws by which the bodies of his fellow animals had evolved.⁵⁰ An extract from the writings of Cardinal Newman was quoted to support the writer's point that what is true in one branch of knowledge is valid in all other branches of knowledge.⁵¹

As Mivart's exasperation with what he regarded as scientifically ill-informed Catholics grew, his writings drew irritate responses from an increasing number of people.

⁴⁷ *Ibid.*

⁴⁸ Mivart, *The Tablet*, 09/05/1885, p. 737.

⁴⁹ Mivart, *The Tablet*, 20/5/1893, pp. 764-765.

⁵⁰ *The Tablet*, Leader, 'Theology and Biology', 8/7/1885, p. 82.

⁵¹ *Ibid.*

Among these were Rev John Gneimer⁵², Rev James J. Fox⁵³ and Rev George M. Searle.⁵⁴

In later life, Mivart began to devote more of his writings to philosophical and theological subjects. Gradually, his discussion of theological matters became more and more provocative to Catholic authorities, including the Holy Office. He questioned the appropriateness of the Roman Congregations, the continuity of the Catholic Church, and alleged that some ‘good’ Catholics questioned, even did not believe in such central doctrines as the Resurrection of Jesus, His supernatural conception and the virginity of Mary, mother of Jesus. The final straw seemed to be the publication of a series of three articles in *The Nineteenth Century* on ‘Happiness in Hell’. Mivart proposed that the punishments of hell were not eternal, and that hell is compatible with some kind of happiness. This article was condemned and placed on the *Index of Forbidden Books* in July 1893. Mivart was charged with apostasy and was formally asked to recant by Cardinal Vaughan, something which he refused.⁵⁵ When Mivart died in 1900, he was refused a Catholic burial. He was consequently interred in the Dissenters’ Chapel, All Souls Cemetery, Kensal Green. Subsequently, following the intervention of some of his friends, his remains were disinterred, and he was finally laid to rest in St Mary’s Catholic Cemetery, Kensal Green, on 18 January 1904.⁵⁶

After his death, most of Mivart’s critics were generous in acknowledging his great contribution to evolutionary studies and, in his earlier life, his services as a Catholic apologist. Tributes to him appeared in publications in England and the USA from authors like

⁵² Gneimer, J., ‘Liberty of Catholics in Scientific Matters’. *The Catholic World*, Vol. 48, Issue 284, Nov. 1888, pp. 145-150.

⁵³ Fox, J.J., *The Catholic World*, Vol. 70, Issue 420, March 1900, p. 725.

⁵⁴ Searle, G. M., *The Catholic World*, June 1900, p. 354.

⁵⁵ *The Catholic Encyclopaedia*, ‘St George Jackson Mivart’. Retrieved 19/12/2021 from <https://www.newadvent.org/cathen/10407b.htm>.

⁵⁶ *The Tablet*, 07/04/1900, p. 545, Obituary, St George Mivart.

Rev J. J. Fox of the Catholic University of America, Rev Arthur Ryan and Rev John Gmeiner were among those who expressed their appreciation of Mivart's service to the Catholic cause.⁵⁷

As we mentioned above, Mivart was a prolific writer and his ideas on reconciling evolution with Catholicism influenced several Catholic scientists and writers abroad, including some in the United States, Spain, France and Germany. Rev John A Zahm of Notre Dame University in the United States had some things in common with Mivart. They were both practicing scientists, they were both great publicists and they were both delated to the Holy Office.⁵⁸

1.5 Wider Participation in the Dialogue

In October 1896, Rev David Fleming OFM reviewed Rev John Zahm's book, *Evolution and Dogma*, in *The Dublin Review*.⁵⁹ It was a favourable review in which Fleming, apart from some minor misgivings, expressed general agreement with Zahm's thesis. *The Tablet* of 14 November 1896, in its review of the October issue of *The Dublin Review*, praised Fleming's article, stating that it was 'admirable for lucidity and perfect in tone'.⁶⁰ The review also added that, 'Like Father Zahm, the learned Franciscan brings the matter

⁵⁷ Fox, J.J., *The Catholic World*, Vol. 70, Issue 420, March 1900, p. 725. *Ibid.*, Vol. 48, Issue 284, Nov. 1888, pp. 145-150; Ryan, A., *The Tablet*, 16/2/1885, p. 780; Gmeiner, J., *The Tablet*, Vol. 48, Issue 284, Nov. 1888, pp. 145-150.

⁵⁸ The case of Rev John Zahm CSC is discussed below.

⁵⁹ David Fleming (1851-1915) was born in Killarney, Co. Kerry, and entered the Franciscan (OFM) Order, making profession in 1870. Ordained 1875, he was appointed professor of Sacred Scripture and, in 1901, Vicar General of his Order, necessitating his transfer to Rome. He was a member of the Special Commission on Anglican Orders and was consulted by Pope Leo XII on the effect of his Bull, *Apostolica Curae* (*The Tablet*, 14/11/1896). His writings which treat of evolution include an article in *The Dublin Review* (vol 119, Oct. 1896, pp. 245-55) and letters to *The Tablet*. He was an admirer of the writings of Rev John Zahm CSC and Rev Erich Wasmann SJ. He was a confidant of St George Mivart, and, ironically, was appointed a consultant in the Holy Office, Rome, in 1897. He was appointed Secretary to the Pontifical commission on Biblical Studies set up by Leo XIII in 1901 (*The Tablet*, Notes, 04/01/1902, p.10).

⁶⁰ Though the review was unsigned it was probably written by the Editor, George Elliott Rankin. Vide history of *The Tablet* in <https://www.thetablet.co.uk/other/history-of-the-tablet-3>.

discussed within the grasp of those who are neither scientists nor theologians.’ The writer noted that Fleming had expressed agreement with the opinions of Rev Zahm and Dr St George Mivart, who both held that, though God created the soul of Adam, his body had evolved from earlier hominids and, ultimately, from a pristine simple organism. Moreover, the reviewer agreed with Fleming that neither scientific nor exegetical reasons could deter people from asserting that the principle of evolution could aptly be applied in the case of the body of Adam.⁶¹

This review in *The Tablet* (14 November 1896) affirming Fleming’s article and deeming it ‘admirably clear’ seemed to provoke the irritation of Rev Arthur Hinsley, who immediately wrote to the same paper severely criticising Fleming’s article and calling it ‘most vague, unphilosophical and misleading’.⁶² Hinsley also labelled Fleming’s theological view as being ‘Scotist’, meaning that his thinking was influenced by John Duns Scotus (1265-1308), whose works, in some eyes, were as worthy of a place on the seminary curriculum as those of Thomas Aquinas (1225-1274).⁶³

Hinsley’s letter to *The Tablet* displays familiarity with Aquinas’ works, and he occasionally supports his points by quoting the latter’s original Latin. Hinsley also questions the adequacy of Fleming’s definition of evolution and calls it ‘a travesty of St Thomas’. He does not, however, make any notable point for or against evolution. Commenting on Fleming’s conviction that the theory of evolution had passed from the state of possibility to the state of probability, Hinsley added, ‘A probable theory that is still in the twilight of

⁶¹ *The Tablet*, 14/11/1896.

⁶² Arthur Hinsley, born in 1865 in Selby, Yorkshire, studied at Ushaw, Durham, and at the English College, Rome, before being ordained in 1893. He became Rector of the English College in Rome and was nominated a Domestic Prelate. In 1928, he was consecrated a bishop and in 1935 he was appointed Archbishop of Westminster, becoming Cardinal in 1937. After his death in 1943, the *London Times* deemed him the most popular Cardinal England ever had and the greatest since Thomas Woolsey (1471-1530).

⁶³ *Ibid.*, 21/11/1896; Pope Leo XIII, in his encyclical, *Aeterni Patris* (1879), prescribed the works of St Thomas Aquinas for all Catholic seminaries.

hypothesis seems nothing more than an illogical nebula'.⁶⁴

It soon became apparent that Fleming's article in *The Dublin Review* and the affirmation it received from *The Tablet's* reviewer had touched a tender spot in Catholic sensibilities because it gave rise to letters from other correspondents, one of the most prominent being St George Mivart. In a letter responding to Father Hinsley, Mivart explained his reasons for becoming involved in the dialogue between proponents of evolution and Catholicism. He stated that, in his contentions about evolution, he held fast to certain objectives:

I have always had two objects in view: the first of these was to show non-Catholics to be mistaken in thinking the Church condemned what to them were evident scientific truths. My second, and far more important object was to hinder those who (with a want of charity, to me appalling) would close the portals of the Church against all who in science, history or criticism were less ignorant than themselves. We often hear warnings against scandalising the weak; is no charity due to the strong?⁶⁵

In December 1882, *The Tablet* contained a rather lengthy unsigned review, very likely the work of the editor, George Elliott Ranken, of Andrew Wilson's book, *Chapters on Evolution*.⁶⁶ Wilson (1852-1912) was a Scottish zoologist, physiologist and author of several books on different aspects of biology. The reviewer praised Wilson for his impartial survey of the controversial topic of evolution, saying that facts should always precede theories:

No preconceived opinions can stand in conflict with the evidence of the senses, if such evidence be forthcoming in overwhelming abundance. The wisdom which has guided Christians on the whole with respect to astronomy and geology will doubtless not forsake them in their attitude towards any science marching with firm steps in the footprints of creation. They will eschew theories in favour of established facts and welcome every evidence of Divine wisdom which the origin of species, natural selection, the survival of the fittest, evolution, development, and all the other great factors of biological science may present.⁶⁷

⁶⁴ Hinsley, A., Letter. *The Tablet*, 21/11/1896,

⁶⁵ Mivart, St G. J., Letter. *The Tablet*, 26/12/1896, p. 1022,

⁶⁶ Wilson, A., *Chapters on Evolution*. London: Chatto & Windus, 1883.

⁶⁷ *Ibid.*, 2/12/1882. Book Reviews, *Chapters on Evolution* (London: Chatto & Windus, 1883) by Andrew Wilson; quote from Mivart, St G., *On the Genesis of Species*. London: Macmillan & Co., Ltd., 1871.

Francis Edward Arundel, 12th Baron Arundel of Wardour (1831-1906), regarded by some as well-informed in the evolutionary studies of the day, expressed disappointment at the apparent acceptance by the Catholic community of St George Mivart's version of evolution.⁶⁸ A book, published some years earlier, containing the correspondence between Arundel and Mr Edward Ryley (1812-1896), an actuary and prominent member of the London Catholic community, gave evidence of wide reading by both in the area of science.⁶⁹ In his letter to *The Tablet*, Arundel remarked:

There was a time, somewhat indefinite and yet not very remote, when Christendom believed that all men were descended from Adam, who was created out of the dust by the Almighty, who also created the universe....and it now comes about that I find myself writing to you to ascertain whether I am the only man left in the world who retains this belief.⁷⁰

Another prominent Catholic who availed of the pages of *The Tablet* to air his views on evolution was Edmund Sheridan Purcell (1823-1899), biographer of Cardinal Manning (1808-1892). In his letter of 6 May 1882, Purcell is keen to emphasise that there can be no real antagonism between the truths of nature and the truths of revelation. While he looked forward to the time when Darwinism would be proved true, he had no doubt that the first man was created with a soul which was in the image of God:

Whether or not the physical structure of pre-Adamite man was evolved out of a primeval germ in an almost infinite series of evolution, including the soulless ape, we may safely leave to science to investigate and, if so be, to determine. What we know with certainty is what concerns us most, that the first man with a soul created in the image and likeness of God was Adam, the only real father of our race, to whose glory and to whose sin alike we alone are heirs.⁷¹

⁶⁸ Arundel is cited as an authority on the literature relating to evolution by Edwin de Lisle MP in *The Tablet*, 05/04/1884.

⁶⁹ *The Scientific Value of Tradition - A Correspondence Between Lord Arundel of Wardour and Mr E. Ryley - With a Letter from The Rev. H. Formby on The Christian Science of Tradition*. London: Pickering, 1879. Recovered 26/07/2021 from <https://www.goodreads.com/book/show/39994221-the-scientific-value-of-tradition>.

⁷⁰ Arundel, Lord, Letter, *The Tablet*, 26/6/1880, p. 820.

⁷¹ Purcell, E. S., Letter, *The Tablet*, 6/5/1882.

Like several letters to *The Tablet* on controversial matters, Mr Purcell's letter drew a response. The following week, a correspondent, signing himself 'Inquirer', called Purcell 'a thorough evolutionist', while expressing scepticism, even disbelief, about evolution. He stressed that no sign of the 'missing link' had been found either in history, archaeology or geology. He concluded that it could only be found in the imagination.⁷²

Letters from Rev Arthur Ryan, President of St Patrick's Seminary, Thurles, Ireland, on the subject of evolution appeared in *The Tablet* in 1884. The first letter was written in response to a statement of Mr Edwin de Lisle MP, son of Ambrose Philipps de Lisle, one of the most prominent Catholics in England, about the biblical flood. At the time, the question of the universality of the Noachian Flood was being hotly debated and was the subject of numerous letters in *The Tablet*. De Lisle had joined enthusiastically in the debate.⁷³ However, in his letter to the editor of *The Tablet*, De Lisle made what was to Ryan a provocative statement, remarking that 'The doctrine of creation is incompatible with evolution'. Ryan replied that support for evolution was 'daily increasing'.⁷⁴ Both Ryan and De Lisle continued their correspondence for several weeks, finally tempting Lord Arundel of Wardour to join in support of De Lisle.⁷⁵

One of the more balanced and informed pieces on evolution was a leader in *The Tablet* in 1877 and was probably written by the editor, George Elliott Ranken.⁷⁶ The piece is underpinned by a wide understanding of the subject. From the start, the author is at pains to distinguish between evolution and Darwinism, the latter with its characteristic mechanism of

⁷² 'Inquirer', Letter, *The Tablet*, 20/5/1882, p. 777.

⁷³ De Lisle, E. MP, Letter, *The Tablet*, 5/4/1884, p. 538.

⁷⁴ Ryan, Rev A., Letter, *The Tablet*, 12/4/1884, p. 581.

⁷⁵ Arundel, Lord, Letter, *The Tablet*, 3/5/1884, p. 698.

⁷⁶ <https://www.thetablet.co.uk/other/history-of-the-tablet-3>.

natural selection. He suggests that, even if natural selection, which, in any case is only a process to account for evident facts, were to be put aside, evolution would still remain:

Rightly considered, it (natural selection) is but a suggestion to account for the facts of evolution. Those facts are such as no one can gainsay, but the means of accounting for them differ widely. Natural selection may be thrust aside, but evolution remains. It is the law of life, without which none of us would have been born, or, being born, would have grown to maturity.⁷⁷

Seventeen years later, another leader in *The Tablet*⁷⁸ returned to the topic of evolution. The tone of this later leader, however, is completely different to that of 1877. It will be remembered, however, that in the meantime the former editor, George E Rankin, had retired owing to ill-health and was replaced by a new editor, John Snead-Cox (1855-1939), a relative of the owner, Cardinal Vaughan.⁷⁹ The title of the leader, 'The Great Evolution Epidemic' gives a hint of the contents. It refers to people who promote evolution as 'cranks'. Different aspects of the Darwinian theory of evolution are chosen and pilloried. Thus, the theory of natural selection is ridiculed:

Failing evidence of the actual derivation of one species from another, they assumed both the process and the explanation. This led to the celebrated suggestion of natural selection and the survival of the fittest. An accumulation of facts illustrating the behaviour of plants and animals under variations in circumstances, was offered to account for variations in quality and structure, and the original process was attributed to natural selection. The facts were overwhelming in their numbers, variety, and ingenuity but the operating process remained merely imaginary, for the fact amounted to little more than a very old adage, circumstances alter cases. The phrase natural selection was a happy thought; deliciously vague, it could apply to everything and meant next to nothing.⁸⁰

1.6 Continental Europe

Though French scientists were not notable admirers of Darwin, they also had

⁷⁷ *The Tablet*, Editorial, 15/09/1877, p. 329.

⁷⁸ *Ibid.*, Editorial, 08/09/1894, p. 362.

⁷⁹ <https://www.thetablet.co.uk/other/history-of-the-tablet-3>.

⁸⁰ *Ibid.*, Editorial, 08/09/1894, p. 362.

advocates of evolution.⁸¹ In 1887, Francois Maria Delmace Delroy OP (1828-1905) published a book, *Evolution des espèces organiques*, in which he endorsed the evolutionary theory of the English Catholic biologist, St George Mivart. Delroy's book was delated to the Vatican by M. Chalmel. The Consultors examined the book and rejected the accusation of M. Chalmel, declaring that Chalmel seemed to have misunderstood Delroy's text. Further examination of not only the first but also a second edition of the book, however, revealed some problems, especially as regards Delroy's assertion that the body of Adam evolved from a hitherto existing organism. Delroy was ordered to withdraw from sale any unsold copies of his book and to publish a retraction. This he did in *Le Monde* newspaper on 4 March 1895, at the same time adding that his retraction was due to the fact that the Vatican had judged his assertions concerning evolution untenable. His brief statement included the following: 'I disavow, retract and repudiate all that I have said, written and published in favour of that theory'.⁸²

The judgement of the Holy Office read:

The author is to be warned as follows: the doctrine of the book, or rather the doctrine of evolution, is unsustainable, for it is in itself contrary to science and faith. It is condemned by true ontological and empirical science: ontology, because the type is immutable, incapable of all evolution either towards the greater or towards the less; empirical science, because of the phenomenon of hybridism which keeps the living species distinct. Evolution theory is temerarious and anti-Christian when applied to the human body, given that the Fathers and Sacred Scriptures speak of the formation of the body of man in a language that proves it is immediately formed by God.⁸³

Some critics see the influence of the aggressively anti-evolution writers of *Civiltá*

⁸¹ Darwin was proposed for membership of the French Academy of Sciences several times before being accepted as a corresponding member in 1878. Vide <https://www.britannica.com/topic/Academy-of-Sciences-French-organization>.

⁸² Brundell, B., 'Catholic Church politics and evolution theory, 1894–1902', *British Journal of History of Science* (hereafter *BJHS*), 2001, 34, p. 87.

⁸³ *Ibid.*, p. 88; The Secretary of the Holy Office at the time was His Eminence, Cardinal Raffaele Monaco La Valetta. Vide also https://en.wikipedia.org/wiki/Congregation_for_the_Doctrine_of_the_Faith#Prefects_since_1965.

Cattolica behind the delation and admonishment of Delroy. As will be seen below, similar treatment was meted out to Rev Raffaello Caverni, Bishop J.C. Hedley OSB and Rev John A. Zahm CSC.⁸⁴

Raffaello Caverni (1837-1900), was born in Tuscany, Italy, and received a good scientific education in Florence. After ordination to the priesthood and some years teaching, he was assigned to a small rural parish, where his light duties left him time to study and write. He remained in the same parish for the remainder of his life. One of the topics he researched extensively was organic evolution.⁸⁵ Some of his articles were published in book form in 1877 under the title, *De' nuovi studi della filosofia, discorsi di R. C. ad un giovane studente*. (*On the new studies of the philosophy, talks of R.C. to a young student*).⁸⁶

Unfortunately for Caverni, Rev Pietro Caterini SJ, who was on the staff of the Jesuit Roman newspaper, *La Civiltà Cattolica*, noticed the book and devoted several articles in his paper to critiquing the book for its theological content.⁸⁷ It will be recalled that the mission of *La Civiltà Cattolica*, founded in 1856 by Rev Carla Maria Curci, was to promote Catholic culture and defend Catholic truth.⁸⁸ Though not an official organ of the Vatican at the time, the paper has been described as a 'quasi-official source of the parameters of orthodoxy, which was in the forefront of the attack on Darwinism'. It was believed at the time to be influential with the Curia, but examination of the now open but hitherto closed Vatican files

⁸⁴ *Ibid.* p. 89.

⁸⁵ Darwin's *Origin* was translated into Italian by Giovanni Canestrini and published by Zanichelli (Modena) in 1864.

⁸⁶ Boccaletti, D., 'Raffaello Caverni and the Society for the Progress of the Sciences: an independent priest criticized by the lay scientists.' *Physis; Rivista Internazionale di Storia Della Scienza* 48(1-2), July 2012, pp. 3-4.

⁸⁷ *Ibid.*, p. 4.

⁸⁸ Logan, O., 'A Journal. La Civiltà Cattolica from Pius IX to Pius XII (1850-1958)'. *Studies in Church History*. Vol. 38: *The Church and the Book*, 2016, *passim*.

suggests that the paper's influence may have been exaggerated.⁸⁹

Following the publicity which Caverni's book received in *Civiltá*, it came to the attention of the archbishop of Florence, Mgr Eugenio Cecconi, who denounced the perceived theological errors which it contained. Subsequently, it was delated to the Congregation of the Index. At the request of this congregation, an eminent Dominican, Tommaso Maria Zigliara OP, submitted a 99-page report on the book. On the basis of this report, the Congregation of the Index listed the book in the *Index Librorum Prohibitorum* by decree of 1 July 1878. The book remained on the Index until the *Index* was formally abolished by Pope Paul VI in 1966.⁹⁰

In an appendix to his book, *Seguiamo la ragione* (1898), Bishop Bonomelli (1831-1914) of Cremona made an illusion to Darwinism and to attempts to Christianize evolution theory. The fact that he mentioned attempts at a Christian version of evolution but did not condemn it was regarded as a serious omission. Brundell notes that though Bonomelli was not formally contacted by the Sacred Congregation, he was persuaded by friends to make a public declaration distancing himself from evolutionary theory. This he did in a letter to the newspaper, *Lega Lombarda* of 25-26 October 1898. *La Civiltá* made sure that this letter was reprinted in full in its pages on 5 November 1898.⁹¹

The bad experiences Pope Pius IX endured in the early years of his pontificate, following the wave of revolutions that swept across Europe in 1848, made him not only fearful of developments in the modern world but convinced that there could be no reconciliation between the Catholic Church and modern society.⁹² This was stated

⁸⁹ *Ibid.*, p. 4.

⁹⁰ *Ibid.*

⁹¹ Brundell, *op. cit.*, p. 91.

⁹² Hennessy, J., 'Leo XIII's Thomistic Revival: A Political and Philosophical Event'. *Journal of Religion*, Vol. 58, 1978, pp. 185-187.

unequivocally in the *Syllabus of Errors* (1864).⁹³ He was convinced that the principles of the French Revolution were the main cause of the undermining of the hitherto stable social, moral and religious order. Pius IX called on Catholic intellectuals to come to the aid of the Church in this crisis. In Rome, he recruited a group of reactionary Jesuit intellectuals and writers, whom he enrolled in a college, commissioning them to publish *La Civiltà Cattolica*, a journal dedicated to the defence of Catholic truth and the support of the papacy.⁹⁴

Civiltà Cattolica, has long been suspected of an aggressive anti-evolution policy in the late nineteenth century. There is good evidence to support the claim that it was the journalism of this group which was largely responsible for focussing the attention of the Holy Office on advocates of evolution such as John A Zahm CSC, St George Mivart, Raffaello Caverni, Dalmace Leroy OP and Bishop John C Hedley OSB.⁹⁵ *Civiltà* continues to be published to this day and is still continues to be 'vetted' by the Holy See's secretariat of State before publication.⁹⁶ Modern research, facilitated by the opening of the archives of the Holy Office to researchers in 1998, indicates, however, that the influence of this journal during the last decades of the nineteenth century was less than was formerly thought.⁹⁷

Since history has come to judge the editorial team of *Civiltà Cattolica*, which was in office toward the end of the nineteenth century rather harshly, it is important to remember that, though all the members of the team were Jesuits, they were a small group, selected individually for their special skills and reactionary attitudes. They were by no means

⁹³ Pope Pius IX, *Syllabus of Errors*, 1864. Retrieved 26/11/2021 from <https://www.papalencyclicals.net/pius09/p9syll.html>.

⁹⁴ Hennessy, *op. cit.*, pp. 186-187.

⁹⁵ Brundell, *op. cit.*, pp. 90-91.

⁹⁶ Canaris, M. M., 'A Case Study in the Battle over Evolution', *The Catholic Star Herald*, retrieved 01/08/2021 from <https://catholicstarherald.org/a-case-study-in-the-battle-over-evolution/>.

⁹⁷ Artigas, M., Glick, T. F. and R. A. Martinez, *Negotiating Darwin: The Vatican Confronts Evolution, 1877-1902. Medicine, Science and Religion in Historical Context*. Baltimore: Johns Hopkins University Press, 2006, passim.

representative of the Jesuit congregation as a whole.⁹⁸ While the attitude of Pius IX's successor, Leo XIII, was more open to a reconciliation between Catholicism and secular sciences, the reactionary ethos of the *Civiltá* college persisted in the Vatican, and its influence arguably increased during the pontificate of Leo XIII's successor, Pope Pius X.⁹⁹ Leo XIII, himself, however, was keen to see more scientific education in the educational curriculum of the clergy. In fact, he expressed a wish for this in the education of seminarians in his encyclical *Etsi Nos*, issued on 15 February 1884.¹⁰⁰

1.7 The United States

In the closing decades of the nineteenth century, there was a lively debate about evolution among Catholic intellectuals in the United States.¹⁰¹ In large part this was encouraged by the controversy over a book by Rev John A. Zahm CSC entitled, *Evolution and Dogma*.¹⁰² Zahm (1851-1922), a professor of physics at the University of Notre Dame, argued for a reconciliation between evolution and Catholic faith by means of a thesis of primary and secondary causation. Essentially, Zahm was promoting Mivart's theory of evolution. He claimed that it was permissible to regard the body of Adam as evolving from some earlier more primitive animal and that there was 'nothing in Evolution, when properly understood, which is contrary to Scripture or Catholic teaching'. 'On the contrary', he said, when viewed in the light of Christian philosophy and theology, there 'much in Evolution to admire, much that is ennobling and inspiring'.¹⁰³ Prompted by *Civiltá Cattolica*, Zahm's book

⁹⁸ Logan, *op. cit.*

⁹⁹ Brundell, *op. cit.*, pp. 83-84; Logan, *op. cit.*

¹⁰⁰ Pope Leo XIII, Encyclical *Etsi Nos*, 15 February 1884, par. 20, retrieved 28/04/2020 from http://www.vatican.va/content/leo-xiii/en/encyclicals/documents/hf_1-xiii_enc_15021882_etsi-nos.html.

¹⁰¹ Mislin, D., 'According to His Own Judgement': The American Catholic Encounter with Organic Evolution, 1875-1896'. *Religion and American Culture: A Journal of Interpretation*, Vol. 22, Issue 2, 2012, pp. 133-162.

¹⁰² Zahm, J. A., *Evolution and Dogma*. Chicago: D.H. McBride, 1896.

¹⁰³ *Ibid.*, p. xxx.

was denounced to the Congregation of the Index on 5 November 1897 by Bishop Otto Zardetti, former Bishop of Minnesota, then retired. In his denunciation, Zardetti cited as evidence a hostile review by Fr Brandi in *Civiltá Cattolica*.¹⁰⁴

The Congregation of the Index chose to reprimand Zahm privately through his own Superior General rather than publicly. Zahm withdrew the English edition of *Evolution and Dogma* and wrote to the Italian translator of the book, requesting that he use his influence to have the Italian edition withdrawn from sale.¹⁰⁵ After this disappointment, Zahm abandoned science and withdrew from the controversy about evolution. Instead, he became involved in the administration of his own congregation¹⁰⁶ and later went on to make a name for himself as an explorer and travel writer.¹⁰⁷

Several members of the Paulist congregation (CSP) made significant contributions to the evolution/Catholicism debate in the second half of the nineteenth century. The Paulist congregation was founded by Rev Isaac Hecker and friends in 1858. The new congregation was devoted to the spreading of the Gospel through the media and its first significant publication was *The Catholic World*, founded in 1865. Rev Augustine Hewit became its editor and, in addition to writing on evolution, he also welcomed contributions from other journalists on this topic. Rev Clarence Walworth (1820-1900) was a colleague of Hewit in addition to being a fellow member of the Paulist congregation. Though a skilled amateur geologist, he was sceptical about evolution, feeling that it lacked anthropological evidence. Nevertheless, he was enthusiastic about all Catholics becoming more knowledgeable about

¹⁰⁴ Appleby, R. S., 'Between Americanism and Modernism: John Zahm and Theistic Evolution'. *Church History*, Vol. 56, No. 4 (Dec. 1987), 487-490.

¹⁰⁵ Brundell, *op. cit.*, p. 91.

¹⁰⁶ O'Connor, T. F. 'John A. Zahm, C.S.C.: Scientist and Americanist', *Americas* 7 (1951) 435-462, p. 453; Appleby, *op. cit.*, p. 487.

¹⁰⁷ Zahm, J. A., *Along the Andes and down the Amazon*, New York: D. Appleton, 1911, *passim*; Zahm, J. A., *The quest of El Dorado*, New York: D. Appleton and Co., 1917, *passim*.

science. His ideas on evolution are set forth in his book, *The Gentle Skeptic*.¹⁰⁸

The publication of Darwin's *Descent of Man* in 1871 aroused new interest in the subject of polygenesis. Walworth wrote at some length on this subject, which was by then a strong under-current in American thought.¹⁰⁹ Like another famous American Catholic, Orestes Brownson (1803-1876), Walworth felt that polygenism was not only a threat to the Catholic dogma of Original Sin but that it also had racial implications that challenged Catholic beliefs in the consanguinity of humanity. In developing an argument against polygenism, as Wiseman did long before him, Walworth advanced two causes of variation in racial characteristics, one gradual and one sudden. The gradual change was the result of an accumulation of small changes over time, which Lamarck (1744-1829) had earlier suggested. The sudden changes were produced by an internal natural force that acted without warning in the 'process of gestation'. This unknown internal force, guided by Providence, caused large variations or 'saltations'.¹¹⁰ The latter word was coined by Geoffroy Saint-Hilaire (1772-1844) as an explanation for the development of new species. In the 1860s, Saint-Hilaire's suggestion was revived by Albert von Kolliker (1817-1905), an opponent of Darwinism, as part of his theory of polygenesis. Today, 'saltations' are an integral part of evolutionary theory but are now known as mutations.¹¹¹

Rev George M Seale (1839-1918) was another member of the Paulist congregation who took an active part in the debate on evolution and Catholic doctrine. Seale, born in

¹⁰⁸ Walworth, C. A., *The Gentle Skeptic; or Essays and conversations of a country justice on the authenticity and truthfulness of the Old Testament records*. New York: P. O'Shea, 1863, passim; Astore, W. J., 'Gentle Skeptics? American Catholic Encounters with Polygenism, Geology, and Evolutionary Theories from 1845 to 1875'. *Catholic Historical Review*, Vol. 82, No. 1 (Jan. 1996), p. 50.

¹⁰⁹ Astore, *op. cit.*, p. 41.

¹¹⁰ Elliott, Rev. Walter, 'Father Walworth: A Character Sketch'. *Catholic World* (New York, New York: The Paulist Fathers) 73 (June 1901): 320-337.

¹¹¹ Alexander, D., *Creation or Evolution. Do we have to Choose?* Oxford: Monarch Books, 2008, pp. 75ff.

England, emigrated with his parents to the United States while still a child. He was already a well-known astronomer when he was converted to Catholicism and joined the Paulist congregation. Seale was a dedicated evolutionist and had no difficulty in accepting natural selection. While never aggressive, he was, nevertheless, a no-nonsense advocate of Darwinism, though he insisted that man's soul was created by God. His promotion of evolution was quiet but insistent. In his review of George Romano's book, *Darwin and after Darwin*, he wrote:

The importance and the prominence and the doctrine of evolution in the biology of the present day cannot be denied and can hardly be overestimated. It has obtained the assent of almost all those who are actively occupied in the investigations of that science, and one cannot deny it, ignore it, or in any way dismiss it without putting one's self outside what are recognized as scientific circles.¹¹²

Seale's unwavering support for evolution was unusual among clergymen of his time. Fortunately for him, perhaps, he was a dedicated scholar and avoided public disputes. In his review of Romanes' book, he made what was for an astronomer a significant statement and, for a Catholic priest, a surprising, if not a historic claim at that time. He wrote:

The fact is that evolution in the organic world is, practically speaking, as much taken for granted by scientific workers in the departments which it concerns as the Newtonian doctrine of gravitation by astronomers.¹¹³

Rev John Gmeiner (1847-1915) was another Paulist who was also well educated in science and who wrote a significant amount on science and religion. One of Gmeiner's firm convictions was his belief that science and religion should never contradict one another. He emphasised that it was not the mission of the Church to interfere in purely scientific matters. He stated this clearly in one of his articles in *The Catholic World*:

A Catholic scientist must always bear in mind that no fact of science can ever really contradict any truth of divine revelation. God, being author of both nature and revelation, cannot teach contradictory propositions. Hence scientific truths can never

¹¹² Searle, G. M., 'Evolution and Darwinism', *The Catholic World*, Vol. 56, Oct. 1892-Mar. 1893, p. 223.

¹¹³ *Ibid.*

be contrary to truths of revelation, but they may, and generally are, outside of the domain of divinely revealed doctrines. Intelligent Catholics of all ages are well aware that God never intended to teach mankind all possible knowledge by his supernatural revelation, but that he has left to human investigation the vast realm of the visible universe.¹¹⁴

Gmeiner felt that if Catholic scientists stuck to their own speciality and disengaged themselves from theological speculation, many disturbing controversies would be avoided. He supported his opinion by reference to the letter of Pope Leo XIII on the subject of Catholic Scientists, addressed to Rev Monsignor Mauritius d'Hulst, Rector of the *Institut Catholique* in Paris, dated 20 May 1887. His Holiness wrote:

In matters concerning theology every scientist should act as a naturalist, or historian or mathematician, critic, and never assume the character of a theologian.¹¹⁵

There was also an outstanding American Catholic layman, William Seton, who was both a professional biologist and a convinced evolutionist.¹¹⁶ A grandson of Mother Elizabeth Seton, foundress and canonized American Saint, he was a well-known Catholic and took seriously his self-appointed task of educating American Catholics on the reasonableness of evolution and assuring them that Darwinism was no threat to their faith.¹¹⁷ He published many articles in Catholic journals on evolution. He felt aggrieved that a theory almost universally accepted by scientists should be rejected by Churchmen. Catholics, he felt, should be told the plain truth so that the Church might not be scandalised among the intelligent.¹¹⁸

In his attempts to make evolution acceptable to American Catholics, some would

¹¹⁴ Gmeiner, J., 'The Liberty of Catholics in Scientific Matters', *Catholic World*, V. XLVIII, No. 248, p. 146.

¹¹⁵ *Ibid.*, p. 147.

¹¹⁶ Seton, W., 'The American Museum of Natural History'. *Catholic World*, LXIII, April 1896, p. 21; Morrison, J. L., 'William Seton: A Catholic Darwinist', *The Review of Politics*, July 1959, Vol. 21, No. 3 (Jul. 1959), pp. 566-584, *passim*.

¹¹⁷ Morrison, J. L., 'American Catholics and the Crusade Against Evolution.' *Records of the American Catholic Historical Society of Philadelphia. American Catholic Historical Society*, Vol. 64, No. 2, June 1953, p. 578. Accessed 08/04/2020, <https://doi.org/10.2307/44210303>.

¹¹⁸ Seton, W., Letter to Editor, New York, *Freeman's Journal*, 26/11/1898, p. 5.

argue that Seton relied too much on scientific arguments while underestimating the emotional and theological obstacles to its general acceptance. Darwinism, and perhaps evolution to a lesser extent, had well-known associations with names that were anathema to many Catholic clergymen, especially the names of Herbert Spencer, Ernst Haeckel and Thomas Henry Huxley.¹¹⁹ To many Catholic leaders, Darwinian evolution would likely lead to Darwinian philosophy and the denial of God the Creator.¹²⁰

1.8 Conclusion

In this chapter, it has been shown that, though the concept of evolution of plants and animals was an ancient one, the first cogent explanation of the process by which it happens was proposed by the French Catholic biologist, Chevalier Lamarck in 1810. More than half a century later, Charles Darwin published his famous book, *On the Origin of Species* (hereafter called *Origin*), which asserted that natural selection was the chief driving force behind all evolution. Almost immediately after the publication of *Origin*, Catholics began a dialogue with the proponents of evolution that has lasted to the present day.

This chapter has discussed and analysed this dialogue up to the end of the nineteenth century. Among the best informed and convincing of early Catholic participants in the dialogue was Bishop Cuthbert Hedley OSB, who anticipated by more than half a century what Pope Pius later said about evolution in the encyclical, *Humani Generis*, in 1950. Hedley was, however, delated to the Holy Office for statements in his articles and barely escaped censure from the Vatican.

Hedley was followed by Dr St George Mivart, who, though an able and enthusiastic supporter of evolution, felt that Darwin had overstated the role of natural selection. Though

¹¹⁹ O’Leary, D., ‘From the *Origin* to *Humani Generis*: Ireland as a Case Study’. Caruana, L. ed. *op. cit.*, pp. 14-19.

¹²⁰ Morrison, *op. cit.*, p. 578.

Mivart later fell afoul of the Church and was excommunicated, his positive attitude towards evolution, though less so towards natural selection, was adopted by a significant number of Catholic writers at home and abroad. Other prominent Catholics in Great Britain joined in the debate about evolution in the Catholic press, which was facilitated, if not encouraged by the editor of *The Tablet* newspaper, who also wrote some well-informed leaders on the subject.

During the last decades of the nineteenth century, the Jesuit journal in Rome, *La Civiltà Cattolica*, adopted a policy of overt opposition to evolution, eagerly seeking out and castigating any Catholic who seemed to entertain or support it. Largely as a result of this campaign, some Catholics, including clergymen, had their books on evolution banned or placed on the *Index of Forbidden Books*. Meantime, there was a small but articulate group of Catholic writers, some with a scientific background, who wrote favourably and encouragingly about evolution in the American Catholic press.

Chapter 2. The Twentieth Century: Towards Adopting a New Perspective

Introduction

In this chapter we will look at the various individuals who either participated in or influenced the discourse between evolution and Catholicism during the twentieth century. In the first half of the century, there were some gifted Catholic scientists, like Gregor Mendel and Eric Wasmann, who, because of their own achievements put, as it were, a Catholic stamp on evolution. Though the anti-modernist campaign of Pope Pius X cooled Catholic enthusiasm for evolution for a period, it was, nevertheless, quietly but effectively fostered by figures like Henry De Dorlodot and Teilhard de Chardin. Since the latter's theological books were not published until after his death in 1965, his real and considerable influence did not begin to grow until well into the second half of the century, but it continues to increase. The second half of the century began with a formal statement from Pope Pius XII in the encyclical, *Humani Generis*, to the effect that evolution was a credible hypothesis which sought to explain the development of the human body from animal forbears and to which Catholics could give their support. The Pope added, however, that it was *de fide* that each human soul was directly created by God. In the last quarter of the century, Pope John Paul II, who from the time of his election had manifested his support and esteem for the Pontifical Academy of Sciences, stated that evolution was more than a hypothesis. From then on Catholic scholars began to work enthusiastically for the integration of the theory of evolution with Catholic dogma and spirituality.

2.1 Johann Gregor Mendel (1822-1884)

Johann Gregor Mendel, an Augustinian monk, is rated one of the great scientists of all time.¹ Today he is known as the father of the science of genetics. We are devoting an

¹ Ayala, *op. cit.*, p. 198.

appreciable amount of space to Mendel and his work for two reasons: in the first case, he was a living example of a statement repeated by Popes and Catholic scientists to the effect that truth cannot contradict truth, whether the truth comes from science or revelation.² In the second instance, Mendel was a model of the Catholic scientist not only abreast of his own discipline but working quietly at the cutting edge of a new science, his research leading to the unlocking of some of the secrets of life. He was living proof of the fact that science and religion can operate hand in hand. Moreover, he ended his days as abbot of his monastery.³

Mendel was born in the Silesian part of the Austrian Empire (now Czechia). He entered the Augustinian monastery in Brno, Moravia, where he taught in the school attached to the monastery. One of his hobbies was experimental biology. His most famous experiments were with garden peas (*Pisum Sativum*). He was a meticulous researcher, spending six years at his project and working with 29,000 plants.⁴ His results were presented in two papers delivered at meetings of the local branch of a Natural History club on 8 February 1865 and 8 March 1865. His presentation was mentioned in the local newspaper.⁵ His paper, 'Experiments on Plant Hybridization', was subsequently published in two issues of the journal, *Proceedings of the Natural History Society of Brúnn*, in 1865 and 1866.⁶ Though

² Pope Leo XIII in *Providentissimus Deus* 18 November 1893; Pope John Paul II, Address to Plenary Session of PAS, 22/10/1996, par. 2, retrieved 25.08.2021 from <http://www.casinapioiv.va/content/accademia/en/magisterium/johnpaulii/22october1996.html>; Wasmann, E., SJ., Preface, *Modern Biology and the Theory of Evolution*, 3rd ed. English trans. by AM Buchanan. London: Kegan Paul, Trench, Trübner & Co. Ltd., 1910, p. vi; Gmeiner, J., 'Issue of Catholics in Scientific Matters', *The Catholic World*, Vol 48, Issue 284, pp.145 -150.

³ Olroyd, D., 'Gregor Mendel: founding-father of modern genetics?' *Endeavour*, Vol. 8, Issue No. 1, 1984, pp. 29-31. [https://doi.org/10.1016/0160-9327\(84\)90126-1](https://doi.org/10.1016/0160-9327(84)90126-1).

⁴ Cardinal, A. et al., 'Gregor Mendel's Influences for his Pea-Plant Experiments'. 2011. Retrieved 26/11/2021 from <https://sites.google.com/a/wisc.edu/ils202fall11/home/student-wikis/group8>.

⁵ *Ibid.*

⁶ Mendel, J. G., *Experiments on Plant Hybridization*. 1866. Reproduced in full in Abbott, S. and D. J. Fairbanks, 'Experiments in Plant Hybrids' by Abbott, S. and Fairbanks, D. J., *Genetics*, Vol. 204, pp. 407-422. DOI: 10.1153/genetics.116.195168.

Mendel ordered forty offprints of this classic paper to send to famous biologists, including, it is believed, Charles Darwin, it was not noticed by any of the major biologists or biological journals of the day and it lay virtually unnoticed until it was rediscovered by Carl Correns (1864-1933) in 1900.⁷

Mendel's chosen experimental plant (*Pisum Sativum*) had the great advantage that different samples of the same plant manifested different characteristics or traits, e.g., plants could be either tall or dwarfed; with white or purple flowers; with yellow or green cotyledons; with white or brownish seed coats; with inflated or shrunken pods; with green or bright yellow unripe pods; with flowers evenly distributed or hunched at the apex of the stalk. He planted numerous batches of plants, carefully observing and recording the results. His analysis of his results led him to formulate certain laws of inheritance, which he then proceeded to test repeatedly with clever critical experiments until he was sure his conclusions were valid. We can restate these laws in contemporary scientific language in the following terms:⁸

1) The Law of Segregation: Each inherited trait is defined by a gene pair.

Parental genes are randomly separated to the sex cells so that sex cells contain only one gene of the pair. Offspring therefore inherit one genetic allele from each parent when sex cells unite in fertilization.

2) The Law of Independent Assortment: Genes for different traits are sorted separately from one another so that the inheritance of one trait is not dependent on the inheritance of another.

⁷ National Human Genome Research Institute, '1900: Rediscovery of Mendel's Work'. Retrieved 16/10/2020 from <https://www.genome.gov/25520238/online-education-kit-1900-rediscovery-of-mendels-work>.

⁸ Ayala, *op. cit.*, pp. 197-198.

3) The Law of Dominance: An organism with alternate forms of a gene will express the form that is dominant.

Mendel's importance, however, does not lie only in the discovery of laws of inheritance but in fact that he articulated a theory of inheritance that has stood the test of time. Though unlucky to have his brilliant research overlooked for some thirty years by the most famous biologists of his day, he was fortunate in that it subsequently became the basis for further research by Cambridge biologists, William Bateson (1861-1926), RC Punnett (1875-1967) and RA Fischer (1890-1962). These scientists applied advanced statistics to Mendel's results and laws and came up with formulae to facilitate genetic calculations that are widely used today in estimating the extent of such things as genetic drift in a population or the incidence of certain diseases.⁹

By measuring the amount of genetic change in a population, it is possible to make predictions about the changes in genetic variation, also known as genetic drift, in a given population. These predictions can then help to throw light on how organisms adapt to an environment or even develop new species. This, in turn, gives important information about the process of evolution in practice.¹⁰

Once knowledge of Mendel's laws of heredity became widespread, evolutionary biologists began to integrate it with Darwin's theory of natural selection. It will be recalled that in the absence of knowledge of the laws of inheritance, Darwin had to rely on the old and by then discredited theory of pangenesis to explain the mechanism of the transmission of

⁹ Lande, R., 'Natural Selection and Random Genetic Drift in Phenotypic Evolution'. *Evolution*, 1976, pp. 314-334. Retrieved 12/09/2020 from First published: June 1976. Retrieved 20/12/2021 from <https://doi.org/10.1111/j.1558-5646.1976.tb00911.x>

¹⁰ *Ibid.*

genetic characteristics during reproduction¹¹. Ironically, he had the real answer to this mystery in the offprint of the research paper which Mendel is thought to have sent him. But even if Darwin never received the offprint, copies were available to him from the Royal Society, the Linnaean Society and the Greenwich Observatory. There is also the fact that a report of Mendel's work was contained in a book published by Herman Hoffman of the University of Giessen as early as 1869.¹²

The addition of Mendel's laws of heredity to Darwin's theory of evolution resulted in a new synthesis of all the related information on this subject. The new synthesis was called Neo-Darwinism by some and the New Synthesis by others.¹³ In 1942, Julian Huxley, grandson of Darwin's 'bulldog', Thomas Henry Huxley, wrote a book on the subject using the title *New Synthesis* and this name gradually became an alternative to the name Neo-Darwinism.¹⁴ In addition to Julian Huxley, there were other famous biologists whose work was incorporated in the new synthesis, including Theodosius Dobzhansky (1900-1975), Ernst Mayr (1887-1930), Thomas Hunt Morgan (1866-1945), JBS Haldane (1892-1964) and RA Fisher (1890-1962).¹⁵

¹¹ Darwin's pangenesis theory postulated that every part of the body emits tiny particles called gemmules which migrate to the gonads and are transferred to offspring. Gemmules were thought to develop into their associated body parts as offspring mature.

¹² Galton, D., 'Did Darwin read Mendel?', *QJM: An International Journal of Medicine*, Vol. 102, Issue 8, Aug. 2009, pp. 587–589, <https://doi.org/10.1093/qjmed/hcp024>.

¹³ The term Neo-Darwinism was first used by George John Romanes (1848-1894), a collaborator of Darwin's, to describe a combination of natural selection with August Weismann's theory of germ plasm. Some use the term to describe the contemporary understanding of evolution.

¹⁴ Huxley, J., *Evolution: A New Synthesis*. London: London: Allen & Unwin, 1942. It will be recalled that Thomas Henry Huxley (1825-1995), known as Darwin's bulldog, was well known in his time for his tenacious defence of Darwin's theory of evolution; see also Holton, Gerald, *The New Synthesis? Society*; Jan/Feb 1998; 35, 2; Education Database. pp. 203-212.

¹⁵ Pigliucci, M. and Müller, G. B., 'Elements of an Extended Evolutionary Synthesis', in Pigliucci and Gerd B. Müller eds., *Evolution - The Extended Synthesis*. Cambridge: Mass; MIT Press, 2010. Note: Thomas Hunt Morgan, though not a Catholic, was appointed a life member of the Pontifical Academy of Sciences by Pope Pius XI in 1933.

2.2 Central Europe

2.2.1 Germany: Erich Wasmann SJ (1859-1931)

In mainland Europe, Erich Wasmann was arguably the best known and most accomplished Catholic champion of evolution during the early twentieth century. A native of South Tyrol in Austria, after his Jesuit training in philosophy and scholastic theology, he studied biology, specialising in entomology, and published some of his studies in prestigious scientific journals. His book, *Modern Biology and the Theory of Evolution*, ran to several editions, a translation of the third edition being published in London in 1910.¹⁶ Letters in the Catholic press show that at least some English readers were familiar with it.¹⁷

In the introduction, the author describes his book as ‘an attempt at conciliation’. He went on to say that ‘it aims at harmonising the ideas of modern biology with the Christian cosmogony, and thus it was not likely to prove acceptable except to men of culture and intelligence.’ He was firmly convinced that nothing in his evolutionary studies would contradict revelation, since there was only one truth. In the preface to the English edition of his book, *Modern Biology and the Theory of Evolution*, he makes this clear:

I have spoken as a Christian engaged in scientific research, and I am firmly convinced that natural truth can never really contradict supernatural revelation, because both proceed from one and the same source, viz. the everlasting wisdom of God. Therefore, the study of modern biology and of the theory of descent, if carried on without prejudice, can tend only to the glory of God.¹⁸

Wasmann’s career as a professional biologist overlapped that of Ernst Haeckel, the best-known proponent of organic evolution in Europe, if not in the world. Haeckel, who was long-time professor of zoology at the university of Jena, was known as the German Darwin.

¹⁶ Wasmann, E., *Modern Biology and the Theory of Evolution*. Translated from the 3rd German edition by AM Buchanan MA. London: Keegan Paul, Trench, Trubner & Co. Ltd, 1910, p.vi.

¹⁷ *Vide* letters mentioning Wasmann by name in *The Tablet*, 29/02/1908; 28/03/1908; 30/08/1913.

¹⁸ Wasmann, *op. cit.*, 1910, p. xi.

He was something of a polymath, excelling as a zoologist, philosopher, artist and writer. As a writer, he was admired not only for his numerous scientific papers but also for his popular surveys of the world of science. He conducted numerous scientific expeditions, discovered and named many new specimens and had several of his books translated into other languages. His *History of Creation* (1868) was widely read and was one of the best-known scientific volumes in the world in his day.¹⁹

Haeckel's name was also associated with virulent anti-Catholicism. He singled out Erich Wasmann as a special target for his attacks. Such attention from an acknowledged intellectual giant added to Wasmann's academic profile and, arguably, helped to make the Jesuit and his evolutionary writing better known all over the Catholic world. The choice of Wasmann to write the section on evolution in the 1909 edition of *The Catholic Encyclopaedia* was in part due to the publicity he received, following his academic disputations with Haeckel. This is not to overlook that fact that it was also a sign of approval of his theistic evolutionism.²⁰

Haeckel admitted that it was Wasmann's book, *Modern Biology and the Theory of Evolution*, which prompted him to give his famous series of lectures at the Sing Akademie, Berlin, in April 1905. These lectures were spread out over three days and had a spectacular public impact. Haeckel dealt with the confrontation between evolution and dogma, the evidence that supported human evolution within the branch of primates and, finally, the controversy regarding the existence of an immortal soul. Wasmann was invited to reply and

¹⁹ Montgomery, W. M., 'Germany'. Glick, T. H. *op. cit.*, 1998, pp. 107-110. Richards, R. J. 'Ernest Haeckel and the Struggles over Evolution and Religion'. *Annals of the History and Philosophy of Biology*, Vol. 10, 2005, pp 89-100. Retrieved 30/09/2020 from https://books.google.ie/books?id=byJk8Ea0WSQC&pg=PA89&redir_esc=y#v=onepage&q=Wasmann&f=false

²⁰ Wasmann, E., 'Catholics and Evolution' in Herberman, C. G. *et al.*, eds. (1907). *The Catholic Encyclopaedia: An International Work of Reference on the Constitution, Doctrine, Discipline, and History of the Catholic Church*, Volume 1: Aachen-Assize. New York: Robert Appleton Company, pp. 654-655.

also delivered several lectures. Haeckel's Berlin lectures were published in 1906.²¹

Haeckel proclaimed the incompatibility of the theory of evolution with any religious thinking inspired by scientific fact, as represented by Wasmann, whom he deemed the most dangerous type of religious scientist. This, according to Haeckel, was not only because Wasmann dealt with the subject more ably and comprehensively than most of his colleagues, but because of his general knowledge of biology, together with his acknowledged specialist competence in entomology.²²

The 1906 book containing Haeckel's conference lectures included a notable postscript by the author entitled, 'Evolution and Jesuitism'. The great biologist considered it a triumph that the main opponent of science, 'the Church', tried to reconcile itself with evolution. Of all the (mostly frustrated) attempts at harmonisation, Haeckel emphasised the quality of Wasmann's efforts, despite the fact that he considered both doctrines, evolution and Christianity, to be absolutely opposed and irreconcilable. Wasmann's lectures were also published in book form and subsequently translated into English.²³

While Wasmann was a source of enlightenment and encouragement for many Catholics all over the world, he also attracted opposition from conservative Catholics, including conservative Catholic clergymen. The most prominent of these in the United States was Rev Simon FitzSimons, who published an entire book, *Revised Darwinism or Father Wasmann on Evolution*, criticising Wasmann's position on evolution, which FitzSimons perceived as Darwinist. Strange to say, it was not only on religious but also on scientific

²¹ Richards, *op. cit.*

²² Hofmann, J., 'Erich Wasmann SJ: Natural Species and the Catholic Polyphyletic Evolution during eh Modernist Crisis'. *Journal of Jesuit Studies* 7 (2020), p. 249.

²³ Wasmann, E., *The Berlin Discussion of the Problem of Evolution: Full Report of the Lectures Given in February 1907 and of the Evening Discussion*. London: Kegan Paul, Trench, Trubner & Co. 1909, p. 249.

grounds that Fitzsimons claimed to challenge Wasmann.²⁴

It goes, of course, without saying, that Father Wasmann is as orthodox – even in his evolution . . . From the standpoint of orthodoxy there is little to find fault with, and it is wholly from the standpoint of scientific and logical conclusion that we intend to deal with it.²⁵

The fundamental reason for FitzSimon's opposition does not emerge until quite late in his book. His complaint is not merely his opposition to Wasmann's version of evolution but to the entire concept of evolution. A further cause of irritation to Fitzsimons is the fact that the American edition of Wasmann's book, (*Modern Biology and the Theory of Evolution*) carried not only a *nihil obstat* from his own Jesuit provincial but also an 'Imprimatur' from Most Reverend John Joseph Lennon, Archbishop of St Louis.²⁶ Commenting on Wasmann's statement that 'evolution was not an experimental science, FitzSimons added, 'We quite agree with him, but it is not an experimental science for the simple reason that it is not a science at all'.²⁷

In one of his articles, Wasmann wrote that the relevance of evolution to the origin of the first human body was an open question. Though both his Jesuit superiors and officials in the Vatican Holy Office were somewhat unhappy with this statement, his work was never delated to the Congregation of the Index.²⁸ He also acted as a mentor for other Catholic evolutionists, such as Jaime Pujiula SJ (1869-1958), who taught biology for many years in

²⁴ FitzSimons, S., *Revised Darwinism, or, Father Wasmann on Evolution* (New York: P. J. Kennedy, 1910).

²⁵ *Ibid.*, p. 13.

²⁶ Wasmann, E., *Modern Biology and the Theory of Evolution*, Trans. AM Buchanan MA. London: Kegan Paul, Trench, Trübner & Co., 1910., p. 13.

²⁷ *Ibid.*, p. 89.

²⁸ Kemp, K. W., 'A Brief History of Catholic Evolutionism'. Society of Catholic Scientists. Retrieved 05/08/2021 from <https://www.catholicscientists.org/ideas/discussions>.

Barcelona.²⁹

2.2.2 Spain and Portugal

Juan Gonzales Arintero (1860-1928), a Dominican, studied physical science at the University of Salamanca before starting his theological studies. After ordination, he was assigned to a post of science teacher, during which time he continued his studies in science, especially biology. Subsequently, he did advanced studies in theology and became a lecturer in this subject. He continued his own private studies in the implications of evolution for religion and published several books, among which was one on *Organic Evolution*.³⁰ Critics regard Arintero as one of the most committed Catholic evolutionists of late nineteenth century Europe.³¹

Between 1892 and 1898, Arintero planned several volumes, covering all aspects of evolution, especially as it related to the origin of man, theology, and philosophy. The first volume of *la evolucion y la filosofia*, published 1898, was the only volume, however, to appear in his lifetime. In it, he admitted that he had originally been opposed to evolution because he was unable to counteract the scholastic thesis of the metaphysical immutability of species. This reticence he later resolved by equating the Thomist concept of species with the modern biological class. To reject evolution totally, he felt, was not possible. His understanding of evolution, however, was limited to evolution within classes, not between them. Moreover, although a self-proclaimed 'evolutionist', Arintero was more Lamarckist than Darwinist. In this, as in his call for a new natural philosophy of living beings, he urged doing for Darwin what St Thomas had done for Aristotle. Arintero was also a precursor of the

²⁹ Pereto, J. and Catala, J. I., 'A Reconciliation with Darwin? Erich Wasmann and Jaime Pujaila's Divergent views on Evolutionism: Biologists and Jesuits'. *Mètode Science Studies Journal*, 7 (2017): 87–93. University of Valencia, p. 90.

³⁰ Arintero, J. G., *Evolution and the Mutability of Organic Species*. 1898. Turnhout: Brepols. Retrieved 20/12/2021 from <https://www.isje.org/frequena/Arintero.pdf>.

³¹ Kemp., *op. cit.*

Catholic evolutionism of Pierre Teilhard de Chardin, aspects of whose thought were anticipated in the writings of more than one Spanish writer of the epoch.³² Kemp notes that the Holy Office was made aware of Arintero's book and had it reviewed in response to a more comprehensive complaint about Arintero's alleged modernism in 1908. However, the Holy Office did not deem any action against him to be necessary, a decision approved by Pope Pius X.³³

Jaime Pujiula (1869-1958), a Spanish Jesuit, went to the University of Innsbruck to study biology and there, in the course of his doctoral studies, he came under the influence of Rev Erich Wasmann SJ. Pujiula received a PhD from the University of Berlin and, on his return to Spain, founded the Jesuit Ebro Biological Laboratory at Roquetes, which subsequently evolved into the European Microbiological Laboratory in Barcelona. He published several biological papers and was a highly vocal advocate of reconciliation between evolution and Catholicism. His approach to evolution, however, owed more to St George Mivart than to Darwin.³⁴

2.2.3 Teilhard de Chardin

Pierre Teilhard de Chardin (1881-1955) was a major figure in the dialogue between Christianity and evolution. Teilhard, who entered the Jesuit novitiate in Aix-en-Provence in 1899, continued his theological studies in Hastings, England, during the years 1908-1912. During this period, he studied Henri Bergson's creative evolution (*élan vital*).³⁵ He was influenced by Bergson's notion of nature as a giant process of development, groping its way

³² Requena, F. M., 2017, Arintero, Juan Gonzales. *Dictionnaire d'histoire et de géographie ecclésiastiques*. Turnhout: Brepols Publishers, 2017, vol. 32, cols 514518, in *Brepols Encyclopaedias*, p. 342.

³³ Kemp, *op. cit.*, p. 5.

³⁴ Pereto, J. and Catala, J. I., *op. cit.*, pp. 90-91.

³⁵ Bergson, H., *Creative Evolution*. New York: Henry Holt and Company, 1907, *passim*.

forward over billions of years and maturing in greater complexity and internalisation in matter. For Bergson, God was not only the origin and goal of creation but was also involved in the process.³⁶ Subsequently, Teilhard went on to develop this idea further.

While Teilhard was teaching at the *Institut Catholique* in Paris in 1926, a private draft document of his, outlining his ideas on Original Sin, mysteriously disappeared from his desk and found its way to the Jesuit Curia in Rome. The Jesuit General Council judged that Teilhard's thinking was not in accord with Church teaching, particularly concerning the subject matter of the document under consideration. Teilhard was required to confirm his acceptance of Church doctrine concerning evolution and Original Sin by signing a statement, generally known as 'The Six Propositions'.³⁷ He was then dismissed from his teaching post in Paris and ordered to leave that city. He chose to go to China, where he worked for the next twenty years as an anthropologist.³⁸

Teilhard came to see the science of evolution as an explanation for the physical world and he viewed Christian life within the context of the process of evolution. Evolution, for him was a progression towards consciousness, the material world containing within it an inherent dynamism towards spirit. For him also, in a metaphysical sense, there is a unity in the universe, all things being linked together in a way not fully understood. In this, he was somewhat ahead of some modern physicists, some of whom now propose not only that the universe is a single entity but also that it is conscious and self-organising.³⁹

³⁶ Küng, H. *The Beginning of all Things: Science and Religion*. Munich: 2005. English translation John Bowden. Grand Rapids, MI; Wm B Erdman Publishing Co. Paperback edition, 2008, p. 97.

³⁷ Grumett, D., 'Pierre Teilhard de Chardin's Theological Trouble'. *The Christian Century*, 11/7/2018.

³⁸ Duffy, *op. cit.*, pp. 16-17.

³⁹ Kemp, K. W., 'A Brief History of Catholic Evolutionism'. Society of Catholic Scientists. Retrieved 05/08/2021 from <https://www.catholicscientists.org/ideas/discussions>; Planck, M., *The Observer*, 25 January 1931; Jeans, Sir J. H., *The Mysterious Universe*. Cambridge: Cambridge University Press, 1932, p.27; Capra and Luisi, *op. cit.*, pp.149-153.

It is in the light of the direction of evolution toward greater complexity and consciousness that Teilhard reflected on the meaning of Christ and Christian life. The process of evolution in the physical sciences may be viewed as one of cosmogenesis and biogenesis, but from the point of Christian faith it is a Christogenesis or a coming to be of Christ.⁴⁰ In Teilhard's view, the process of creation is still ongoing in the universe, in the world, and in the human species. Human beings are still in the process of coming into full being, of becoming more human. Anthropogenesis will press on to Christogenesis, and Christogenesis will finally press on towards its future fullness, its *pleroma* at the Omega Point, where the individual and the collective adventure of human beings will find their end. Then the consummation of the world and the consummation of God will converge. This 'pleromatisation', the coming to fullness, this development of the cosmos and human beings forward and upward, will culminate in the universal cosmic Christ, who, for Teilhard, was the unity of the reality of God and the world in person. Of course, for him, all this was a vision, not of pure reason, but of faith.⁴¹

Teilhard was a mystic who glimpsed the evolutionary cosmic significance of the incarnation of God in Christ.⁴² Most scientists would not follow him in such bold scientific hypotheses. Hans Küng has been loud in his affirmation of Teilhard's contribution towards fostering worthwhile dialogue between scientists and theologians, though he did not hesitate to point out some of the weaknesses in Teilhard's work, including the one-sidedness of some of his statements. Küng also finds Teilhard too optimistic, though this seems to be one of the

⁴⁰ De Chardin, P. T., *The Human Phenomenon*, trans. Sara Appleton -Weber, Portland OR: Sussex Academic Press, 1999, pp. 297-298.

⁴¹ Delio, *op. cit.*, 2008, pp. 70-71.

⁴² De Chardin, P. T., *Christianity and Evolution*. Trans. Rene Hague, New York; Harcourt Brace Jovanovich, 1969, p. 116.

qualities that draws the Christian laity to his books.⁴³ Küng also notes that

Theologians find some of Teilhard's theological views often formulated in an extremely one-sided way, exaggerated or - in respect of Jesus' life and cross - defective. And possibly today both sides would reject above all his optimism, belief in progress, and orientation on the 'Omega Point', which reflects too little on the problem of suffering and evil.⁴⁴

Küng, however, puts his finger on Teilhard's principal contribution from the point of view of this thesis. This is his considerable success in bringing about dialogue between theologians and scientists. No other Catholic theologian gets as many mentions from scientists as Teilhard. Küng's conclusion was,

Be this as it may, Pierre Teilhard de Chardin cannot be praised highly enough for being the first to combine theology and science in a brilliant way and bringing together scientists and theologians provocatively to reflect on the whole set of problems. He was concerned with the religious significance of evolution and the evolutionary scope of religion.⁴⁵

A modern theologian, John F Haught, praises Teilhard for his farsightedness:

The famous Jesuit geologist and palaeontologist Pierre Teilhard de Chardin was far ahead of professional theologians in perceiving evolution's demand for a revitalized understanding of God. Our new awareness of nature's immensities – the domains of space, time and organized physical complexity – provides us, he thought, with the exciting opportunity to enlarge our sense of cosmic immensity.⁴⁶

Teilhard's continued prominence as a controversial figure in the discourse between evolution and religion has led some people to overlook the extent of his non-theological contribution to scholarship in this area. Küng noted that a list of his purely scientific works alone runs to 380 items.⁴⁷ Teilhard, however, did not live to see any of his theological books

⁴³ King, U., *Christ in All Things: Exploring Spirituality with Teilhard de Chardin*. Maryknoll, New York: Orbis Books, 2007, *passim*; Tucker, M. E., 'Teilhard's Ecological Spirituality' in Duffy, K. ed., *Rediscovering Teilhard's Fire*. Philadelphia: St Joseph's University Press, 2010, *passim*.

⁴⁴ Küng, H., *The Beginning of All Things: Science and Religion*. Trans. John Bowden. Grand Rapids, MI: William B Eerdmans Publishing Company, 2007, p. 98.

⁴⁵ *Ibid.*

⁴⁶ Haught, J. F. *God After Darwin: A Theology of Evolution*. CO: Westview Press, 2000, p. 140 *et seq.*

⁴⁷ Küng, *op. cit.*, p. 99.

published, though some nineteen volumes of these have been published since his death.⁴⁸ He has become immensely popular with both Catholics and non-Catholics and there are several Teilhard societies or associations throughout the world. In France alone, there have been more than five thousand publications about him. Four Popes have explicitly mentioned his work.⁴⁹

In 1962, Cardinal Alfredo Ottaviani, Prefect of the Holy Office, imposed a *Monitum* or warning on all the works of Teilhard. The *Monitum* exhorted ‘all Ordinaries as well as the superiors of Religious institutes, rectors of seminaries and presidents of universities, effectively to protect the minds, particularly of the youth, against the dangers presented by the works of Fr Teilhard de Chardin and of his followers.’ No claim of heresy was made nor were any specifics given of the dangerous ideas of de Chardin. In 2017, at a plenary session of the Pontifical Council for Culture it was decided to request Pope Francis to remove the 1962 *Monitum*.⁵⁰

It would probably be true to say that today, in any in-depth discussion of evolution and the Catholic Church, one will encounter the ideas of Teilhard de Chardin. While a minority might feel that his contribution was disturbing and unsettling, Teilhard’s own intention was only a slight variation of that of the founder of his Order, Ignatius of Loyola. But while the motto of Ignatius was ‘*sentire cum ecclesia*’ (to think with the Church) that of Teilhard was ‘*praesentire cum Ecclesia*’ (to think ahead of the Church).⁵¹ That Teilhard

⁴⁸ Duffy, K., *Teilhard’s Mysticism. Seeing the Inner Face of Evolution*. New York: Orbis Books, 2014, pp. xiii-xiv.

⁴⁹ Pope Paul VI: speech to workers in Pharmaceutical Company on 24/02/1966; Pope John Paul II: letter to Rev George Coyne SJ, Director of Vatican Observatory, 01/06/1988; Pope Benedict XVI: Homily, Cathedral, Aosta, Italy, 24/07/2009/ Pope Francis: footnote 83 in encyclical, *Laudato Si*, issued 24/05/2014.

⁵⁰ O’Connell, G., ‘Will Pope Francis remove the Vatican’s ‘warning’ from Teilhard de Chardin’s writings. *America*, 21/11/2017, retrieved 07/08/2021 from <https://www.americamagazine.org/faith/2017/11/21/will-pope-francis-remove-vaticans-warning-teilhard-de-chardins-writings>.

⁵¹ Mahony, *op. cit.*, p. 77.

succeeded in his endeavour would appear to be confirmed by the fact that his ideas are increasingly to be found in contemporary discourse between Christianity and evolution, while, at the same time, many Catholic scholars seem to find inspiration in his writings.⁵²

The Modernist Crisis

What is known as the Modernist crisis spanned the closing years of the nineteenth century and the early decades of the twentieth century. In retrospect, we can view it as a temporary phenomenon, but, unfortunately, it spanned the theological careers of some great twentieth century scholars and affected the intellectual formation of a generation of Catholic clergymen. McBrien defined modernism concisely as ‘a generic early-twentieth century movement in Catholicism condemned by Pope Pius X because it seemed to deny the permanence of dogmas and tended to reduce all doctrines to their rational or humanistic components.’⁵³ Paul remarks that the attack on Modernism was really an attack on a perception introduced by Darwinism. He suggests that, since Rome’s main doctrinal preoccupations were guarding against perceived ‘errors’ in philosophy and theology, to a certain extent, Darwinism escaped ‘under the radar’.⁵⁴

Most authors would agree that the Modernist crisis during the first decade of the twentieth century had the effect of muting discussion of evolution in Catholic circles. Some saw the *Institut Catholique* in Paris as a breeding ground for the new thinking and Mgr d’Hulse (1841-1896), its director, as the orchestrator of new liberalism.⁵⁵ Two of the outstanding scholars at the *Institut* were Abbe Loisy (1857-1940) and Teilhard de Chardin

⁵² *Ibid.*, pp. 75-78.

⁵³ McBrien, *op. cit.*, p. 1245; *vide also*, Daly, G., *Transcendence and Immanence: a study in Catholic Modernism and Integralism*. Oxford: Clarendon Press, 1980, *passim*.

⁵⁴ Paul, H., 'Religion and Darwinism: Varieties of Catholic Reaction'. Glick, T. H. ed., *Comparative Reception of Darwinism*. Chicago: University of Chicago Press, 1988, p. 403.

⁵⁵ Brundell, *op. cit.*, pp. 82-84.

(1881-1955), whose work we discussed above. While the influence of the former was confined to the first quarter of the twentieth century, the influence of the latter is still felt today.

Loisy, who was first a student and later a lecturer at the *Institut*, published his own bi-monthly journal, *L'Enseignement biblique*. An expert in biblical languages, he began to publish articles devoted to biblical criticism. In 1893, he summarised his conclusions in five propositions, the fifth of which was that biblical writings were subject to the same limitations as those of other authors of the ancient world. The same year, he was dismissed from the *Institut* and, days later, Leo XIII issued the encyclical *Providentissimus Deus* which directly condemned Abbe Loisy's and Mgr D'Hulst's positions. On leaving the *Institut*, he ceased publication of his journal, *L'Enseignement*, and accepted a position as lecturer with *Ecole Pratique des Hautes Etudes*, a secular institution.⁵⁶

Though Leo XIII hesitated to condemn Loisy, Pius X had no such reservations. In 1907 the Holy Office issued a decree, signed by Pius X, formally condemning 65 modernist tendencies with the title, *Lamentabili Sane Exitu* (*Lamentable Departure Indeed*). This was followed by the encyclical *Pascendi Domini Gregis* which characterised modernism as the 'synthesis of all heresies'. When he failed to recant, Loisy was excommunicated on 7 March 1908.⁵⁷

Loisy's writings were the focus of some attention from Catholic scholars in the first quarter of the twentieth century. In the minds of some, his biblical criticism and ecclesiology were associated with Darwinism. Thus, Dr (later Bishop) Daniel Coghlan published a long article in two instalments in the *Irish Ecclesiastical Record* pointing out the errors of Loisy.

⁵⁶ GOICHOT, Émile, *Alfred Loisy and his friends*. Paris, Les Éditions du Cerf ("History" collection), 2002, p. 196. Retrieved 01/10/2020 from <https://www.erudit.org/en/journals/ltp/2006-v62-n1-ltp1384/013581ar/>.

⁵⁷ McGiffert, A. C., Modernism and Catholicism. *The Harvard Theological Review.*, Vol. 3, No. 1 (Jan. 1910), pp. 28-30.

The use of the word ‘Evolution’ in the title was arguably an indication that the concept of evolution was associated with the name of Loisy by some academics.⁵⁸

2.2.4 Belgium: Henry de Dorlodot (1855-1929)

Henry de Dorlodot was a Belgian priest and geologist on the staff of the University of Louvain. In 1921 he published a controversial book, *Le Darwinisme au Point de Vue de l'Orthodoxie Catholique*.⁵⁹ The book, which was envisaged as the first of a two-volume treatise, was devoted to Darwinian theory as set out in *Origin*. He did not, however, dwell on the origin of man in the first volume, intending to devote the second volume entirely to this topic. De Dorlodot advocated a reconciliation between evolutionary science and Catholicism, using a theology of nature, which was familiar to Catholics, and which can form the foundation for Catholic evolutionism. Some people in Rome reacted unfavourably to his approach and there was a threat from the Congregation of the Index to list his book. Pope Pius XI, however, refused to permit this until he had consulted Cardinal Desiré Mercier in Belgium. In the end, De Dorlodot agreed not to publish the projected second volume of his book and the matter ended there, with the author’s first volume still in circulation.⁶⁰ Dorlodot’s student, Ernest Messenger, translated his first volume into English and helped to popularise the ideas of his mentor in England.⁶¹

2.3 Ireland

Bertram Windle (1828-1959) qualified as a physician in Birmingham, where he

⁵⁸ Coghlan, D., ‘Evolution: Kant and the Loisy. Theory of the Evolution of Christianity’. *Irish Ecclesiastical Record*, Vol XXI, 1907, Jan-Jun. 4th Series, pp. 60 *et seq.*; *ibid.* pp. 362 *et seq.*

⁵⁹ De Dorlodot, H., *Le Darwinisme au point de vue de l'orthodoxie catholique*. Brxelles: Vromant & Co., 1921; *Darwinism and Catholic Thought*, trans. E. C. Messinger. London: Burns, Oates and Washbourne, 1922.

⁶⁰ Kemp, *op. cit.*, p. 7; Bont, R. D., ‘Rome and Theistic Evolutionism: The Hidden Strategies behind the ‘Dorlodot Affair’, 1920-1926’, *Annals of Science*, Vol. 62, 2005, Issue, 4, *passim*. <https://doi.org/10.1080/00033790500256562>.

⁶¹ Dorlodot, H., *Darwinism and Catholic Thought*. Trans. Rev E. Messenger. London: Burns, Oates & Washbourne Ltd., 1922.

became dean of the faculty of medicine. In 1904, he became President of Queen's College (from 1908 onwards known as University College) Cork. In 1918, feeling uncomfortable in the increasingly nationalistic ambience of University College, Cork, he resigned his post as President and moved to Toronto, where he accepted a post as Professor of Anthropology at St Michael's College, University of Toronto.⁶²

A convert to Catholicism during his time in Birmingham, Windle was a prolific author and contributed to several Catholic journals. He wrote a number of overtly Catholic books in addition to two on evolution. Though a critic of Darwin, he welcomed St George Mivart's Catholic version of evolution. He has also been called a Neo-Lamarckist.⁶³

Windle provided a great service to Catholics as a populariser. He had a gift for expressing complicated matters in a simple way. Thus, he explained the difference between Lamarck's theory of acquired characteristics and Darwin's theory of natural selection as follows:

In the case of the long neck of the giraffe, Lamarck would say that, with constant stretching of the neck, each generation produces longer necks, because acquired characteristics are inherited. With Darwinists, those with longer necks survive better and pass on their genes to the next generation. This continues so that only long-necked animals survive.⁶⁴

Though Windle was an advocate of the theory of organic evolution, he did not believe that natural selection was the full explanation of evolution.⁶⁵ Moreover, he was an early believer in mutation, so named and popularised by Hugo De Vries, following his landmark experiments with the Evening Primrose (*Oenothera lamarckiana*) plant. With his usual

⁶² Taylor, M., *Sir Bertram Windle: A Memoir*. London: Longmans Green & Co., 1932, *passim*.

⁶³ Livingstone, D. N. 'Evolution and Religion.' Ruse, M. & Travis, J., *Evolution: The First Four Billion Years*. Harvard University Press, 2009, p. 355.

⁶⁴ Windle, B., *Science and Religion*. London: Catholic Truth Society, 1917, p. 350.

⁶⁵ Windle, B., *The Evolutionary Problem as it is Today*. New York: Joseph F. Wagner; London B. Herder, 1927, p. 415.

clarity, Windle explained the matter simply: quoting the old maxim, popularised by Linnaeus and repeated by Charles Darwin, '*natura non facit saltum*'. Then he added:

Nothing can now be more sure than that Nature does make leaps, and whether we accept that statements of de Vries to the full extent or not, it may safely be said that the general opinion of biologists is entirely against the possibility of any process of evolution having taken place by means of small, slowly accumulating variations.⁶⁶

Windle was an admirer of the work of Erich Wasmann SJ, the Austrian entomologist. He quoted approvingly Wasmann's conclusion that the principle of evolution is the only one which supplies a natural explanation of the phenomena in creation.⁶⁷ He also agreed with Wasmann that there was a perceptible and even overt opposition to any notion of a Creator among some biologists: Wasmann had noted, that 'in many scientific circles there is an absolute theophobia, a dread of a Creator'. Wasmann believed that this was due to a defective knowledge of Christian philosophy and theology.⁶⁸

There were a number of Irish Jesuits who put pen to paper in support of a Catholic version of evolution. Among these were Rev Henry V Gill SJ (1872-1945), Rev Thomas J Agius SJ (1855-1961), and Rev Leo O'Hea SJ (1881-1976). Father Gill was an internationally recognised scientist, his paper on 'Glow from Palladium in Vacuum' having been published in the *Proceedings of the Royal Society*.⁶⁹ His research was undertaken in Downing College, Cambridge, under the supervision of Nobel Prize Winner, Professor JJ Thompson. Subsequently Gill volunteered for chaplaincy work during World War I and was awarded both the Military Cross (MC) and the Distinguished Service Cross (DSC).⁷⁰ In one

⁶⁶ *Ibid.*, p. 362.

⁶⁷ *Ibid.*, p. 371.

⁶⁸ Wasmann, *op. cit.*, 1909, p. 6.

⁶⁹ Gill, H. V., 'Glow from Palladium in Vacuum' *Proceedings of the Royal Society* 7/05/1909.

⁷⁰ Further biographical details concerning Fr H. V. Gill in <https://www.jesuitarchives.ie/unpublished-manuscript-by-fr-henry-gill-sj-of-his-memoirs-as-a-chaplain>.

of his many articles in the *Irish Ecclesiastical Record*, entitled ‘Catholics and Evolution Theories’, he highlighted the contribution of Rev Henry Dorlodot in promoting a Catholic version of evolution. The article is essentially a review of Dorlodot’s *Darwinism and Catholic Thought*, which had appeared in Messenger’s English translation the same year.⁷¹

Commenting on the suspicion of some Catholics that the boasted achievements of science hide an irreligious purpose, he wisely remarked,

they (Catholics) commit perhaps a greater fault in shutting their eyes to the wonders of God’s creation. The Christian standpoint is that through all the workings of nature God’s wisdom, power, and goodness shine out and speak with eloquence of their Lord and Maker.⁷²

Rev Thomas Agius was a lecturer at the Jesuit scholasticate in Milltown Park, Dublin. He was an occasional contributor to the *Irish Ecclesiastical Record*. In 1919, he contributed an article, entitled, ‘Genesis and Evolution’ In this paper he showed the reasonableness of the theory of evolution, without, as he noted, excluding creation. He quoted approvingly Pasteur’s well-known dictum, ‘*omne vivum e vivo*’ (*all life comes from life*). In the course of the article, he argued,

If man is an animal, and animals have developed one from another, it is reasonable to suppose that man also has followed the general law of Nature. Moreover, man exhibits rudimentary organs, such as the coccyx (and the appendix?) his embryological development falls within the scope of the phylogenetic argument outlined above, and the different races of men show structural differences which are related to their mental development, especially their cranial capacity, and the anatomical structure of the skull.⁷³

Rev Leo O’Hea SJ was another contributor to the *Irish Ecclesiastical Record*, who wrote on ‘The Days in Genesis’. He felt that there was no ‘insuperable’ theological difficulty

⁷¹ Gill, H. V., ‘Catholics and Evolution Theories’, *The Irish Ecclesiastical Record*, 5th Series, Vol. 19 (June 1922), p. 622.

⁷² Gill, H. V., *Ibid.*, p. 622.

⁷³ Agius, T., ‘Genesis and Evolution’, *The Irish Ecclesiastical Record*. 5th Series, Vol. 13 (June 1919), p. 441.

against the evolution of the body of man from a pre-existing animal. O’Hea was a prominent figure in Catholic Adult education. He had founded Plater College (for Workers) in Oxford and followed this up by founding the Catholic Workers College in Dublin in 1922. Both these institutions were based on the French model, *L’Action Populaire*, a similar institute also founded by the Jesuits in Paris in 1921.⁷⁴

2.4 England

In the twentieth century, several Catholic writers in England published work on evolution. Among the more prominent were Rev Ernest Charles Messenger (1885-1951), Sir Arnold Lunn (1888-1974) and Philip G Fothergill (1908-1967).

Father Ernest Messenger was one of the most active proponents of evolution in England in the first half of the twentieth century. A lecturer at St Edmund’s College, Ware, he published two books on the topic. Moreover, he translated Canon Henry Dorlodot’s book on evolution into English and was mainly responsible for promoting the latter’s ideas on the compatibility between organic evolution and Catholicism.⁷⁵ Messenger’s first book, *Evolution and Theology*, received wide coverage and was reviewed in several Catholic newspapers, journals and magazines.⁷⁶ When dealing with the origin of man, he borrowed an idea from Cardinal Zeferino Gonzalez (1831-1894), a respected Dominican Thomist, to the effect that a divine modification had been made on a highly developed animal to form a suitable receptacle for a rational soul.⁷⁷ In his book, *La Bible y la Ciencia*, Gonzalez made his point as follows:

...juxtaposition of Mivart’s hypothesis with a possibility noted by St Thomas,

⁷⁴ O’Hea, L., ‘The Days of Genesis’. *Irish Ecclesiastical Record*, 5th Series, Vol. 9, (Mar. 1917), p. 451.

⁷⁵ Dorlodot, H., *Darwinism and Catholic Thought*. Trans. Rev E. Messenger. London: Burns, Oates & Washbourne Ltd., 1922.

⁷⁶ Messenger, E.C., *Evolution and Theology. The Problem of Man’s Origin*. London: Burns, Oates & Washbourne, 1931.

⁷⁷ *Ibid.*, pp. 226-227.

regarding the possibility that causes agents other than God intervened in the formation of Adam's body, that is to say, in its preliminary preparation up to an imperfect stage of development, reserving the final stages of its preparation to receive a rational soul by Divine action.⁷⁸

As with Dorlodot's book, Messenger's book, *Evolution and Theology*, was brought to the attention of the Congregation of the Index. However, when Pope Pius XI was consulted on the matter, he instructed the Congregation to seek an opinion on the scientific state of the question from the Austrian priest-anthropologist, Wilhelm Schmidt SVD (1868-1954). In reply, Schmidt said that the question was still scientifically open.⁷⁹

Messenger, himself, claimed that his first book made 'theological history'.⁸⁰ When copies of the book were destroyed in an air raid during World War II, the author decided to publish a second volume incorporating some of the reviews of the first volume and correspondence ensuing from the discussions about it. This second volume was entitled *Theology and Evolution*.⁸¹

The first volume (*Evolution and Theology*) was divided into four sections⁸². In the first section, the author discussed general principles concerning the sources of revelation, the teaching office of the Church and the different modes of infallible and non-infallible pronouncements. The second section dealt with the origin of living organisms. It examined the accounts of creation in Genesis and then moved on to the teaching of the Fathers of the Church, especially the writings of SS Ephrem, Basil, Gregory of Nyssa, Chrysostom, Ambrose and Augustine of Hippo. The third section dealt with the origin of man and the

⁷⁸ Gonzalez, Z., *La Biblia y la Cincia*. Izquierdo, 1892, pp. I:514-515.

⁷⁹ Vatican Archives, Memorandum 'Circo uno studio su l'evoluzionismo'. 1938, ACDF CL, 1933/246. *Varie*.

⁸⁰ Messenger, E. C., ed., *Theology and Evolution*, London & Glasgow: Sands & Co., 1949, p. 1.

⁸¹ Messenger, 1949, *op. cit.*

⁸² Browne, M., 'Evolution and Theology: Another Opinion', in Messenger, 1949, *op. cit.*, p. 68.

pronouncements of Church authorities on this matter.⁸³ The author noted that there were two public pronouncements, one from the Provincial Council of Cologne in 1860 and the second from the Biblical Commission in 1909⁸⁴. There were also private actions taken by the Church, especially those designed to secure withdrawal of writings by St George Mivart, Delmace Leroy, John A Zahm, Bishop Bonomelli and Bishop Hedley. Though Bishop Browne, one the contributors, calls the action of the Vatican against Mivart, Leroy, Zahm, Bonomelli and Hedley ‘private’ acts, adding that it was not certain that ‘the private acts were those of a Roman Congregation’, this is arguable. Perhaps they might more correctly be described as acts against private individuals. The fourth section of the book was devoted to the formation of Eve.⁸⁵

While several of the reviewers complimented Messenger on his scholarly handling of the question of the acceptability of evolution by the Church, some considered the book ‘an exercise in special pleading’. McClellan thought the aim of the book was to ‘search the sources of Catholic teaching for the admission of principles justifying a novel hypothesis’.⁸⁶ L’Abbe Gross, Head of the faculty of Theology at the University of Strasbourg, agreed with Messenger that not only is transformism ‘not opposed to the essential principles of scholastic metaphysics, but indeed harmonises very well with these’. Gross then went on to add, ‘We can therefore regard it as established that neither Catholic doctrine nor traditional philosophy are opposed to the evolution of species. It is to be hoped that our manuals will now cease to

⁸³ *Ibid.*

⁸⁴ Catholic Church. Provincial Council (1860: Cologne): *Acta et decreta concilii provinciae Coloniensis in civitate Coloniensi anno domini MDCCCLX pontificatus Pii PP. IX. decimoquarto celebrati.* (Coloniae : J.P. Bachem, 1862; Pontifical Biblical Commission, Report. AAS 1 (1909) 241; also, Denziger: *Enchiridion* 2123, Pontifical Biblical Commission (February 15, 1909).

⁸⁵ Browne, M., *op. cit.* pp., 68, 84.

⁸⁶ McClellan, W., ‘A Recent Catholic Book on Evolution’, in Messenger, 1949, *op. cit.*, p. 73.

oppose this theory in the name of Revelation and philosophy.⁸⁷ The conclusion of Gross was,

Thus, Revelation, and with it, theology, which is the science of Revelation, has nothing to say either for or against evolution, once the divine action, presiding over the origin of things, is safeguarded. They have nothing to do with evolution as a scientific theory, and it is just as impossible for them to oppose it as it is to lend it their support.⁸⁸

The much extended and at times querulous debate about the support or otherwise of the Church Fathers for evolution was neatly summed up by Dr Meagher, onetime professor of Dogmatic Theology at Ushaw College:

Is the Bible favourable to evolution? My answer to that is in the negative. Is it opposed to evolution? Again, I answer negatively. Are the Fathers favourably disposed to evolution? No, I do not think so, because they never thought of it.⁸⁹

Dom Cuthbert Butler OSB summed up the contribution of Messenger's book and the Catholic Church's attitude to organic evolution in words that were both wise and temperate. Concerning the book, he wrote that its value was that it established to a large extent that the objections to 'moderate evolution' were not 'theological'. Then he went on to add,

...as regards the attitude of ecclesiastical authority, whether in the past or the future, we may remind ourselves, in Newman's words that the Church's principle 'is one and the same throughout; not to prohibit truth of any kind, but to see that no doctrines pass under the name of Truth but those which claim it rightfully'.⁹⁰

Messenger's second book is particularly useful in that it brought together reviews of the first book, mainly by theologians, who though expert in theology, were admittedly not known for their writings on evolution. Virtually all the contributors to the second book paid tribute to Messenger for his industry in searching for and assembling material.⁹¹

⁸⁷ Gross, Abbe J., 'The Problem of Origins in Recent Theology', in Messenger, 1949, *op. cit.* p.134.

⁸⁸ *Ibid.*, p.145.

⁸⁹ Meagher, R.W., 'Evolution and Theology' in Messenger, 1949, *op. cit.*, p. 18.

⁹⁰ Butler, C. B., 'A Benedictine View' in Messenger, 1949, *op. cit.*, p. 21.

⁹¹ Messenger, *op. cit.*, 1949, *passim*.

Sir Arnold Lunn, born in India, was educated in England. He was a dedicated mountaineer and wrote several books on the subject. In 1932, he was converted to Catholicism and became a prominent Catholic apologist and controversialist. He was a hesitant, if not a sceptical evolutionist.⁹² He acted as moderator in a debate between H.S. Skelton, a leading Darwinist, and Douglas Dewar, a distinguished ornithologist, who, in later life, founded the Evolutionary Protest Movement, which was intended as a rallying point for anti-evolutionists. The contributions in this debate, edited by Skelton, were subsequently published.⁹³

Philip Fothergill, a Catholic biologist, teaching at King's College, Newcastle, published two books on evolution and Christianity. According to one reviewer, his book, *Evolution and Christianity*, had three objectives. The first was to convince fellow Catholics that the theory of organic evolution was well established and could not be treated merely as a provisional hypothesis. Secondly, he argued that evolution did not require the denial of God as the source of life, only the recognition of God's use of secondary means for the natural development of ever higher forms of life, culminating in the evolution of the body of man. Thirdly, he argued that the scriptural account of creation can and should be interpreted in such a way that it takes into account established biological principles, together with the discoveries of hominid palaeontology. This would seem to be a fair judgement of the content of the book. When it came to *Homo sapiens*, Fothergill was insistent that it was the infusion of an immortal soul into man which made him distinct from all other primates. The reviewer also pointed out that, like other Catholic writers on the subject of evolution, Fothergill started from an *a priori* statement of Catholic dogma, which, according to the reviewer, could be

⁹² Lunn, A., *The Revolt against Reason*. London: Sheed & Ward, 1951, pp. 121-125.

⁹³ Skelton, D. ed., *Is Evolution Proved? A Debate between Douglas Dewar and H.S. Skelton*, reprinted by Read Books, London, 2007. ISBN-13: 978-1406720587.

said to limit the author's openness to scientific discoveries.⁹⁴

It might be noted here that on the question of Catholic dogma and ongoing scientific discoveries the great Austrian biologist Erich Wasmann made a helpful comment. When discussing the development of organic from inorganic matter, Wasmann declared, 'Should science be in a position to prove that spontaneous generation is actually possible, and that living beings could proceed spontaneously from inorganic matter, theism would at once surrender this postulate'.⁹⁵

2.5 Canada: William Robin Thompson (1887-1972)

William Thompson was one of the more prominent Catholic biologists in middle of the twentieth century. Canadian born, of Irish extraction, he was educated at the Universities of Toronto, Cambridge (England) and Paris, where he obtained a DSc degree. He held several prestigious positions, including that of Director of the Institute of Entomology in Britain and later Director of the Commonwealth Institute of Biological Control in Ottawa, Canada. The high regard in which he was held as a biologist may be judged from the fact that he was invited to write the introduction to the Everyman edition of Darwin's *Origin of Species* to mark the centenary of its original publication. Though Thompson warned the publishers that he was unsympathetic to Darwin's theory, they nevertheless encouraged him to write the critical introduction which ran to sixteen pages.⁹⁶

Contrary to the position of most evolutionists of his time, Thompson was somewhat sceptical about evolution and much more so about natural selection. He granted that evolution

⁹⁴ Greene, J. C., Review of P. G. Fothergill's, *Evolution and Christians*. *Isis*, Vol 54, No. 1 (Mar. 1963), pp. 148-151.

⁹⁵ Wasmann, 1912, *op. cit.*, p. 29.

⁹⁶ Thompson, W. R., ed., Darwin, C. R. *On the Origin of Species by means of natural selection: or the preservation of favoured races in the struggle for life*. ed. W. R. Thompson, London & New York: J. M. Dent & Sons, Everyman's Library, 1956.

sometimes occurred, but that it was possibly due to factors, additional to, if not other than natural selection. His biographer, observed:

He never doubted that evolution had occurred and had often displayed, in a discordant and irregular manner, an advance from low to high ontological levels; and he thought that this must be due to the action of factors which do not form part of the physical world. He therefore advocated that we look around for explanations other than those of natural selection for the diversity of organic forms ⁹⁷

In addition to being a professional biologist, Thompson was also a philosopher, who had a PhD in that discipline. One of his special interests was the application of Thomist philosophy and theology to evolution. In this area, however, not all his colleagues judged him successful. A colleague recalls that it was difficult to talk to Thompson about any subject not purely technical without the Angelic Doctor creeping into the conversation. Commenting on Thompson's views on organic evolution, Thorpe notes,

Thompson adopted the Aristotelian view that every material thing is composed of a principle of specificity and stability and a principle of non-specificity or change which the Aristotelian calls 'form' and 'matter'; so, the Aristotelian sees nature as a collection of forms immersed in matter in which there is a possibility of definition provided we do not attempt to make the definition too rigid and unalterable. In discussing the views as to randomness of genetic variance, Thompson made the important point that chance could only exist on a substratum of finality.⁹⁸

Though, in addition to a large body of professional papers, Thompson also contributed occasional articles to popular journals, such as the *Catholic World*, he did not seem to wield great influence among Catholic intellectuals, his professional interests being perhaps too far removed from popular concerns.⁹⁹

2.6 Vatican Declarations

2.6.1 *Humani Generis*

⁹⁷ Thorpe. W. H., 'WRT, 1887-1972, *Biographical Memoirs of Fellows of the Royal Society*'. Vol 19 (Dec. 1973) p. 669.

⁹⁸ *Ibid.*

⁹⁹ Thompson, W. R., 'Evolution', *The Catholic World*, Vol. 34, 1881-1882, p. 683.

As far as dialogue between the Catholic Church and evolution is concerned, the encyclical, *Humani Generis*, of Pope Pius XII in 1950 is a very significant document. For the first time, the highest authority in the Church stated clearly that Catholics are free to hold 'the doctrine of evolution, in as far as it inquires into the origin of the human body as coming from pre-existent and living matter'.¹⁰⁰ The Pope, however, immediately added that 'souls are immediately created by God'.¹⁰¹ He also added that the Church remained the final arbiter in matters of dogma and the interpretation of sacred scripture, even where science was able to shed light on a given problem. He went on to remind Catholics that the theory of evolution, though a credible hypothesis, was not yet an absolute fact and, since revelation also had something to say on the matter, it demanded 'the greatest moderation and caution'.¹⁰² On the whole, the encyclical was positively received by Catholic theologians, though the section on evolution produced 'surprisingly little' significant comment.¹⁰³ Weigel found that only three commentators had something significant to say about the section of the encyclical on evolution. In regard to the three scholars, one, Augustin (Cardinal) Bea,¹⁰⁴ suggested that scientists at that time were moving towards a questioning or rejection of evolution.¹⁰⁵ On the other hand, both Vandebroek and Renwart warned that to conclude that 'we are passing through a crisis of the evolutionary theory would be a clumsy mistake'.¹⁰⁶

Humani Generis also dealt with the matter of polygenism, but in this matter, the

¹⁰⁰ Pope Pius XII, Encyclical *Humani Generis*. Rome: Vatican Polyglot Press: 12/081950. Par. 36.

¹⁰¹ *Ibid.*

¹⁰² *Ibid.*

¹⁰³ Weigel, G. 'Gleanings from Commentaries on *Humani Generis*'. *Theological Studies*, 12, No. 4, Dec. 1951, p. 526.

¹⁰⁴ Bea, A. SJ. "L'Enciclica 'Humani generis' e gli studi biblici." *La Civiltà Cattolica*, CI (1950), pp. 417-30.

¹⁰⁵ Weigel *op. cit.*, pp. 526, 543.

¹⁰⁶ Vandebroek, G. and Renwart, L. SJ., "Humani generis' et les sciences naturelles.", *Nouvelle revue theologique*, LXXIII (April 1951), 337-51; Weigel, *op. cit.*, 543.

liberty of discussion accorded to evolution, was not extended to polygenism.¹⁰⁷ Belief in monogenism, that is that all human beings descended from two 'first parents', Adam and Eve, was an essential part of the rationale of Original Sin. In the words of *Humani Generis*, '...original sin ... proceeds from a sin actually committed by an individual Adam and which, through generation, is passed on to all and is in everyone as his own'.¹⁰⁸

The fact that *Humani Generis* lifted the ban on Catholics believing in evolution was noted by the world press as a significant development in Catholic teaching. The encyclical received wide publicity, with even *Time* magazine devoting an article to it.¹⁰⁹

What might be called the modest concession by Pope Pius XII that evolution was a credible hypothesis, together with his treatment of that subject in the encyclical *Humani Generis*, did not indicate the full extent of his belief in one of the fundamental concepts of evolution, namely the mutability of things. In an extended address to a plenary session of the Academy of Pontifical Sciences on 22 November 1951 he dealt at some length with several instances of mutability in the universe.¹¹⁰ He pointed to the continuous movement within atoms and the non-stop radiation from certain elements in the periodic table. He then went on to describe the emission of 'a gigantic quantity of radiant energy' from the sun and the continuous replacement of its lost energy through the process of fusion of hydrogen into helium. He then turned to the stars and described the process of the formation of the nuclei of heavy elements when stars collide.¹¹¹ He summarised the mutability of the universe as

¹⁰⁷ Kemp. K. W., 'Science, Theology, and Monogenesis', *American Catholic Philosophical Quarterly*, Vol. 85, No. 2, 2011, pp. 217-236., *passim*.

¹⁰⁸ Pope Pius XII, *op. cit.*, par. 37.

¹⁰⁹ *Time* 04/09/1950, 'Religion: *Humani Generis*', Vol 56, Issue 10. Retrieved 20/12/2021 from <http://content.time.com/time/subscriber/article/0,33009,856709,00.html>.

¹¹⁰ Pope Pius XII, Address to plenary session of PAC, 22/11/1951, retrieved 28/08/2021 from <http://www.casinapioiv.va/content/accademia/en/magisterium/piusxii/22november1951.html>.

¹¹¹ Only the very lightest elements (Hydrogen, Helium and Lithium [2]) were created at the time of the Big Bang and therefore present in the early universe. All the other heavier elements now around us were produced at a

follows:

It is truly astonishing at first glance to see how the knowledge of the fact of mutability has steadily gained ground in both the macrocosm and the microcosm as the sciences have gradually progressed, almost confirming with new proofs the theory of Heraclitus: 'Everything flows: πάντα ῥεῖ.'¹¹²

Though Vatican II did not deal with evolution, the concept of evolution was mentioned in a positive way and there was no condemnation of it. In The Pastoral Constitution of the Church in the Modern World, *Gaudium et Spes*, we read, 'And so humankind substitutes a dynamic and more evolutionary concept of nature for a static one.'¹¹³ Later in the same document, when the Council was dealing with the development of culture, it drew attention to the 'tremendous expansion of natural and human sciences'. It then went on to note that 'historical studies tend to make us view things under the aspects of changeability and evolution'.¹¹⁴

The advent of John Paul II to the pontificate, ushered in a new era in the dialogue between evolution and Catholicism. In September 1987, Rev George Coyne S. J. and members of the Pontifical Academy of Sciences, organised a study week at Castel Gandolfo, Rome, to commemorate the 300th anniversary of the publication of Isaac Newton's famous book, *Principia Mathematica*. When the proceedings of this conference were being prepared for publication in June 1988, Pope John Paul II wrote a special letter to George Coyne, Director of the Vatican observatory, in which he urged scientists and theologians to work together for mutual benefit. But this letter is not only notable for its call for 'critical openness

later time by nucleosynthesis inside stars. European Space Agency. Retrieved 28/08/2021 from <https://www.eso.org/public/news/eso0129/>.

¹¹² Pope Pius XII, 'The Proofs for the Existence of God in the Light of Modern Natural Science' 22/11/1952. Retrieved 21/11/2021 from <https://inters.pusc.it/pius-xii-speech-1952-proofs-god>.

¹¹³ *Gaudium et Spes*, par. 5, in Flannery, A.I., ed., *Vatican Council II: The Conciliar and Post Conciliar Documents*. Newport, New York; Costello Publishing Company, 1975, revised ed. 1984.

¹¹⁴ *Ibid.*, par. 54.

and interchange' of ideas between the Church and scientists, but even more so for the range of the collaboration between science and theology envisaged by the Pope. In fact, the extensive nature of some of the headings suggested by the Pope for research and investigation looks somewhat like the content of an ongoing research programme in a dedicated research institute. The Pope's list includes theological anthropology, the human person as the *imago Dei*, the problem of Christology, meaning the challenge of providing an answer for different generations in changing times to the question Jesus asked Peter, 'Who do you say I am?' (Mt 16:15).¹¹⁵ Perhaps a surprising item on the list was John Paul II's musing on the possibility of evolutionary science having an influence on the development of Church doctrine.

The Pope candidly admitted that science can purify religion from error and superstition, but he added that 'religion can purify science from idolatry and false absolutes'.¹¹⁶ Observing that just as some of the cosmologies of the Near Eastern world were purified and assimilated into the first chapters of Genesis, he wondered if contemporary cosmology had something to offer to theological reflection on creation. He then went on:

What, if any, are the eschatological implications of contemporary cosmology, especially in light of the vast future of our universe? Can theological method fruitfully appropriate insights from scientific methodology and the philosophy of science?¹¹⁷

There were other parts of Pope John Paul's letter, which though they may not have received wide publicity, were quite significant in the ongoing dialogue between science and theology. One of these points was the allusion to different instances when science provides evidence of 'the unity of nature'. The Pope pointed out that the unity which we perceive in

¹¹⁵ Pope John Paul II, Letter to Rev George V. Coyne S.J., 1 June 1988, retrieved 24/08/2021 from <http://www.casinapioiv.va/content/accademia/en/magisterium/johnpaulii/1june1988.html>; see also Macquarrie, J., 'Some Problems of Modern Christology', p.156, *Indian Journal of Theology* 23.3-4 (July-Dec. 1974): p. 155.

¹¹⁶ Pope John Paul II, op. cit., 1 June 1988.

¹¹⁷ *Ibid.*

creation on the basis of our faith in Jesus Christ as Lord of the universe seems to be reflected and even reinforced in what contemporary science was revealing to us. He then went on to cite the increasing success of contemporary physics in its quest for a theory that would facilitate the unification of the four fundamental physical forces: gravitation, electro-magnetism, the strong and weak nuclear forces.¹¹⁸ Though this feat has not yet been achieved, it is the ongoing quest of many ambitious scientists.¹¹⁹

Another important point mentioned by Pope John Paul is the success of scientists in identifying the organic building blocks of living organisms. This is a key concept in the modern understanding of evolution.¹²⁰ In the Pope's words,

Molecular biologists have probed the structure of living material, its functions and its processes of replication. They have discovered that the same underlying constituents serve in the make-up of all living organisms on earth and constitute both the genes and the proteins which these genes code. This is another impressive manifestation of the unity of nature.¹²¹

This quotation also implies a familiarity with the pre-biotic molecular theory of Russian chemist, Alexander Oparin (1894-1980), which suggests that the sequence of evolution has been: from molecules to biomonomers to macromolecules to compartments to genetic code to metabolic networks to living cells.¹²²

‘More than a Hypothesis’

In October 1996, Pope John Paul II issued a statement which caught the attention of

¹¹⁸ *Ibid.*

¹¹⁹ West, G.B., Mottola, E. and Matti, M.P., *Unification of Nature's Fundamental Forces: A Continuing Search*. Retrieved 24/08/2021 from <https://fas.org/sgp/othergov/doe/lanl/pubs/00285651.pdf>.

¹²⁰ Capra and Luisi, *op. cit.*, p. 216.

¹²¹ John Paul II to Coyne, 1 June 1988. Retrieved 24/08/2021 from <http://www.casinapioiv.va/content/accademia/en/magisterium/johnpaulii/1june1988.html>.

¹²² Capra and Luisi, *op. cit.*, p.216.

the world press¹²³ and is even alleged to have 'startled' some Catholics.¹²⁴The occasion was the plenary session of a conference on 'The Origins and Early Evolution of Life' organised by the Pontifical Academy of Sciences in Rome. In the course of an address to the members of the Academy, Pope John Paul II stated that evolution was 'more than a hypothesis'.¹²⁵ He went on to note that the theory of evolution has been 'progressively accepted by researchers' following a series of discoveries in various fields of knowledge. He also noted that the 'convergence, neither sought nor fabricated, of the result of work that was conducted independently is in itself a significant argument in favour of this theory.'¹²⁶

Following his statement about evolution being 'more than a hypothesis', Pope John Paul referred to evolution as a 'theory' and then went on to describe what he meant by a theory:

A theory is a metascientific elaboration, distinct from the results of observation but consistent with them. By means of it a series of independent data and facts can be related and interpreted in a unified explanation. A theory's validity depends on whether or not it can be verified; it is constantly tested against the facts; wherever it can no longer explain the latter, it shows its limitations and unsuitability. It must then

¹²³ Neff, N. D., 'The Pope, the Press and Evolution' in *Christianity Today*, 06/01/1997, p. 18; Johnson, E.A. *op. cit.* p.13; Holden, H., 'The Vatican's position evolves', *Science*, Washington Vol. 274, Issue 5288, (Nov 1, 1996): 717.

¹²⁴ Korsmeyer, J. D., *Evolution and Eden. Balancing Original Sin and Contemporary Science*. New Jersey: Paulist Press, 1998, p. 19.

¹²⁵ John Paul II, Address to Pontifical Academy of Sciences 22/10/1996, retrieved 24/08/2021 from <http://www.casinapioiv.va/content/accademia/en/magisterium/johnpaulii/22october1996.html>, par. 4.; There is a dispute about the actual wording of the sentence involved. The original statement was in French, and the most widespread translation is 'new knowledge leads to the recognition of the theory of evolution as more than just a hypothesis.' (Vide Frame, R., 'Evolution: Pope says Evolution More than a Hypothesis' in *Christianity Today*, retrieved 24/08/2021 from <https://www.christianitytoday.com/ct/1996/december9/6te072.html>; also, Stamer, C.B., "'Evolution is More than a Hypothesis' Pope tells Scientists", in *Los Angeles Times*, 26/10/1996; also De Duve, C., 'Facts of Life', Pontifical Academy of Sciences, *Scripta Varia*, 105, 2002, p. 71 . However, the Vatican press translation issued later (PAS, 2003, pp. 370-374) reads 'new knowledge has led to the recognition of more than one hypothesis in the theory of evolution.' Pontifical Academy of Sciences, Magisterium, 22/10/1996, retrieved 24/08/2021 from <http://www.casinapioiv.va/content/accademia/en/magisterium/johnpaulii/22october1996.html>. It is worth noting that Gereon Wolters, when addressing a Plenary session of PAS in October 2008 claimed that the translation in the PAS translation of that part of the Pope's statement was 'wrong' and should read 'more than a Hypothesis'. *Vide* p. 460, fn. 34, <http://www.pas.va/content/accademia/en/publications/acta/evolution.html>.

¹²⁶ *Ibid.*, par. 4.

be rethought.¹²⁷

To describe evolution as a theory, however, is very high praise in the world of science. We immediately think of the theory of general relativity or the theory of gravity or the theory of heliocentrism proposed by Copernicus in 1543. For virtually all scientists, these theories are statements of fact.¹²⁸

Conclusion

This chapter on encounters between evolution and Catholicism in the twentieth century began with the discussion of two outstanding Catholic evolutionary scientists, Gregor Mendel OSA and Erich Wasmann SJ. Both were enthusiastic advocates of evolution while exemplifying the best of Catholic theology and ministry. Sir Bertram Windle, President of University College, Cork, together with a small number of Irish Jesuits helped to popularise the concept of evolution in Ireland. In England, Rev Ernest Messenger was one of the most prominent advocates of evolution. His theological approach to the subject was given a scientific underpinning by Philip Fothergill, who was both an articulate Catholic and a professional biologist. William Robert Thompson, a Canadian, with international connections, was a significant figure in the dialogue between evolution and Catholicism in his own country.

Teilhard de Chardin was a major, and arguably the most significant, figure in the discourse between Catholicism and evolution during the twentieth century. His influence has continued to grow since his death in 1965. It would probably be true to say that one will

¹²⁷ *Ibid.*

¹²⁸ De Duve, C., 'All Life is One'. Pontifical Academy of Sciences, *Scripta Varia*, No. 105, p. 71, retrieved from <http://www.casinapioiv.va/content/accademia/en/publications/scriptavaria/culturalvalues.html>.

rarely, if ever, encounter a Catholic publication on evolution today that does not mention his name.

Though the Vatican remained silent about evolution until 1950, Pope Pius XII then pronounced it a serious hypothesis in his Encyclical, *Humani Generis*. Pope John Paul II went further in 1996 when he said that evolution was more than a hypothesis. During the latter's pontificate, the Pontifical Academy of Science recruited some of the leading scientists in the world, many of them Nobel laureates, conferring on them life-long membership of the Academy. From then on, the regular conferences and workshops of this Academy became the venue for the discussion of cutting-edge scientific research. It could be said that evolution had not only made an appearance at the Vatican but, as it were, had taken up permanent residence there. We will discuss this at greater length in a later chapter.

In the next chapter, we will look at some of the new developments which the twenty first century has brought us and the challenges they pose in the ongoing dialogue between the Catholic Church and evolution. These developments include the discovery and publication of the human genome; the determination of the genomes of several new species of the genus *Homo* and new perceptions of the universe.

Chapter 3. The Twenty-First Century: Accommodating a New Perspective

Introduction

This chapter will look at some of the major themes in the ongoing dialogue between evolution and the Catholic Church during the twenty-first century. Because of lack of space, the discussion is confined to four major themes. The first item to be discussed is the Human Genome, the discovery and use of which has revolutionised biological research, medicine and arguably the future lives of human beings. The doctrinal significance of the ongoing discovery of the remains of hitherto unknown extinct species of the *Homo* genus is then considered. Their discovery raises questions about their membership of the human race and, as such, the likelihood of their being beneficiaries of the redeeming sacrifice of Christ. This topic is significant in the light of the fact, that, as the theologian, Gabriel Daly, reminds us, most theological speculation in the past has been 'uninterested in what preceded *Homo sapiens*'.¹²⁹ Original sin continues to be an ongoing doctrinal challenge, which has hitherto defied full reconciliation with our knowledge of human origins and development. The writings of a range of theologians on this taxing topic are reviewed. We then look at the confident manner in which contemporary Catholic writers discuss major changes in the perception of the universe. It is evident that they have accepted evolution as a fact and this, in turn, influences the tone and content of their writing on religious topics.

3.1 Human Genome Project

3.1.1 Importance and Significance of this Achievement

One might well ask, why is knowledge of the human genome relevant to a study which is reviewing and analysing the dialogue between evolution and Catholicism. One reason why it is important is that it provides evidence for the truth of evolution, which, in the

¹²⁹ Daly, G., *Creation and Redemption*. Dublin: Gill & Macmillan Ltd., 1988, p. 133.

past, some objectors said was missing.¹³⁰ Genome studies provide the evidence which hitherto 'missing links' were expected to supply. Comparison between the genomes of humans and other organisms reveals that related species share DNA sequences, and the extent of the sharing is proportional to the degree of genetic relationship. Thus, comparison of the genomes of humans and chimpanzees reveals that they share 98.6% DNA. They are, consequently, closely genetically related. Similarly, various stages in a virtual phylogenetic 'tree of life' can be pinpointed indicating the proportion and parts of human DNA that is shared with different organisms.¹³¹

Another reason is that evolutionary studies have contributed vital information about the nature of life and consequently about the bodies of human beings. Pope John Paul II stated this very clearly in 1996 in his address to the plenary session of a workshop organised by the Pontifical Academy of Sciences on the topic, 'The Origins and Early Evolution of Life':

I am pleased with the first theme you have chosen, that of the origins of life and evolution, an essential subject which deeply interests the Church, since Revelation, for its part, contains teaching concerning the nature and origins of man. How do the conclusions reached by the various scientific disciplines coincide with those contained in the message of Revelation?¹³²

Yet another reason why the human genome is important in any consideration of the dialogue between evolution and Catholicism is again clearly stated by Pope John Paul II. It is because it is one of the 'contemporary developments in science which challenge theology far

¹³⁰ Wolters, G., 'Catholic Church and Evolution: A Conflict Model', p. 462, a paper delivered at PAS conference October 2008, containing a reference to a statement by Cardinal Schönborn in his article in *The New York Times*, 07/07/2005. Vide <http://www.accademiascienze.va/content/accademia/en/publications/acta/evolution.html>

¹³¹ Reich, D., *Who we are and how we got Here*. Oxford: University Press, 2018, pp. 44 ff; see also Nature and Knowledge Project. Retrieved 28/08/2021 from <https://www.nature.com/scitable/knowledge/library/comparative-genomics-13239404/>.

¹³² Pope John Paul II, Address to Plenary session of PAS, par. 2., 22/10/1996. Retrieved 12/09/2021 from www.casinapioiv.va/content/accedemia/en/magisterium/johnpaulii/22october1996.html.

more deeply than did the introduction of Aristotle into Western Europe in the thirteenth century'.¹³³ As we will see later in this section, the discovery of the inner secrets of the human genome has become one of the most critically important tools in the future development of humankind. It is a powerful force for good or evil.¹³⁴

The Human Genome project began in 1990. It was a collaborative effort with every country being invited to participate. Though the project was expected to last for fifteen years, it was completed in thirteen years, and intermediate achievements were published online within 24 hours of completion. While a draft report was ready in 2000, the entire genome was not published until 2003. It cost \$3 billion. Most of the sequencing was done by hand/eye or using small computers.¹³⁵

A commercial company, CELERA, was also engaged independently in a similar venture. While this company claimed it could do the job cheaper and faster, it could only do this because it availed itself of the published results of the public project, which had a policy of open access to all its experimental data. There were ethical questions also on which public and private groups did not agree.¹³⁶

The DNA (deoxyribonucleic acid) is contained in the chromosomes in the human cell. Though there are 46 chromosomes in each cell, 23 of these come from each parent (22X + 1 Y from the male and 23X from the female). Each chromosome has many pairs of nucleotides, and they are in the form of long strings, each section called a sequence. There are about three billion sequences. The genes are contained in the sequences. About 99.9% of the genome of

¹³³ Pope John Paul II, Letter to Rev George V Coyne S. J., Director of the Vatican Observatory, 1/06/1996. Retrieved 12/09/2021 from <http://www.academiascienze.va/content/accademia/en/magisterium/johnpaulii/1june1988.html>.

¹³⁴ *Ibid.*

¹³⁵ Alexander, D, *Creation or Evolution. Do we have to Choose?* London: Monarch Books, 2008, pp. 57-58.

¹³⁶ *Ibid.*

each human is similar, but there is still plenty of room for variation in the 0.1% that is different.¹³⁷

3.1.2 Reactions to the Discovery of the Human Genome

The Human Genome Project (HGP) researchers deciphered the human genome in three major ways: by determining the order, or "sequence," of all the bases in our genome's DNA; by making maps that show the locations of genes for major sections of all our chromosomes; and by producing what are called linkage maps, through which inherited traits (such as those for genetic diseases) can be tracked over generations.

The HGP has revealed that there are probably about 20,500 human genes. This ultimate product of the HGP has given the world a resource of detailed information about the structure, organization and function of the complete set of human genes. This information can be thought of as the basic set of inheritable "instructions" for the development and function of a human being.¹³⁸

Upon publication of the major part of the incomplete genome in February 2001, Francis Collins, then director of the National Human Genome Research Institute, noted that the genome could be thought of in terms of a book with multiple uses:

It's a history book - a narrative of the journey of our species through time. It's a shop manual, with an incredibly detailed blueprint for building every human cell. And it's a transformative textbook of medicine, with insights that will give health care providers immense new powers to treat, prevent and cure disease.¹³⁹

Following up on the publication of the entire Human Genome, work was intensified to reveal the genomes of other organisms. To date, the genomes of thousands of organisms have

¹³⁷ Schuster, P., 'Evolution and Design. A Review of the State of the Art in the Theory of Evolution'. *Creation and Evolution. A conference with Pope Benedict XVI at Castel Gandolfo*. San Francisco: Ignatius Press, 2007, p. 53.

¹³⁸ *Ibid.*

¹³⁹ Collins, FJ, Remarks at press conference announcing sequencing and analysis of Human Genome 12/02/2001, retrieved 05/09/ 2020 from <https://www.genome.gov/>.

been published. This has been of considerable use in medical research, including surgical transplants. Biomedical technology and research are particular beneficiaries of the Human Genome Project.

Looking back over the history of the extended work to uncover the exact structure of the Human Genome, it should be noted that when the idea was first promoted, there was mixed reaction to it. Even some scientists were skeptical about the value-for-money aspect of the project. A contributor to *Science* journal went so far as to write, ‘The idea of trudging through the genome sequence by sequence does not command wide and enthusiastic support in the UK.’¹⁴⁰

Perhaps the explanation of the failure of some people to appreciate the enormous scientific significance of the determination of the Human Genome lay in the fact that it was too great to be grasped by everyone at once. This would seem to be confirmed by Professor Maynard Olson, one of the scientists who worked on the Genome project. He remarked, ‘the change is so fundamental it is hard for even scientists to grasp.’¹⁴¹

A more representative view was expressed by a contributor to the journal *Issues in Science and Technology*, ‘The sequence of the human genome would be perhaps the most powerful tool ever developed to explore the mysteries of human development and disease.’¹⁴²

The Holy See took a keen interest in the Human Genome Project and though the full results were not published until 2003, as early as 1993, Pope John Paul II spoke on the legal

¹⁴⁰ Brenner, S. *Science*, 08/08/1986, retrieved 05/09/2020 from <https://science.sciencemag.org/content/291/5507/1196>.

¹⁴¹ Olson, M., retrieved 05/09/2020 from <https://science.sciencemag.org/content/291/5507/1196>.

¹⁴² Hood, L., *Issues in Science and Technology*, Spring 1987, retrieved 05/09/2020 from <https://science.sciencemag.org/content/291/5507/1196>.

and ethical aspects of the project.¹⁴³ He had been made aware of the project through the Pontifical Academy of Sciences (PAS), some of the members of which were personally engaged in the research. PAS considered the project sufficiently important to devote a working group to it in November 1993. In an address to academicians, Pope John Paul II, while noting the importance of deciphering the human genome with a view to revealing its secrets and gaining 'greater knowledge of molecular biology and the genetic causes of many diseases', also warned that 'these discoveries risk being used for the selection of embryos, eliminating those affected by genetic diseases or which are carriers of pathological genetic traits.'¹⁴⁴ He then went on to say that some of the applications of this new technology could reach beyond the medical field and represented a formidable threat to the human being.¹⁴⁵

Pope John Paul then went on to speak about his central concern, which was the danger of experimentation with human embryos. He stated very clearly that at no time in its development should the human embryo be the subject of experimentation that was not 'beneficial', much less lead to its destruction or mutilation or irreversible damage.¹⁴⁶ 'The genetic inheritance', he said, 'is the treasure that belongs or could belong to a unique being who has the right to life and integral human growth'.¹⁴⁷

The Pope then went on to remind legislators of their responsibility for the protection and promotion of persons, since projects for human genome analysis are rich in promise but also imply innumerable risks. He said that the embryo should be recognised as a legal subject

¹⁴³ Pope John Paul II, Address to the Working Group on the Subject 'Legal and Ethical Aspects of the Human Genome Project.' 20/11/1993. Retrieved 07/09/2021 from <http://www.pas.va/content/accademia/en/magisterium/johnpaulii/20november1993.html>.

¹⁴⁴ *Ibid.*, par. 2.

¹⁴⁵ *Ibid.*, par. 3.

¹⁴⁶ *Ibid.*, par. 6.

¹⁴⁷ *Ibid.*, par. 7.

by the laws of nations lest humanity be endangered.¹⁴⁸

PAS and Pope John Paul again returned to the subject of the Human Genome one year later. In October 1994, in his address to the plenary session of the academy, the Pope noted that knowledge of the human genome would make it possible to perceive genetic influences more clearly and to distinguish heritable characteristics from those stemming from the natural and cultural surroundings and living experience.¹⁴⁹ He again called for strict adherence to certain moral norms insisting that,

All interferences in the genome be done in a way that absolutely respects the specific nature of the human species, the transcendental vocation of every being and his incomparable dignity. The Genome represents the biological identity of each subject: furthermore, it expresses a part of the human condition of being desired by God for his own sake through the mission entrusted to his parents.¹⁵⁰

The Pope ended by asking the academicians to use their authoritative voice to further efforts at formulating an international consensus in this sensitive area.¹⁵¹

3.1.3 Biotechnology

One of the most significant scientific advances in recent times has been an immense growth in biotechnology. Increasing knowledge of genetics and cellular functioning, coupled with increases in computing power, has enabled the development of novel highly targeted treatments for all manner of diseases.¹⁵² Ongoing sophisticated computer technology, combined with the ever-growing amount of DNA and protein sequence data, allows deeper insights into the fundamental sources of disease. While humankind in general welcomes these

¹⁴⁸ *Ibid.*, par. 8

¹⁴⁹ Pope John Paul II, Address to the Plenary Session, 'The Human Genome; Alternative energy Sources for Developing Countries; the Fundamental Principles of Mathematics and Artificial Intelligence', 28/10/1994, par. 3. Retrieved from www.casinapioiv/content/accedemia/en/magisterium/johnpaulii/28october1994.html.

¹⁵⁰ *Ibid.*, par. 4.

¹⁵¹ *Ibid.*, par. 5.

¹⁵² Lammers, A. and Peters, T., 'Genethics: Implications of the Human Genome Project', *The Christian Century*, 3 October 1990, pp. 868-872, *passim*.

advances, wise people also recognise the fact that every new treatment also represents a potential new weapon.¹⁵³

Since the life of all organisms is controlled by their unique genetic code, which is stored within the DNA, many human diseases are caused by mutations in the chemical structure, which is also an ‘information’ system, in the DNA molecules. Non-infectious diseases, such as cancer and sickle-cell anaemia, can be attributed to mutations. While some mutations may be harmless others may increase or decrease the organism’s ability to survive in the changed environment. With new knowledge of the cell’s processes, it has become possible not only to identify the mutations associated with disease but also to treat a disease by modifying DNA or targeting malformed proteins within a cell. With this information, it has become possible to design custom treatment for a given disease and, moreover, to increase the specificity of this treatment, thereby increasing the likelihood of success.¹⁵⁴

As the scientific understanding of cellular pathways and the genetic roots of diseases increases, so does the opportunity for more effective therapies – and potentially more lethal uses – increase. A dark side to this new technology must be acknowledged and it must be freely admitted that the cellular path to more effective healing also opens a way to the use of pathogens as biological weapons.¹⁵⁵ This genetic manipulation affects not only the animal kingdom but also both cultivated and wild plants, and, in fact, all living organisms, including bacteria and viruses. Moreover, in the absence of a worldwide system to control genetic engineering, the dangers of accidents and other unforeseen consequences of ill-advised

¹⁵³ Lewis, D.R., ‘Biotechnology: An era of Hopes and Fears’. *Strategic Studies Quarterly*, Vol 10, No. 3 (Fall 2016), pp. 23-26

¹⁵⁴ *Ibid.*

¹⁵⁵ Jones, D. A., ‘Germ-line Genetic Engineering: A Critical Look at Magisterial Catholic Teaching’. *Christian Bioethics*, 18(2), 126–144 2012, pp. 126-144, *passim*.

projects in this field must not be overlooked.¹⁵⁶

The twenty-first century has witnessed a large increase in gene sequencing and synthesis. An analysis in the USA in 2003 found that capabilities to achieve gene sequencing and synthesis of new molecules was following Moore's Law of computing power.¹⁵⁷

The process whereby the DNA sequence of an organism can be modified to induce genetic changes is known as genome editing. Powerful gene editing tools, such as CRISPR-Cas9, are now available commercially and are capable of modifying regions of the DNA. Moreover, the execution of this work does not require highly qualified personnel. A survey conducted in the USA in 2003 found that the professional qualifications of the personnel involved in genetic manipulation rarely reached doctoral level and in most cases were merely first-degree or certificate level.¹⁵⁸ The significance of CRISPR-Cas9 as a gene-editing tool may be gauged from the fact that its inventors, Emmanuelle Charpentier of the Max Planck Unit for the Science of Pathogens and Jennifer Doudna of the University of California, Berkeley, were awarded the Nobel Prize in Chemistry for 2020. CRISPR-Cas9 has been described as a 'scissors' for editing DNA sequences.¹⁵⁹

Computer modelling has been very helpful in reducing the cost of genetic manipulation of medicines. Treatments can be custom designed, based on, for instance, the molecular genetic profile of normal cells versus cancerous tissues in patients. Nor is genetic manipulation confined to ordinary cells of the human body. Genome editing of gametes and

¹⁵⁶ Avise, J. C., 'The best and the worst of times for evolutionary biology'. *Bioscience*; Mar. 2003; 53, 3; Education Database p. 247.

¹⁵⁷ Moore's law is the observation that the number of transistors in a dense integrated circuit doubles about every two years. The observation is named after Gordon Moore, co-founder of Fairchild Semiconductors and CEO of Intel. His 1965 paper described a doubling every year in the number of components per integrated circuit and projected this rate of growth would continue for at least another decade.

¹⁵⁸ Lewis, *op. cit.*, p.25.

¹⁵⁹ Cohan, J. *Science*, Bulletin of 7 October 2020. Retrieved 15/10/2020 from <https://www.sciencemag.org/news/2020/10/crispr-revolutionary-genetic-scissors-honored-chemistry-nobel>.

fertilized eggs is also possible. Undesirable characteristics may be suppressed or replaced by more desirable ones.¹⁶⁰ Using genome editing tools, such as CRISPR-Cas9, researchers are able to construct mutations that drive a gene through a population much more rapidly than would be predicted by Mendelian genetics. This technique offers the potential to insert and drive a mutation into a population within a few generations – even if detrimental to the offspring. While, on the one hand, one can see this as a great benefit to insert a beneficial trait quickly into a native population of insects or plants, on the other hand, it could be equally used to weaken or drive a population to extinction. Most people would welcome the possibility of using this technique to control or eradicate mosquito-borne diseases such as Dengue, Malaria, Zika, Yellow and West Nile Fevers.¹⁶¹

The Pontifical Academy of Sciences views the advances in biology as a welcome contribution to the ongoing drive to improve human health worldwide. It notes the ‘spectacular’ progress in genomics, which is an interdisciplinary field of biology focusing on the structure, function, evolution, mapping, and editing of genomes and looks forward to the realisation of a ‘Genome Information-oriented society’. The Academy views this latter as paving ‘the way for personalised medicine.’¹⁶²

While many would view genetic modifications to control insect populations, even when commercialized, as being useful and benevolent, there are other uses of genetic modification that raise serious ethical questions.¹⁶³ It would be foolish to deny that, using genetic engineering, at least some children of wealthy parents in the future will be born, with

¹⁶⁰ Mendz, G. L., ‘Transhumanist Genetic Enhancement: Creation of a “New Man” Through Technological Innovation’, *The New Bioethics*, Vol. 27 No. 2, 2021, 105–126, *passim*.

¹⁶¹ *Ibid.* p. 29.

¹⁶² PAS, Final Statement 14 November 2018 Plenary Session. Retrieved 20/12/2021 from <http://www.accademiascienze.va/content/accademia/en/publications/acta/acta25.html>.

¹⁶³ Collins, F., Hubbard, R., Lap-Chee, T. *et al.*, ‘What issues in genetics research most concern 13 experts right now?’ *The Chronicle of Higher Education*; Jul 3, 1998; 44, 43; Education Database, pg. B6.

desirable characteristics, such as beautiful bodies, remarkable health and strength and great intelligence. The children of the poor and underprivileged are, of course, unlikely to benefit from this biotechnology.¹⁶⁴

3.1.4 Stem cell Research and Treatment

The subject of stem cells has attracted a great deal of interest during the last two decades. Indeed, it brings about the hope of a novel medicine through which cells in the adult organism that are deficient or subjected to massive death could be replaced by healthy ones. With the increase in longevity in industrialized countries, such instances, resulting from degenerative diseases, are more and more common. This regenerative medicine would complement therapeutics relying on surgery, chemistry and antibodies, which are one of the most important legacies of the twentieth century. The Pontifical Academy for Sciences sees the use of stem cell therapies as important in the ‘transformative role of science in society’.¹⁶⁵ During the last four decades it has been recognized that stem cells are present in virtually all tissues in adult vertebrates and are a source of youth, since their role is to replace cells which regularly die during the lifetime of the individual. Moreover, vertebrate embryos are entirely made up of stem cells at the early stages of their development. This pluripotent state of embryonic cells is transitory but can be captured thanks to the spectacular advances in the biotechnologies during recent decades. It is now possible to maintain this particular stemness state in a chemical culture, thus generating permanent cell lines, endowed with the properties of this pivotal and intriguing type of cells.¹⁶⁶

¹⁶⁴ *Ibid.* p. 30.

¹⁶⁵ PAS, Final Statement of the 2018 PAS Plenary Session. Retrieved 10/09/2021 from <http://www.accademiascienze.va/content/accademia/en/publications/acta/acta25.html>.

¹⁶⁶ Le Douarin, N. M., ‘New Developments in Stem Cell Biotechnology’, PAS, ‘The Scientific Legacy of the Twentieth Century’, October 2010, retrieved 30/08/2021 from <http://www.pas.va/content/accademia/en/publications/acta/scientificlegacy.html>.

In short, stem cells are undifferentiated, pluripotent and able to self-renew, thus forming a reserve of cells able to maintain homeostasis (by which is meant the state of steady internal, physical, and chemical conditions characteristic of living systems). In addition to the use of stem cells in regenerative medicine, they are also extremely useful in testing drugs. Instead of testing the drug on a living person, the drug can be tested (in a laboratory culture) on the cells of the body for which they are intended, and, in this way, we can avoid endangering the patient.¹⁶⁷

The part of this process which is of particular concern to Catholics is the source of the original stem cells. While, as said, stem cells can be found in virtually every part of the human body, the richest source is the human embryo which consists entirely of stem cells. A tempting and plentiful source of stem cells would consequently be aborted human foetuses. This source, however, is forbidden by the Catholic Church, which teaches that the origin of human life begins with the fertilisation of the female ovum and the formation of a zygote.¹⁶⁸ Research is in progress at present to attempt, by means of appropriate chemical stimuli in artificial cultures, to transform ordinary adult stem cells so that they acquire and become significantly richer in the unique qualities of pluripotency and self-renewal possessed by embryonic stem cells. It is hoped that, when this process has been perfected, there will then no longer be any need to utilise stem cells from either a human zygote (single fertilised egg cell) or blastocyte (embryo with up to 200 cells). Meantime, stem cell lines of questionable origin continue to be available on a commercial basis.¹⁶⁹

It is suspected that some of the anti-Covid-19 vaccines available during the current

¹⁶⁷ *Ibid.*

¹⁶⁸ Pope John Paul II, Address to PAS group on 'The Legal and Ethical aspects of the Human Genome Project', 20/11/1993, par. 7. Retrieved 07/09/2021 from <http://www.pas.va/content/accademia/en/magisterium/johnpaulii/20november1993.html>.

¹⁶⁹ *Vide* online advertisements under the heading, Stem Cells for Sale.

pandemic have been developed from cultures that originated from foetal stem cells. Pope Francis has approved the use of these vaccines,¹⁷⁰ though some Catholic authorities have disapproved of their use.¹⁷¹

3.2 Other Species of the Homo Genus

In his well-known letter of 1 June 1988 to Rev George Coyne SJ, Director of the Vatican observatory, and a member of PAS, Pope John Paul II raised a number of questions about the light an evolutionary perspective can bring to questions like the meaning of the human person as the *imago Dei*.¹⁷² When raising this question, there is little doubt that the Pope was well aware that *Homo sapiens* was not the only member of the *Homo* genus that has lived on this Earth. The Pope's question raises others, one of which is whether the concept of human uniqueness and human beings as *imago Dei* also extend to other species of the *Homo* genus, species which preceded but, which, in some cases, were contemporaneous with *Homo sapiens*.¹⁷³ James Barr notes that the concept of *imago Dei* has had different meanings for different people throughout history.¹⁷⁴ He cites the following interpretations:

- rationality, argued by Augustine and Aquinas, and accepted by Luther and many of the Protestant Reformers.

¹⁷⁰ Heaney, S., 'Morally Permissible' for Catholics to accept Covid-19 vaccine which uses aborted foetal cells.' *Irish Examiner*, 10/12/2020; In a statement released on December 14, Bishop Kevin C. Rhoades, chairman of the U.S. Conference of Catholic Bishops' (USCCB) Committee on Doctrine, and Archbishop Joseph F. Naumann, chairman of the USCCB's Committee on Pro-Life Activities reiterate that, given the urgency of the crisis, "the lack of available alternative vaccines, and the fact that the connection between an abortion that occurred decades ago and receiving a vaccine produced today is remote, inoculation with the new COVID-19 vaccines in these circumstances can be morally justified." Retrieved 07/09/2021 from <https://www.vaticannews.va/en/church/news/2020-12/us-bishops-covid-clarification-ethical-use-vaccine.html>.

¹⁷¹ Bishop Joseph Brennan, Fresno CA: *Los Angeles Times*, 19/11/2020 www.latimes.com/california/story/2020-11-19/fresno-bishop-urges-catholics-not-to-jump-on-the-covid-19-vaccine-bandwagon.

¹⁷² Pope John Paul II, Letter to Rev G. Coyne SJ, 1 June 1988, *op. cit.*

¹⁷³ Deane-Drummond, C., 'Human Nature in Theistic Perspective', *Zygon*, vol. 47, no. 4 (December 2012) pp. 934-948.

¹⁷⁴ Barr, J., *Biblical Faith and Natural Theology*, Oxford: Clarendon Press, 1993, p. 157.

- the possession of a ‘soul’
- physical distinctiveness (bipedalism, etc)
- functionality – dominion over the world (associated particularly with von

Rad¹⁷⁵): the *imago Dei* is not what we are but what we are called to do. This will be discussed further below.

To return to question of the full humanness to all members of the genus *Homo*, it might be put it in another way: did Christ also die for all species of the genus *Homo*?¹⁷⁶

To put this question within a taxonomical context, it can be said that there are some twenty species of the genus *Homo*, all but one, *Homo sapiens*, now extinct.¹⁷⁷ So, did Christ die for all twenty species or for *Homo sapiens* only?¹⁷⁸

Instead of describing all twenty species of the genus *Homo* here, a small number of the these will be selected, choosing those species, on the remains of which intense DNA studies have already been done. It follows that what obtains for a small number of species of the genus also applies to all twenty species because each species has met the scientific requirements for classification as members of the genus *Homo*.¹⁷⁹

The first remains of *Homo neanderthalensis* were discovered in a quarry in the Neanderthal valley, near Dusseldorf, Germany, in 1856. From available evidence, it is believed that Neanderthals appeared about 300,000 years ago and ranged over a wide area in Europe and as far east as Uzbekistan. They lived in small groups, were skilled hunters and

¹⁷⁵ Von Rad, Gerard (1901-1971) was a German Lutheran theologian and exegete at the University of Heidelberg.

¹⁷⁶ Gaine, S. F., ‘Did Christ die for Neanderthals’, *New Blackfriars*, Vol. 102, Issue 1098, pp. 225-238.

¹⁷⁷ Alexander, *op. cit.*, p. 202; Reich, D., *Who we are and how we got Here*. Oxford: University Press, 2018, p. 25ff.

¹⁷⁸ Graham, R., ‘Did Neanderthals have Souls?’. *The Atlantic*, 20/09/2015.

¹⁷⁹ Wood, B. and Collard, M., ‘The Human Genus’. *Science* (www.sciencemag.org), Vol. 284, 2 April 1999, pp. 65-71, *passim*.

fishermen and buried their dead. They had brains as large as ours, were generally heavier and more muscular and in some instances interbred with members of *Homo sapiens*.¹⁸⁰ They became extinct about 40,000 years ago. It must be remembered, however, that since some of them interbred with members of *Homo sapiens*, their DNA has survived, with some 2-3% of the DNA of present Eurasians known to have Neanderthal DNA sequences.¹⁸¹

The Neanderthals were skilled stone tool makers, especially as regards stone axes, some sixty different types of which have so far been found.¹⁸² Since they had the necessary physiology for speech and since their DNA possessed the FOXP2 gene, which is necessary for language development, it is believed that they had a language, albeit one of a simple and fundamental nature.¹⁸³

Another recently discovered member of the Hominin family is *Homo denisova*, the sparse remains of which were found in 2010 in the Denisova Cave, near the Anui river in the Altai Mountains of Russia.¹⁸⁴ Evidence at the site revealed that these hominins had occupied that cave as long as 280,000 years ago. Further research revealed occupation of that site as recently as 30,000 years ago. Fortunately, DNA was recovered from the remains showing that these people shared a common ancestor with both *H. neanderthal* and *H. sapiens*. Moreover, it was found that *H. denisova* had interbred with both *H. neanderthal* and *H. sapiens*.¹⁸⁵ More recent research has revealed that up to 4% of the DNA of Melanesian populations is

¹⁸⁰ Drell, J. R. R., 'Neanderthals: A History of Interpretation', *Oxford Journal of Archaeology* 19(1) 1–24 2000.

¹⁸¹ Gaine, *op. cit.*, p. 232; Reich, *op. cit.*, p. 25ff.

¹⁸² Middleton, N.M., *Homo Lapsus. Sin, Evolution and the God who is Love*. Oregon: Deep River Books, 2018, p. 124.

¹⁸³ *Ibid.*, p. 133.

¹⁸⁴ *Encyclopaedia Britannica* retrieved 06/09/2021 from <https://www.britannica.com/place/Denisova-Cave#ref1120010>.

¹⁸⁵ *Ibid.*

Denisovan, while modern Tibetans also have Denisovan genes.¹⁸⁶

Homo erectus is believed to be the earliest known direct ancestor of *Homo sapiens*. He evolved in Africa almost two million years ago. As the name suggests, he was bipedal, walking upright, cooked his food and made hunting tools, including advanced teardrop-shaped hand axes. The first wave of this species that travelled to Eurasia is thought to have died out, but it was followed later by a second group of the same species.¹⁸⁷ It is thought that another species, *Homo heidelbergensis*, evolved from *H. erectus*. The first specimen of *H. heidelbergensis* was found near Heidelberg, Germany, in 1908. Subsequently, other remains of the same species were found in Africa, France, Greece and as far away as China. One of the most interesting things about members of this species is that their brain size was about twice that of *H. erectus*.¹⁸⁸ Some of the tools found at *H. heidelbergensis* sites include javelin-like finely crafted spears. They hunted large animals, such as horses and bison, suggesting that they were capable of planning and teamwork. It is believed that they evolved over time into *H. neanderthal*, about which we know much more.¹⁸⁹

Taking the four species, *H. erectus*, *H. heidelbergensis*, *H. denisova* and *H. neanderthalensis*, as representative of the twenty species of the *Homo* genus, we might ask were they, like members of *Homo sapiens*, made in the image of God and were they truly human? Did Christ come to save all members of the genus *Homo* or was redemption confined to members of the species *Homo sapiens*? Anthropologists have failed to find any quality that early members of *Homo sapiens* possessed which other species of *Homo* did not possess, whether it be in the categories of language, technology or culture.

¹⁸⁶ Reich, *op. cit.* pp. 63-65.

¹⁸⁷ Reich, *op. cit.*, p. 5; Middleton, *op. cit.*, 119-122.

¹⁸⁸ Reich, *op. cit.*, pp. 63-64, 71-74.

¹⁸⁹ *Ibid.*; Middleton, *op. cit.*, p. 123.

It is worth noting that the DNA of Jesus of Nazareth, like our own, was not genetically pure *Homo sapiens*. His mother, Mary, like us, had about 2% of Neanderthal DNA in her genome and so did Jesus.¹⁹⁰ In other words, he was arguably partly Neanderthal and thus ultimately descended from *Homo erectus*. Moreover, St Thomas assures us that the sacrifice of Jesus was infinite in its capacity to save, since it was the sacrifice of a divine person.¹⁹¹ So, any possible exclusion of other species of *Homo* on the grounds that the sacrifice of Jesus was insufficient to cover all hominins cannot be entertained.

The traditional way of defining ‘humanness’ has been to seek particular criteria allegedly unique to the human condition: bipedalism, opposable thumbs, tool-making ability, learning ability, abstract thought, shame, play and artistic sense.¹⁹² Some theologians say that there is now general agreement that the requirement to be deemed an image of God (*imago Dei*) are neither anatomical, genetic, neurological nor behavioural.¹⁹³ God did not give to human beings only the image of God. Rather it is a dimension of our very creation. The expression ‘in our image’ is adverbial (that is, it describes the way God made us), not adjectival (that is, as if it simply described a quality we possess). The image of God is not so much something we possess, as what we are. To be human is to be the image of God.¹⁹⁴

While science would seem to answer the question of humanness of all members of the genus *Homo* in the affirmative, Pope John Paul II reminds us that there is an ‘ontological

¹⁹⁰ Gaine, *op. cit.*, p. 232.

¹⁹¹ Aquinas, Thomas, *Commentary on the Gospel of St John*, 1.8. Retrieved 20/12/2021 from <https://isidore.co/aquinas/english/SSJohn.htm>. I am indebted to Gaine, *op. cit.*, fn. 9 for this reference.

¹⁹² Moritz, J. M., ‘Theological Perspectives on the Evolutionary Origins and Boundaries of Human Nature’, *Dialog: A Journal of Theology* • Volume 54, Number 1 • Spring 2015 • March, pp. 51-60, *passim*.

¹⁹³ Berry, R. J. & Jeeves, M., ‘The Nature of Human Nature’, *Science & Christian Belief*, Vol. 20, No. 1, p. 26.

¹⁹⁴ Wright, C. J. H., *Old Testament Ethics for the People of God*. Leicester: InterVarsity Press, 2004, 119; de Smedt J. and H. de Cruz, ‘Human Nature as *Imago Dei*’, *Zygon*, Vol. 49. No. 1 (March 2014), pp. 135-156, *passim*.

leap' between what is human and what is pre-human.¹⁹⁵ However, he admits that it is difficult to find a practical reliable way to make the distinction. He says, 'does not posing of such ontological discontinuity run counter to that physical continuity which seems to be the main thread of research into evolution in the field of physics and chemistry'?¹⁹⁶ His conclusion is that the final determination of humanness must be left to 'philosophical analysis and reflection, while theology brings out its ultimate meaning according to the Creator's plans'.¹⁹⁷ Gabriel Daly, however, would seem to disagree, saying, that 'theology is incompetent to answer' this question.¹⁹⁸

Gaine, A Dominican, who lectures in religion at Oxford, contents himself with saying that if we agree that the different species of the genus *Homo* were created in God's image and saved by Christ, this must expand our understanding of the beneficiaries of Christ's salvation and must also show how God's saving grace was made available to them.¹⁹⁹ Nicola Creegan goes further when she argues:

Theologians must pay attention to our animal inheritance, not as a fleeting fact to be reconciled in a moment, but as a way of looking at the world which requires long pondering in conversation with the biblical text.²⁰⁰

3.3 Evolutionary Perspective on Original Sin

Gabriel Daly in his book, *Creation and Redemption*, poses the question, 'Did something go wrong at a critical stage in human history?'. He then goes on to say that the question will tend to divide believers into those who think that orthodoxy demands that we

¹⁹⁵ Pope John Paul II, *op. cit.*, 22/10/1996, par. 6. Retrieved 12/09/2021 from www.casinapioiv.va/content/accedemia/en/magisterium/johnpaulii/22october1996.html.

¹⁹⁶ *Ibid.*

¹⁹⁷ *Ibid.*

¹⁹⁸ Daly, *op. cit.*, p. 132.

¹⁹⁹ Gaine, *op. cit.*, p. 238.

²⁰⁰ Creegan, N. H., 'Being an Animal and being made in the Image of God', *Colloquium*, 32/2/2007, pp. 185-2003.

affirm an actual, and by implication a very serious, sin committed at the dawn of history, and those who recognise the anthropological implausibility of such a special sin.²⁰¹

In 1973, Herbert Haag (1915-2001),²⁰²an influential Swiss theologian, published an article, entitled 'The Original Sin Discussion 1966-1971' in which he examined the writings of several European theologians, including Karl Rahner (1904-1984), Karl Schmitz-Moormann (1928-1996) and Richard Baumann (1899-1997), on the question of Original sin.²⁰³ He concluded that 'only a few of these views remain rigidly fixed in the old, well known territory, and these views are, for the most part, in official publications. In the others, an honest attempt to come to grips with today's world is clearly visible...'²⁰⁴ Moreover, he found that some, like Schmitz-Moormann and Baumann, were 'clearly ready to overcome an erroneous ecclesiastical tradition and move on to concepts which are truly new, and not merely "new interpretations" of the old'.²⁰⁵ Haag, himself, had no hesitation in stating that the doctrine of Original sin had no basis in scripture:

The idea that Adam's descendants are automatically sinners because of the sin of their ancestor, that they are already sinners when they enter this world is foreign to Holy Scripture ...No man enters the world a sinner.²⁰⁶

The Dutch Jesuit, Piet Schoonenberg, was one of the theologians influenced by Teilhard de Chardin's thinking on Original Sin.²⁰⁷ Though Schoonenberg viewed the problem

²⁰¹ Daly, *op. cit.*, p. 116.

²⁰² Haag, H., *Is Original Sin in Scripture?* New York: Sheed & Ward, 1969, *passim*.

²⁰³ Haag, H., 'The Original Sin Discussion-1966-1971' in *Journal of Ecumenical Studies*, pp. 259-289 see also Doncel, M. G., 'Theology of evolution (II): Karl Schmitz-Moormann (1997) and the trinitarian creative call'. Researchgate: Pensamiento 64(242):783-814, January 2008.

²⁰⁴ *Ibid.*, p. 288.

²⁰⁵ *Ibid.*

²⁰⁶ Haag, H., *Is Original Sin in Scripture?* New York: Sheed & Ward, 1969, pp.106-107.

²⁰⁷ Halloran, N., 'Evolution and the Nature and Transmission of Original Sin: Rahner, Schoonenberg and Teilhard De Chardin', *Colloquium*, 44/2 2012., pp. 177-193, *passim*.

from the perspective of modern evolutionary biology and within the context of historical biblical criticism, he nevertheless wished to affirm the universal sinfulness to which the doctrine points, even though he acknowledged the usual problems of the classical doctrine. He considered that the historicity of Adam, a posited Fall and the alleged physical transmission of a sin were no longer tenable. For Schoonenberg, it was not a case of sin entering the world once or in some ideal realm, such as the Biblical Garden of Eden. On the contrary, sin began and continues to exist because of humankind's failure to love. Moreover, God's redemptive act highlights this failure to love, which is the essence of sinfulness. We are called to transcend this sinfulness with the help of God's grace and the cooperation of his Church, which acts as a conduit for this grace.²⁰⁸

American theologian, John F Haught, stated his wish to uncover what truths the concept of Original Sin can meaningfully express, while at the same time rejecting metaphors that are no longer helpful. He sees evolutionary science as rendering the assumption of an original cosmic perfection 'obsolete and unbelievable'. Moreover, he believes that evolutionary science also abolished the 'whole cosmological framework in which motifs of reparation and expiation have become so deeply entrenched in our cultures and in our classical spiritualities'.²⁰⁹ While acknowledging that we inevitably inherited instincts of aggression and selfishness from our Last Universal Common Ancestor, he feels that it would be 'theologically inappropriate' to identify Original Sin with it.²¹⁰

For Haught, the most appropriate way to view Original Sin is in an evolutionary context whereby 'each of us is born into a still unfinished, imperfect universe where there

²⁰⁸ Schoonenberg, P., 'Sin and Guilt' in Karl Rahner ed. *Encyclopedia of Theology: The Concise Sacramentum Mundi*, New York: Seabury Press, 1975, 1579-86, art. 1584.

²⁰⁹ Haught, J. F., *God after Darwin: A Theology of Evolution*. Boulder, CO: Westview Press, 2000, pp. 57-58.

²¹⁰ *Ibid.*, p. 60.

already exist strong pressures - many of them inherited culturally over countless generations - for us to acquiesce in an indifference to God's creative cosmic aim of maximizing beauty'.²¹¹

In the emerging universe that Haught envisages, the best of creation is yet to come.²¹²

Haught is also known for his support of the use of causal layers in explaining the effects of evolution on humankind. He contends that it would be a mistake to reduce the human phenomenon to a single dimension or layer. As he says, 'Completely different, though noncompeting, causal levels can be operative in the production of a single event, and I need to keep alive a sense of this plurality if I am to avoid the fallacy of reductionism.'²¹³

It will also be remembered that Haught believes that God, in creating the universe identified himself with it and that in a certain sense the ongoing wonders of evolution are part of God's revelation of himself. As an instance of his infinite love God displayed his vulnerable nature and has, moreover, given the universe freedom to evolve. Haught is one of the modern theologians who regard the universe not only as still in the process of becoming but also doing this as a single, self-organising entity.²¹⁴

Daryl Domning argues that biological selfishness is 'literally programmed into the genes of all living things'. Moreover, he contends that this quality is passed on by biological generation and it is this inherited genetic trait, much more than the 'sinful' social climate into which children are born, which accounts for human delinquency. As Domning puts it, 'even without the legacy of learned behaviour, we would still be urged to sin by the genetically programmed selfishness dating from the dawn of life, that underlies and gives rise to it.'²¹⁵

²¹¹ *Ibid.*, p. 62.

²¹² *Ibid.*, p. 63.

²¹³ Haught, J. F., *Christianity and Science: Toward a Theology of Nature*. New York: Orbis Books, 2007, 142.

²¹⁴ Haught, J.F., *op. cit.*, 2000, p. 141.

²¹⁵ Domning, D., 'Evolution, Evil and Original Sin'. *America*, 12 November 2001; see also Domning, D. P., and Wimmer, J. F., 'Evolution and Original Sin: Accounting for Evil in the World'. *Washington Theological Consortium. Crossroad of Dialogue, Faith and Learning*. Retrieved 20/12/2021 from

Monika Hellwig, who, as a theologian, was invited by Domning to comment on his discussion of Original Sin, has no problem in conceding that the origin of the delinquent nature of humankind may have come from prehuman ancestors. She maintains, however, that a Catholic theologian cannot grant a 'reduction of the doctrine of Original Sin' to these inherited qualities.²¹⁶ This would suggest that she has some distance to travel before she is on Domning's side of the debate.²¹⁷

Roger Haight, an American theologian, says that the doctrine of an originating sin does not explain why we are the way we are (that is, prone to evil) because, in principle, religious interpretation does not 'explain' anything; rather he thinks that doctrines interpret a situation in the light of the religious experience and the symbols of a faith tradition. He states that human beings are the way they are and behave the way they do because of impulses that emerged through the process of evolution and to view the condition as faulty is a cultural ethical judgement; to regard the matter as sin before the face of a creator God relies on faith. For Haight, a so-called fallen condition really projects what we should be; it affirms an 'ought' by contrast with 'wild' nature; it intuits future and 'higher' potentiality of what this nature is called to be. To Haight, the rule of God, as mediated by Jesus of Nazareth, means that human beings are called to be far more than they exhibit in their actual behaviour.²¹⁸ It is arguable whether this summary of Haight's contribution has brought significant clarity to the debate.

Jack Mahoney SJ makes an important contribution to the theological debate on

<https://washtheocon.org/wp-content/uploads/2012/10/EvolutionOriginalSin1-corrected.pdf>.

²¹⁶ O'Sullivan, J. P., 'Catholics Re-examining Original Sin in light of Evolutionary Science: The State of the Question'. *New Blackfriars*, 99, No. 2, Sep. 2018, pp. 653-674.

²¹⁷ Hefner, P., 'Biological Perspectives on Fall and Original Sin,' *Zygon*, vol. 28, no. 1 (March 1993).

²¹⁸ Haight, R., 'What is wrong with us?'. *Buddhist-Christian Studies*, 37 (2017), 3-16, Hawaii: University of Hawaii University Press.

Original Sin in the course of his wider focus on the development of Christian doctrine in the light of evolution. He contends that the death and resurrection of Jesus 'saved humanity from death rather than from sin'.²¹⁹ He regards the etiological myth of primal innocence, a disastrous fall and consequent Original sin, as a sophisticated attempt to account for current reality by inventing a mythical past.²²⁰ This myth picked up many accretions throughout the course of history, beginning with articulation by St Paul, followed by systematisation by St Augustine and culminating in codification at the Council of Trent.²²¹ He agrees with Fitzmyer that there is no Biblical warrant for a Fall or Original sin and concludes that there is no longer any need for the doctrine of Original Sin. Neither, he concludes, is there a need to explain the origin of death since it is now widely acknowledged that this is an essential part of the life cycle, in operation for billions of years before the arrival of humankind on Earth. Mahoney, however, insists that there is a place in evolutionary theology for human weakness, sin, divine forgiveness and redemption. Moreover, these are best understood within the context of cosmic evolution.²²²

Mahoney is at pains to emphasise the point that Jesus triumphed over death, and that his death was more than a striking moral example of the extent to which altruism could draw one. It was also in evolutionary terms a cosmic achievement of humanity, taking our species through the evolutionary *cul-de-sac* of individual extinction into a newer form of human living. Jesus not only liberated humanity from self-centredness, instilling in us the moral values of peace, justice, freedom and truth, but also rescued us from the evolutionary destiny

²¹⁹ Mahoney, J., *Christianity in Evolution: An Exploration*. Washington DC: Georgetown University Press., 2011, p. 51.

²²⁰ *Ibid.*, p. 61.

²²¹ *Ibid.*, p. 59.

²²² *Ibid.*, p. 94.

of individual death.²²³

It would probably be true to say that the doctrine of Original Sin remains a sensitive issue in the Catholic Church and any attempt to restate it in a manner which carries meaning and relevance for modern men and women is liable to beget vocal opposition from those who see no need for such restatement.²²⁴ Nevertheless, there is no doubt about the growing insistence of the question. Despite Daly's noting the anthropological implausibility of a special sin at the dawn of Biblical history,²²⁵ the *Catechism of the Catholic Church* insists on such by Adam and Eve.²²⁶ Since, however, in the words of Pope John Paul II, truth cannot contradict truth²²⁷, perhaps we do not so much need to jettison the question of Original sin as to interpret it in a way which remains faithful to its basic insight which is that to be human is to be in need of redemption.²²⁸

3.4 Changing Perceptions of Universe

Perhaps a helpful way to describe most Catholic writers on evolution in the twenty-first century is to say that they start from the premise that evolution is the currently accepted theory of the origin and development of all organisms on Earth, including humankind. They acknowledge that while evolution is a scientific theory, as in the case of the theory of gravity, they also see that, while there is room for opinion about the causes of the phenomenon, there is no evidence that it is not true. Evolution is the working hypothesis for all scientific biological work and research today. The Nobel laureate and member of the Pontifical

²²³ *Ibid.*, p. 51.

²²⁴ Daly, *op. cit.*, p. 123.

²²⁵ *Ibid.*, p. 116.

²²⁶ *Catechism of the Catholic Church, Popular and Definitive Edition*. ISBN 9780860123279. Pars. 396-397.

²²⁷ Pope John Paul II, *op. cit.*, 22/10/1996, par. 2. Retrieved 12/09/2021 from www.casinapioiv.va/content/accedemia/en/magisterium/johnpaulii/22october1996.html.

²²⁸ Daly, *op. cit.*, p. 130.

Academy of Sciences, Christian de Duve (1917-2013), stated this unambiguously in the summary of proceedings at a conference on evolution in the Vatican in 2010:

It is now established that all living beings, including humans, descend by evolution from a single ancestral form and that this process was largely driven by natural selection, the fundamental mechanism, first discovered by Charles Darwin and independently perceived by Alfred Russell Wallace, whereby forms of life best fit to survive and produce progeny under prevailing conditions obligatorily emerge when several variants compete for the same limited resources.²²⁹

Fritjov Capra, a theoretical physicist and ecologist, summarises an informative discussion of evolution by stating that ‘evolution is a process that is complex, highly ordered and ultimately cognitive. It is an integral part of life’s self-organisation.’²³⁰ Francisco Ayala, a prominent geneticist, says that the explosion of knowledge in molecular biology in recent years means that there is no longer any gap in the evolutionary history of living organisms. He says that the days of talk about missing links are over. In his book, *Darwin’s Gift to Science and Religion*, he writes:

Scientists agree that the evolutionary origin of animals and plants is a scientific conclusion beyond reasonable doubt. They place it beside such established concepts as the roundness of the Earth, its revolution around the sun, and the molecular composition of matter. That evolution has occurred is, in ordinary language, a fact.²³¹

Rev George Coyne SJ (1933-2020), former Director of the Vatican Observatory, is unequivocal in his verdict on evolution: ‘Neither the universe as a whole nor any of its ingredients can be understood except in terms of evolution. We human beings came to be

²²⁹ De Duve, C., ‘The Evolutionary Lottery’. PAC, 28 October-1 November 2010, ‘Proceedings of the Plenary Session. retrieved 28/10/2021 from <http://www.pas.va/content/accademia/en/publications/extraseries/evolution.html>.

²³⁰ Capra, F. and Luisi, P.L., *The Systems View of Life: A Unified Vision*. Cambridge: Cambridge University Press, 2014, p. 215.

²³¹ Ayala, F. J., *Darwin's Gift to Science and Religion*. Washington DC: Joseph Henry Press, 2007, p. 140.

through evolution, and evolution is a daily happening.’²³² Writing about the same topic, Elizabeth Johnson, one of the foremost female Catholic theologians in the world today, says that in the contemporary world there is no reasonable scientific debate about the core accuracy of evolution, only over details.²³³

Understanding of the process of evolution has been greatly helped during the last half century by advances in molecular and cell biology. The secrets of macro systems can often be laid bare by a detailed study of microscopic systems. Studies in molecular and cell biology have shown that one of the fundamental forces in nature is a striving towards greater complexity. Delio, echoing Capra and Luisi,²³⁴ notes that the whole history of the universe, and particularly the history of biological science on earth, has been characterised by the steady emergence of complexity. Evolution, however, does not appear to progress smoothly over time but by sudden jumps into increasing states of complexity.²³⁵ One must add to this one other less obvious drive of nature, which is toward unity or wholeness. Teilhard de Chardin, whose work we discussed in greater detail in a previous chapter, puts it thus: 'there is only one real evolution, the evolution of convergence, because it alone is positive and creative'.²³⁶

With ever-improving technology and increasing scientific specialisation, we are learning more and more not only about the nature of our Earth but also about the universe. Over the period which this study covers (from the date of the publication of Darwin's *Origin*

²³² Coyne, Rev George SJ, 'Can God and Evolution Co-exist?' *Thinking Faith*, 07/10/2008. Retrieved 10/03/2021 from https://www.thinkingfaith.org/articles/20081007_1.htm.

²³³ Johnson, E.A., *Ask the Beasts: Darwin and the God of Love*. London: Bloomsbury, 2014, p. 13.

²³⁴ Capra and Luisi, *op. cit.*, pp. 12; 98-126.

²³⁵ Delio, I., *Christ in Evolution*. New York: Orbis Books, 2008, p. 18.

²³⁶ De Chardin, P.T., *Christianity and Evolution*, trans. René Hague, New York: Harcourt, Brace Janovich, 1971, p. 87. Please see Chapter 2 for fuller discussion of De Chardin's work.

to the present day), there has been a fundamental change in our perception of the universe. In 1859, it was perceived as a largely static cosmos. Today, it is perceived as a dynamic unfolding chemical process, immensely large in time and space. This shift continues to challenge the place of humans in the universe, as humans have been shifted from centre stage to the growing tip of an evolutionary trend. John Haught, who has specialised in relationship between science and theology, has discussed this matter and poses the question, ‘Can Christianity and its theological interpretations find a fresh foothold in the immense and mobile universe of contemporary science, or will science itself replace our inherited spiritualities altogether, as many now see happening?’²³⁷

Evolution helps us realise that God works through the chaos of creation and is less concerned with imposing design on processes than in providing nature with opportunities to participate in its own development. Jean-Michel Maldamé OP, when addressing members of the Pontifical Academy of Sciences in 2002, drew attention to an insight of Jürgen Moltmann that is relevant here. According to Moltmann, the concept of evolution must be understood as the fundamental concept of self-motion of the divine Spirit in creation.

The Trinitarian God does not only face his creation from the outside, so to speak, but enters it through his eternal Spirit, penetrating all things and communing with the creation by inhabiting it. From this insight, a new conception of the relationship between all things emerges. It is no longer, however, a mechanistic relationship but a dynamic one.²³⁸

This theme of God identifying himself with his creation, the universe, is discussed by several modern theologians. Denis Edwards was one of the first to deal with it in his book,

²³⁷ Haught, J. F., *Christianity and Science: Towards a Theology of Nature*. New York: Orbis Books, 2007, p. xi; Peters, T., ‘Constructing a Theology of Evolution: Building on John Haught’, *Zygon*, vol. 45, no. 4 (December 2010) pp. 921-937, *passim*.

²³⁸ I am indebted to Maldamé for this quote from his lecture, ‘New Scientific Paradigms and Changing Notions of the Sacred’ to PAS on 28/10/2008, *vide PAS Scripta Varia* 105. Retrieved 10/09/20221 from www.pas.content/dam/accedemia/pdf/sv105/sv105-maldamé.pdf.

Jesus and the Cosmos.²³⁹ Different aspects of the theme are also discussed in books by Ilia Delio, especially her *Christ in Evolution*²⁴⁰ and *The Emergent Christ*.²⁴¹ Cletus Wessels also writes from this perspective in his *Jesus in the New Universe Story*.²⁴² Scientifically literate modern Catholic writers are sensible of the fact that modern physics and cosmology show that the atoms in the body of Jesus were taken from the universe, probably most of them previously forming parts of the bodies of other organisms. Additionally, his flesh was composed of the same atoms and chemicals found in all living organisms, while these elements, in turn, were originally formed in supernovas and, through a long process, found their way to Earth and into human bodies. The Incarnation, therefore, means not only that the Son of God became a member of the human race but that he united himself with the universe and all forms of life. As Johnson explains,

God joins the material world, sharing in the conditions of the flesh in order to accomplish a new level of union between Creator and creature. The early church axiom that ‘what is not assumed is not redeemed’ carried the insight that it is essential for the divine self-embodiment in Jesus Christ to encompass all that belongs to the creaturely human condition, or else the material conditions of all biological life forms (grasses and trees), and the experienced pain common to sensitive creatures (sparrows and seals). The flesh assumed in Jesus Christ connects with all humanity, all biological life, all soil, the whole matrix of the material universe down to its very roots.²⁴³

Pope John Paul II had already drawn attention to this point in his encyclical,

Dominum et Vivificantem, as far back as 1976:

The Incarnation of God the Son signifies the taking up into unity with God not only human nature, but in this human nature, in a sense, of everything that is ‘flesh’: the whole of humanity, the entire visible and material world. The Incarnation, then, also

²³⁹ Edwards, D., *Jesus and the Cosmos*. Homebush, NSW 2140: St Paul Publications, 1991, *passim*.

²⁴⁰ Delio, I., *Christ in Evolution*. Maryknoll, New York: Orbis Books, 2008, *passim*.

²⁴¹ Delio, I., *The Emergent Christ. Exploring the Meaning of Catholic in an Evolutionary Universe*. Maryknoll, New York: Orbis Books, 2011, *passim*.

²⁴² Wessels, C., *Jesus in the New Universe Story*. Maryknoll, New York: Orbis Books, 2003, *passim*.

²⁴³ Johnson, *op. cit.*, p.196.

has a cosmic dimension. The ‘first-born of all creation’ becoming incarnate in the individual humanity of Christ, unites himself in some way with the entire reality of humanity -which is also ‘flesh’ and in this reality all ‘flesh’ with the whole of creation.’²⁴⁴

The twenty-first century would seem to be witnessing a closer relationship between religion and science. Undoubtedly, religious writers are becoming more scientifically literate, and some scientists welcome the contribution of theologians to science. The amicable relations between the two groups, evident in the proceedings of the Pontifical Academy of Sciences, is indicative of this. Pope Francis also noted it in his address to the members of that Academy in November 2018:

The scientific world, which in the past tended to assert its independence and self-sufficiency, and to show a certain distrust vis-à-vis spiritual and religious values, seems today instead to be increasingly aware of the ever more complex reality of the world and of the human being.²⁴⁵

Conclusion

In this chapter the nature and extent of the discourse between evolution and Catholicism during the twenty-first century was discussed. In the world of science, the outstanding event of the early years, and possibly of the entire century, was the determination and publication, with open access, of the structure of the human genome. This galvanised studies in genetics and led to revolutionary techniques in regenerative medicine and, in the words of Pope John Paul II, in preventing ‘the recurrence of genetic diseases and their transmission’.²⁴⁶ The same Pope, however, warned of the danger of the immoral and illegal use of human embryos for scientific research and for use in the development of vaccines to

²⁴⁴ Pope John Paul II, *Dominum et Vivificantem*, 18 May 1976, par. 50. Retrieved 17/09/2021 from <https://ipi.mobi/dominum-et-vivificantem-english-52/>.

²⁴⁵ Pope Francis, Address to PAS, 12/11/2018. Retrieved 14/09/2021 from www.casinapioiv.va/content/accademia/magisterium/12november2018.html.

²⁴⁶ Pope John Paul II, Address to Plenary Session PAS, 28/10/1994, par. 3. Retrieved 16/09/2021 from www.casinapioiv.va/content/accademia/en/magisterium/johnpaulii/28october1994/html.

counteract diseases. Knowledge of genomes, not only of humankind, but of other organisms, has paved the way for the genetic control of pathogens and the modification of plant and animal genomes with a view to rendering them more beneficial to humankind. It has been shown in this chapter that the ongoing discovery of new species of the genus *Homo* raises the question of their recognition as beneficiaries of the redeeming sacrifice of Jesus. The opinions of a range of theologians on the ongoing challenge of reconciling the doctrine of Original Sin within the context of our knowledge of the palaeoanthropology and history of human beings have been discussed. The views of some prominent Catholic writers on changing perceptions of the world were considered. The twentieth century was one of great scientific advancement and those writers who managed to absorb the ideas and the language of contemporary science, in addition to being religiously literate, were best equipped to engage in a dialogue with evolution in the twenty-first century.

Chapter 4: The Pontifical Academy of Sciences: An Effective Agency for Fostering Dialogue

Introduction

In this chapter the origin, history and role of the Pontifical Academy of Sciences (PAS) will be discussed and its effectiveness as a channel of communication between the Catholic church and the scientific community, with special reference to organic evolution, will be critiqued. The way the Academy operates, the choice and calibre of the academicians, the nature of their work and the means whereby the insights from their discussions are communicated to the world will be evaluated. The way the academicians view their role and what the rest of the world think of them will also be considered. Finally, an attempt will be made to assess the efficacy of the Academy as a channel of communication between the Catholic Church and the scientific community, especially that part of it involved in evolutionary studies and related sciences.

4.1 History and Organisation

The Pontifical Academy of Sciences (PAS), the oldest of ten such Academies sponsored by the Holy See, is arguably an ideal means for fostering effective dialogue between the scientific community and the Catholic Church. Professor Nicola Cabibbo (1935-2010), a former President of PAS, who was also a highly respected scientist of international standing, went so far as to say that the Academy established ‘at the highest level, an open channel of communication between the Catholic Church and the scientific community’.¹ Before discussing the nature of the contribution of PAS to ongoing dialogue between the Catholic Church and the scientific community, its history, organisational structure, membership and working arrangements will be briefly considered.

¹ Cabibbo, M., ‘The Meaning of the Pontifical Academy of Sciences’, Session 9, 9/11/2003, *Acta* 17, pp. 115-120. Retrieved 31/10/2021 from <http://www.pas.va/content/accademia/en/publications/acta/anniversary.html>.

PAS has a long history. Its roots lie in the Academy of the Lynxes (*Accademia dei Lincei*) which was founded in Rome in 1603 by Prince Federico Cesi, who was an enthusiastic botanist. It was the first exclusively scientific academy in the world. It achieved international recognition and appointed Galileo Galilei as a member on 25 August 1610. The use of the word lynx, an animal famous for its sharp eyesight, in the title of the Academy was intended to stress the careful observation and experimentation that would characterise the scientific work of the members. However, after the death of Cesi in 1630, the Academy languished and eventually ceased to function. The Academy was re-established in 1847 by Pope Pius IX, who reconstituted it as the New Pontifical Academy of the Lynxes. A new era for the Academy however, dawned when Pope Pius XI, himself a great scholar, reconstituted the Academy in 1936 and gave it its present name. Today, in addition to pure science, it also concerns itself with the ethical aspect of scientific experiments and environmental concerns, together with the relations between science and religion. The academy has its own headquarters in the beautiful historic villa, Casina Pio IV, located within the Vatican gardens. This well-preserved structure was built in 1561 to serve as a summer residence of Pope Pius IV.²

Relationship with the Holy See

PAS, an independent entity within the Holy See, operates according to Statutes drawn up by Pope Pius XI in 1936 and amended by Pope Paul VI in 1976. Article 2 of these Statutes states that the purpose of the PAS is to promote the progress of the mathematical, physical and natural sciences and the study of related epistemological questions and issues.³ Its freedom was guaranteed in 1939, when in the course of an address, Pius XII said: 'To you

² PAS, *Yearbook 2008*, 'Historical Profile', p. 11. Retrieved 31/10/2021 from <http://www.pas.va/content/accademia/en/publications/extraseries/yearbook2008.html>.

³ *Ibid.*, PAS, Statutes of Pontifical Academy of Sciences, No. 2, 1936, amended 1976.

noble champions of human arts and disciplines the Church acknowledges complete freedom in method and research ...'.⁴ The deliberations and studies which the Academy undertakes are not influenced by any one national, political or religious point of view. Not least because of its academic freedom, the Academy constitutes an invaluable source of objective information from which the Holy See and its various bodies can draw. The operating expenses of the Academy are defrayed mainly by the Holy See, though, as an independent academic body, it sometimes receives financial grants and behests from benevolent foundations, firms, membership organisations and individuals.⁵

Organisation & International Cooperation

The Academy is governed by a President who is nominated from among the Academicians by the Pope. The President is assisted by the Council and by the Chancellor, who is appointed by the Pope. The Academy maintains relationships and publication exchanges with other academies and with institutions of scientific research. It is also a member of the International Council of Scientific Unions (ICSU). The current chancellor is Bishop Marcello Sanchez-Sorondo, an Argentinian former professor of philosophy, who was appointed by Pope John Paul II in 1978. The work of the Academy covers six main areas: fundamental science; the science and technology of global questions and issues; science relating to the problems of the developing countries; ethics and politics of science; bioethics and epistemology. Among the fundamental sciences, biology is included in the life sciences category, which also contains agronomy, zoology, genetics, molecular biology, biochemistry, the neurosciences and surgery.⁶

⁴ Pope Pius XII, Address to Plenary Session of PAS, 03/12/1939. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/servant-of-god-pius-xii/1939-3-december.html>.

⁵ Annual budget of PAS was estimated by its President, Nicolo Cabibbo, to be in the region of €800,000 in 2009. Vide Cartledge, E., 'The Pope's Scientists', in *Physics World*, May 2009, p. 12.

⁶ PAS, *Yearbook*, 2008, retrieved 27/10/2021 from <http://www.pas.va/content/accademia/en/publications/extraseries/yearbook2008.html>.

The publications of the Academy are known by their Latin names: *Acta* (the proceedings of plenary session); *Scripta Varia* (major works such as full reports on study weeks and from working groups set up by the Academy); *Documenta* and *Extra Series* (for quick publication of summaries and conclusions of study weeks and working groups; also for dissemination of Papal addresses to the Academy, and of significant documents such as the ‘Declaration on the Prevention of Nuclear War’); *Commentarii* (notes, memoirs and reports of special studies on scientific subjects). All publications are available online.⁷

4.2 Membership

The Academy consists of eighty life members, including men and women from many countries and different religions who have made outstanding contributions in different fields of scientific endeavour. PAS statutes state that members are chosen for membership by the Academy ‘on the basis of their eminent original scientific studies without any form of ethnic or religious discrimination and are appointed for life’. However, there is one other requirement for membership, which is stated as ‘acknowledged moral personality’. Potential members are nominated by the Pope after being elected by the body of Academicians.⁸ Since there is a limit of eighty life members, vacancies occur only on the death of an academician. According to former President, Professor Werner Arber, about half of those elected by the academy are appointed.⁹ In addition to the life members there are also a few *ex-officio* members and some honorary members. The *ex-officio* members include the Chancellor of the Academy, the Director of the Vatican Observatory, the Prefect of the Apostolic Library and the Prefect of the Vatican Secret Archives. There may also be a small number of honorary

⁷ *Ibid.*

⁸ *Ibid.*, PAS, *Yearbook*, 2008, Statutes, Article 5, p. 319.

⁹ Cartlidge, E., ‘The Pope’s Scientists’, *Physics World*, May 2009, p. 12.

academicians, who are generally theologians or philosophers.¹⁰

The academy is governed by a President, drawn from among the academicians and appointed by the Pope for a four-year term. He may be reappointed. He is assisted by a full-time Director of the Chancellery, also known as the Chancellor, who is appointed by the Pope for a period of four years and may also be reappointed repeatedly. There is also a council of seven members appointed by the Pope for a term of four years who may also be reappointed. For the first three decades, the President of PAS was a clergyman, and it was not until 1972 that Paul VI appointed the first lay President, Carlos Chaggas, an internationally known biologist from Brazil. Professor Werner Arber, a Swiss Nobel Laureate, was the first non-Catholic President, appointed by Pope Benedict in 2010. Joachim Von Braun, a German, is the current President.¹¹

Apart from the first one, Professor Pietro Salviucci, all the other Chancellors have been ordained clergymen. The present Chancellor, HE Bishop Marcello Sanchez Sorondo, is assisted by a Vice-Chancellor, Rev Dario Eduardo Vigano, a Brazilian, appointed in 2017. The academicians choose the topics for their conferences, workshops and meetings. Among them are scientists of the very first rank, several of them being Nobel laureates. Among the seventy-four Nobel prize winners who are/were academicians can be found some revered names such as Ernest Rutherford (Chemistry, 1908); Guglielmo Marconi (Physics, 1909); Max Planck (1918, Physics); Niels Bohr (Physics, 1922); Werner Heisenberg (Physics, 1932); Erwin Schrodinger (Physics 1933); Paul Dirac (Physics, 1933) and Sir Alexander Fleming (Physiology, 1945).¹²

4.3 Relationship between PAS and Different Popes

¹⁰ PAS, *Yearbook*, 2008, 'Historical Profile', p. 11.

¹¹ *Ibid.*, 'Council', retrieved 27/10/2021 from <http://www.pas.va/content/accademia/en/about/council.html>, p. 1.

¹² *Ibid.*

4.3.1 Pius XI

It would probably be true to say that throughout its long history of more than four hundred years, the most fruitful period of academic activity of PAS began with its re-foundation by Pope Pius XI in 1936. In the *motu proprio*, ‘*In multis solaciis*’, the Pope said, ‘Science, when it is real cognition, is never in contrast with the truth of the Christian faith’. He went on, ‘We promise again that it is our strongly held intention, that the ‘Pontifical Academicians’, through their work and our institution, work ever more effectively for the progress of the sciences’.¹³

In its bulletin, *Science*, the American Association for the Advancement of Science devoted a column to the launch of the Academy under its new name, listing the names of the American representatives. These included two famous evolutionary biologists, Thomas Hunt Morgan, Director of the Laboratories of Biological Sciences at the California Institute of Technology, and Professor Alexis Carrell, Professor of Biology at the Rockefeller Institute, New York. The same publication also gave a summary of the Pope’s address to the members of the Academy.¹⁴

Pius XI personally addressed the academicians sixteen times during his pontificate, generally on the opening of the academic year. His love and respect for the academicians is evident in all his addresses. He even called them his ‘Academic Senate’.¹⁵ Among the seventy life members whom he appointed to the academy were some fifteen biologists, drawn from several countries, most of them well-known experts in evolution.¹⁶

¹³ PAS, *Yearbook, 2008, Moto Proprio, In Multis Solaciis*, 1936, p. 316.

¹⁴ American Association for the Advancement of Science (AAAS), ‘Foundation of Pontifical Academy for Sciences’. *Science*, Vol. 86, No. 2238, 19/11/1937, p. 470.

¹⁵ Pope Pius XI, Address to PAS, 12/1/1936. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/pius-xi/1936-12-january.html>.

¹⁶ PAS, Pope Pius XI, 21/01/1936, retrieved 27/10/2021 from <http://www.pas.va/content/accademia/en/magesterium/piusxi/21january1936.html>.

4.3.2 The Academy under Pope Pius XII

Pius XII, in his first address to the Academy as Pope, had no hesitation in stating that the re-founding of the Academy in its present form was his predecessor's 'greatest achievement'.¹⁷ This Pope, in his speeches to the academicians, seemed to be personally enthused by their work, especially in the case of the conferences devoted to physics and astronomy. In November 1941, he urged them to continue their search for truth, following in the 'footprints of the most audacious heroes of research':

Yes, your souls, illustrious Academicians, crave and search for the truth... This is the way of human progress, a difficult avenue to take, marked by the footprints of the most audacious heroes of research from Thales, Aristotle, Archimedes, Ptolemy, from Galileo to Bacon, to Leonardo da Vinci, to Copernicus, to Kepler, Newton, Voltaire, Pasteur, Curie, Hertz, Edison, Marconi and one hundred more names that one could add; and to you who, having received the flame of investigation and knowledge, will pass it on with greater brilliance to even younger heroes.¹⁸

The early part of Pius XII's pontificate saw a great advance in knowledge about the nature of matter and energy. One of Pius's concerns was to constantly remind the academicians that there was no conflict between science and faith. He wished to promote 'hard' science and he sought advice from the members of the Academy. He gave eight Papal addresses to the Academy in which he dwelt at length on contemporary issues of scientific concern. Moreover, he had no hesitation in giving moral guidance to the academicians as far as their work was concerned. In a session in 1955, he outlined his ideas on the role of scientists: 'The duty of a scientist is to understand God's design, to interpret the Book of Nature, to explain its contents and to draw from it, consequences for the common good.' He went on

You observe, research, study and experiment with nature in order to understand its

¹⁷ Pius XII, Address to PAS, 3/12/1939, retrieved 27/10/2021 from <http://www.pas.va/content/accademia/en/magisterium/piusxii/30november1941.html>.

¹⁸ *Ibid*, Address to PAS, 30/11/1941. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/servant-of-god-pius-xii/1941-30-november.html>.

principles and intrinsic causes, so as to penetrate the governing laws of its constitution and action, to set in order the process of such laws, and to deduce from it a science with principles, causes and conclusions following through logical consequence. Consequently, you seek the regularity and order in the various kingdoms of creation; and which the investigating spirit of man has discovered in its great richness! ¹⁹

Pius XII made it quite clear that members of the Academy had complete freedom in their research: ‘To you noble champions of human arts and the disciplines the Church acknowledges complete freedom in method and research’. Neither was the experimental method of scientists to be influenced by ‘philosophical assumptions.’²⁰

Though it is only an impression, the speeches of Pius XII would appear to reveal more mastery of the scientific concepts under consideration than those of any other Pontiff. Pius XII seemed to have had a particular facility for understanding and mastering the language of the new quantum mechanics. His speeches discussed in some detail the new findings of atomic physics and astronomy and it must have been very flattering for the academicians to listen to a Pope discussing competently and respectfully their advances in research.

He discussed the ‘the state and nature of primitive matter’²¹ the formation of ‘heavy nuclei and their relative frequency in the periodic table’²², the ‘mutability of things’²³, the nature of ‘solar energy’²⁴, ‘quantum theory’²⁵ What sounds like a provocative note is struck, however, is struck in 1957 in the Pope’s address to the academicians when he maintains that

¹⁹ *Ibid.*, Address to PAS, 21/02/1943. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/servant-of-god-pius-xii/1943-21-february.html>.

²⁰ *Ibid.*, Address to PAS, 03/12/1939. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/servant-of-god-pius-xii/1939-3-december.html>.

²¹ *Ibid.*, Address to PAS, 22/11/1951. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/servant-of-god-pius-xii/1951-22-november.html>.

²² *Ibid.*

²³ *Ibid.*

²⁴ *Ibid.*

²⁵ *Ibid.*, Address to PAS, 24/04/1955. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/servant-of-god-pius-xii/1955-24-april.html>.

scientific knowledge is ‘lower’ than ‘moral knowledge’:

...since the moral universe transcends the physical world, every gain made by science is on a lower plane than that of man’s personal destiny – the ultimate aim and purpose of his existence – and of the relations which unite him to God.²⁶

Pius XII's strong statement for and affirmation of evolution in *Humani Generis* was very welcome to evolutionary biologists, especially to the Catholic members of that profession. It is also reasonable to assume that PAS played an important part in the Pope’s decision to dispel the atmosphere of fear and suspicion of evolution which had hitherto contributed to pushing the subject of evolution to the margins. We must remember that for years he had been receiving in audience academicians who were proponents of evolution and following their deliberations. He also repeatedly stated that there is no clash between scientific findings and religion.²⁷ In virtually every statement of every Pope, however, is a reminder that God is the original creator.²⁸

4.3.3 Pope John XXIII

Pope John XXIII addressed members of PAS on only two occasions, in 1961 and 1962. He made no attempt to speak about the subject matter which the academicians were discussing at the time but thanked them for accepting the invitation of the Chancellor of the Academy to come to Rome and take part in the conference. In 1961, he also quoted Pope Pius XI’s statement about the close relationship that should exist between faith and science: ‘Not only can faith and reason never be in opposition to each other, but they render to each other

²⁶ *Ibid.*, Address to PAS, 12/05/1957. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/servant-of-god-pius-xii/1957-20-may.html>.

²⁷ *Ibid.*, Address to PAS, 03/12/1939. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/servant-of-god-pius-xii/1939-3-december.html>.

²⁸ *Ibid.*, Address to PAS, 30/11/1941. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/servant-of-god-pius-xii/1941-30-november.html>.

reciprocal assistance'²⁹

Pope John returned to the same theme of cooperation between faith and science in his brief message to the Plenary session of PAS in 1962, saying, ' We have entered, thank God, upon an epoch when, let us hope, questions about opposition between the conquests of the human mind and the demands of faith will become less frequent.'³⁰

4.3.4 Pope Paul VI

In his first address to members of PAS, the newly elected Supreme Pontiff took the opportunity to assure members of PAS of his interest and wish to support their work.

To those who belong to the Pontifical Academy of Sciences, and to those who participate in its work or honour it with their friendly interest, we wish to reaffirm our high esteem for this institution, and the resolution we have taken to grant it the support and honour which will ensure its stability and favour its development.³¹

It is evident that Pope Paul VI was at pains to emphasise his high regard for the work of PAS. He repeated his affirmation of the work of the academicians in several addresses. In 1968, he said that scientific discoveries contribute to the 'religious and Christian progress of humankind'³². He encouraged the search for scientific means to help 'conquer world hunger'.³³ In 1970, when the plenary session was devoted to the topic of Nuclei of Galaxies, he recalled Pius XI's hope that PAS would form a 'Scientific Senate', adding that ideally PAS would provide a 'solid basis upon which believers can rely for a fruitful dialogue with

²⁹ Pope John XXIII, Address to PAS, 30/10/1961. Retrieved 27/10/2021 from <http://www.pas.va/content/accademia/en/magisterium/johnxxiii/30october1961.html>

³⁰ *Ibid.*, Address to PAS, 05/10/1962. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-xxiii/1962-5-october.html>.

³¹ Pope Paul VI, Address to PAS, 13/10/1963, retrieved from <http://www.pas.va/content/accademia/en/magisterium/paulvi/13october1963.htm>.

³² *Ibid.*, Address to PAS, 07/04/1968. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/paulvi/1968-27-april.html>.

³³ *Ibid.*

scientific thought'.³⁴

Paul VI began a new phase in the life of PAS when, in 1972, he appointed the first lay President of PAS, Professor Carlos Chagas (1910-2000), a world-famous Brazilian neuroscientist.³⁵ Hitherto this post was reserved for clergymen who were also scientists. In 1975, when the theme of the PAS conference was the use of biological and artificial methods for use in the desalination of water, he presented the Gold Medal of Pius XI to academician Stephen Hawking for his scientific work on Black Holes. Hawking was a well-known atheist.³⁶

Among the new academicians appointed by Pope Paul VI were eight evolutionary biologists, the best known, perhaps, being Christian de Duve (1917-2013), a Nobel laureate who gave many years of service to PAS.³⁷ De Duve's summing up at the end of an important conference on evolution in 2008 is worth quoting for the insight it gives into what renowned biologists like him thought of the nature and tenor of discussions during PAS conferences. To put de Duve's remarks into context, we should add that the subject, which he termed of 'burning interest', was 'Scientific Insights into the evolution of the Universe and of Life'. He said:

The Academy offered a unique setting and intellectual climate for the chosen topic, which is of burning interest – and an occasional source of dispute – for scientists, philosophers, and theologians alike, as well as for the general public. It was particularly valuable to have representatives of all major scientific disciplines and of philosophy and theology gathered together and exchanging views in an atmosphere of

³⁴ *Ibid.* Address to PAS, 18/04/1970. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/paul-vi/1970-18-april.html>.

³⁵ PAS, *Yearbook* 2008, p. 13, 'Presidents, Chancellors and Members of the Council, 1936-2008'. Retrieved 21/12/2021 from <https://www.pas.va/en/publications/extra-series/es14pas.html>.

³⁶ PAS, Pope Paul VI, Address 19/04/1975, retrieved 28/10/2021 from <https://www.pas.va/en/magisterium/paul-vi/1975-19-april.html>.

³⁷ Christian de Duve (1917-2013), Nobel Prize winner in 1974 for Physiology, was appointed to PAS on 10/04/1970.

intellectual freedom and mutual respect.³⁸

In his address to a plenary session of PAS in 1976, Pope Paul VI took the opportunity to remind his listeners that the institutional purpose of this Pontifical Academy of Sciences was ‘to stimulate the progress of science for the service of man’. He then returned to a frequent theme in his allocutions to members of the academy, namely his appreciation of their work and the service science was performing for truth and for the Church:

Not only does she (the Church) recognise the legitimate methodological autonomy of modern science, but she appreciates, in the change that the latter brings into the way of thinking and living, positive values which are not unrelated to the work of salvation with which she is charged. That is why the Church needs you, your demanding sense of research, and your love of truth.³⁹

4.3.5 Pope John Paul II

The Pontificate of Pope John Paul II coincided with or perhaps led to PAS receiving more publicity from world media. This, in turn, led to a general realisation that the Holy See was much better informed on scientific matters than had hitherto been thought.⁴⁰ To a certain extent, PAS moved from the shadows towards the centre of religious affairs. Possible reasons for this are the fact that Pope John Paul II used plenary meetings of PAS to make important announcements that became world news. These statements included an expression of regret in 1979 at the way Galileo had been treated by the Church and the announcement of his intention to set up of a special commission to examine the three-hundred-year-old case of the condemnation of the founder of modern science in 1637;⁴¹ his famous statement in 1996 that

³⁸ De Duve, C., Lecture, Pontifical Academy of Science, 31/10/2008, retrieved 28/10/2021 from <http://www.pas.va/content/accademia/en/publications/extraseries/evolution.html>.

³⁹ Pope Paul VI, Address to PAS, 1976, retrieved 20/12/2021 from <http://www.pas.va/content/accademia/en/magisterium/paulvi/23october1976.html>.

⁴⁰ Mason, M., ‘Holy Alliance’, *Discover*, 02747529, Sep. 2008, Vol. 29, Issue 9.

⁴¹ Pope John Paul II, Address to PAS, 10/11/1979 retrieved 28/10/2021 from <http://www.pas.va/content/accademia/en/magisterium/johnpaulii/10november1979.html>.

evolution was ‘more than a hypothesis’⁴² ; his warnings about the use of stem cells for biological research in 1993 and 1994⁴³ There was also his blueprint for the study of the many implications and consequences of evolution outlined in his letter to Rev George Coyne SJ, who in addition to being Director of the Vatican Observatory, was also one of the organisers of a PAS Study Week in 1988, designed to mark the three hundredth anniversary of the publication of Isaac Newton’s *Principia Mathematica*.⁴⁴

Another reason why PAS assumed greater importance was because of the academic eminence of the scientists whom Pope John Paul II appointed as academicians. He enlarged the number of academicians appointed for life from seventy to eighty, several being Nobel laureates. Nine of the new members were biologists and well-known proponents of evolution.⁴⁵

In the course of his twenty-seven years as Pope, John Paul II addressed PAS on thirty-five occasions. Most of these speeches were at plenary sessions of PAS, with each session having a specific theme. The Pope always addressed part of this usually brief speech to the topic under discussion, but he also referred to themes that were of special concern to him at the time. Among these themes were: the fact that the academy is made up of believing and non-believing members;⁴⁶ condemnation of ‘experimental manipulation of the human

⁴² *Ibid.*, Address to PAS, 22/10/1996. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1996-22-october.html>.

⁴³ *Ibid.*, Address to PAS, 22/10/1993, retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1993-22-october.html>; *ibid.*, 28/10/1994, retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1994-28-october.html>.

⁴⁴ *Ibid.*, Address to PAS, 01/06/1984. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1984-1-june.html>.

⁴⁵ Altogether Pope John Paul II appointed 106 new members to PAS. retrieved 28/10/2021 from <http://www.pas.va/content/accademia/en/magisterium/johnpaulii.html>.

⁴⁶ *Ibid.*, Address to PAS, 10/11/1979. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1979-10-november.html>.

embryo’;⁴⁷ science and religion conversing ‘at a deeper level’;⁴⁸ the ‘fruitfulness of a trusting dialogue between the Church and science’;⁴⁹ the importance of epistemological research as part of a scientific culture;⁵⁰ the need for theologians to keep themselves informed of scientific advancements;⁵¹ the pollution of air and water;⁵² the duty to serve more fully the whole of humankind.⁵³

John Paul II and his ‘rehabilitation’ of Galileo

Mention of the Galileo case is significant in any attempt to understand the relations between the Catholic Church and evolution because some people contend that the fallout from the Church's handling of the Galileo case had a big influence on the same Church's attitude towards evolution.⁵⁴ Having made one disastrous mistake in opposing Galileo's scientific findings, the Church seemed to be determined not to repeat this mistake when dealing with Darwinian evolution. The policy of the Church, consequently, initially became one of ‘cautious non-condemnation’, gradually moving to ‘carefully qualified acceptance’.⁵⁵

⁴⁷ *Ibid.*, Addresses to PAS 23/10/1982, retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1982-23-october.html>; 21/10/1985, retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1985-21-october.html>; 26/09/1986, retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1986-26-september.html>.

⁴⁸ *Ibid.*, Letter to Rev George Coyne SJ, 01/06/1988. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1988-1-june.html>.

⁴⁹ *Ibid.*, Address to PAS, 29/10/1990. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1990-29-october.html>.

⁵⁰ *Ibid.*

⁵¹ *Ibid.*, Address to PAS, 31/10/1992. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1992-31-october.html>.

⁵² *Ibid.*, Address to PAS, 12/03/1999. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1999-12-march.html>.

⁵³ *Ibid.*, Address to PAS, 13/11/2000. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/2000-13-november.html>.

⁵⁴ Cartlidge, E., ‘The Pope’s Scientists’. *Physics World*, 22 (05), p. 12.

⁵⁵ Pellegino, E., ‘Theology and Evolution in Dialogue’. *Quarterly Review of Biology*. Vol 72, No. 4, Dec 1997, p. 385.

Within this context, therefore, not only scientists but the world press welcomed the announcement of Pope John Paul II on 10 November 1979 that he intended to establish a commission to examine the case of Galileo's condemnation and sentence to house arrest by the Holy Office in 1643. The occasion of the announcement was a meeting of PAS commemorating the centenary of the birth of Albert Einstein. The Pope's address was on 'the deep harmony that can exist between the truths of science and the truths of faith'. He said that 'theologians, scholars and historians, animated by' a spirit of sincere collaboration, will study the Galileo case more deeply and, in loyal recognition of wrongs from whatever side they come, will dispel that mistrust that still opposes in many minds, a fruitful concord between science and faith, between the Church and the world.⁵⁶

The guidelines given to the commission were never published but a letter of Cardinal Agostino Casaroli, Vatican Secretary of State, to Bishop (later Cardinal) Paul Poupard indicated that the commission was intended

to rethink the whole Galileo question, with complete fidelity to historically documented facts and in conformity with the doctrine and culture of the time, and to recognize honestly, in the spirit of the Second Vatican Council and of the quoted speech of Pope John Paul II, rights and wrongs from whatever side they come. This is not a review of a trial or a rehabilitation but a serene and objectively founded reflection, in the context of today's historical - cultural epoch'.⁵⁷

The members of the Commission worked in four different groups, which were designated as follows: exegetical; cultural; scientific and epistemological; historical and judicial. The personnel heading these groups were all prominent ecclesiastics, apart from Professor Carlos Chagas, then President of PAS.⁵⁸

⁵⁶ Pope John Paul II, Address to PAS, 10/11/1979, retrieved from <http://www.pas.va/content/accademia/en/magisterium/johnpaulii/10november1979.html>.

⁵⁷ Segre, M., "Rehabilitation" of Galileo', *Endeavour*, Vol. 23 (1), 1999, p. 20.

⁵⁸ *Ibid.* The Archbishop of Milan (later Cardinal), Carlo Maria Martini S. J. (1927-2012), for exegetical questions; Bishop Paul Poupard, then acting president of the Secretariat for Non-Believers and later President of the Pontifical Council for Culture, for cultural questions; Carlo Chagas (1910-2000), President of PAS and

The commission was coordinated by Cardinal Gabriel Marie Garrone (1901-1994), one-time head of the Congregation for Catholic Education, aged eighty at the time. There was nobody representing the history and philosophy of science on the commission. Leading scholars from different fields and countries were invited to contribute and their several works were published by PAS. Since Cardinal Garrone had passed away in the meantime, the final report was presented in French at a plenary session of PAS by Cardinal Poupard on 31 October 1992. An English translation was published in the weekly edition of *L'Osservatore Romano*, of 4 November 1992.⁵⁹

The Commission was set up on 3 July 1981, and it presented its report in 1992, the year of the commemoration of the 350th anniversary of the death of Galileo. Cardinal Poupard's report has been severely criticised. In the first instance, though the commission was established in 1981 and dissolved after presenting its report in 1992, it did not meet during the years 1983-1990. The *modus operandi* of the commission was largely to encourage members and interested scholars to pursue their own research on the topic. This approach led to the publication of several valuable studies, from some of which Cardinal Poupard later drew when compiling his report. Another criticism was that the report 'was full of historical inaccuracies and of the traditional anti-Galilean apologetics'.⁶⁰ The report was also criticised for the 'uncritical appropriation' of a study by Bandmüller, which was unsympathetic to Galileo. Perhaps, even more serious was the charge that 'Poupard's report (together with the commission's actions and inactions) was perhaps an attempt to reaffirm the

George Coyne S. J. (1933-2020), Professor of Astrophysics and Director of the Vatican Observatory, for scientific and epistemological questions; Rev. Michele Maccarrone, historian, Edmond Lamalle S. J. (1900-1989), one-time archivist of The Roman Curia of the Jesuits, for historical and juridical questions. The latter was replaced after his death by Mario d' Addio (1923-2017), professor on the Faculty of Political Science at the University of Rome

⁵⁹ Segre, *op. cit.*

⁶⁰ Finocchiaro, M.A., 'The Church and Galileo; *The Catholic Historical Review*, Vol. 44 No. 2 (April 2008), p. 2608.

conviction of Galileo and undo the rehabilitation attempt of Pope John Paul II.⁶¹

Following the submission of Poupard's report, Pope John Paul II spoke about it when addressing a plenary meeting of PAS on 31 October 1992. Critics noted that he did not explicitly endorse the report, although he accepted some of its conclusions. In the course of his speech, he paid some unusual compliments to Galileo, not least of which was praise for Galileo's biblical hermeneutics.⁶² Another was his memorable judgement that in regard to the relationship between science and religion, 'Galileo, a sincere believer, showed himself to be more perceptive in this regard than the theologians who opposed him'.⁶³ He also quoted a memorable line from a letter of Galileo to Benedetto Castelli, 'If Scripture does not err, certain of its interpreters and commentators can and do so in many ways'.⁶⁴ The Pope also quoted a sage comment of St Augustine in respect of the interpretation of passages of scripture, 'That which is opposed to Scripture is not what is in Scripture but what he (the interpreter) has placed there himself, believing that this is what Scripture meant.'⁶⁵

While it is agreed that the intention of Pope John Paul II in setting up the commission and the general import of his address to the plenary session of PAS was a desire to clear the name of Galileo, there is general agreement that Cardinal Poupard's report did not accomplish this.⁶⁶ Neither is the report likely to be an effective force in dispelling what Pope John Paul II called the accusation of 'the Church's supposed rejection of scientific progress, or of

⁶¹ *Ibid.*, p. 279.

⁶² *Ibid.*, p. 281; Pope John Paul II, address to PAS, 31/10/1992; retrieved 29/10/2021 from <http://www.pas.va/content/accademia/en/magisterium/johnpaulii/31october1992.html>.

⁶³ Finocchiaro, *op. cit.*, p. 270; Pope John Paul II, address to PAS, 31/10/1992; retrieved 29/10/2021 from <http://www.pas.va/content/accademia/en/magisterium/johnpaulii/31october1992.html>.

⁶⁴ *Ibid.*

⁶⁵ *Ibid.*

⁶⁶ Hodgson, P. E., 'The Church and Science', *Heythrop Journal*, XLIX (2008), p. 645.

'dogmatic' obscurantism opposed to the free search for truth'.⁶⁷ The Galileo case continues to be mentioned in much of the literature dealing with the relationship between science and scripture, some authors even terming it 'one of the greatest scandals in the history of science'. Equally notable is the claim that there is general consensus about the truth of this latter judgement.⁶⁸

4.3.5 Benedict XVI

Pope Benedict, as Cardinal Ratzinger, was appointed an honorary member of PAS in 2005. It can be assumed, therefore, that he was personally acquainted with several of the members and that he had a reasonably good knowledge of the nature of PAS and how it operated. In his very first address to members of PAS on 8 September 2006, he reminded members that their task was and continues to be

...that of offering the scientific community a valid and qualified contribution to the solution of those relevant scientific-technical problems that are at the basis of the development of humankind, taking into due consideration the moral, ethical and spiritual aspects of every question as well.⁶⁹

While indicating his high regard for members of PAS by calling them his 'dear academicians', he went on to add, 'In performing its special service, the Pontifical Academy of Sciences always refers to the data of science and to the teachings of the Magisterium of the Church'.⁷⁰

Altogether, Pope Benedict formally addressed PAS on six separate occasions. One of the topics to which he regularly returned was the need to include philosophy and theology in

⁶⁷ Pope John Paul II, address to PAS, 31/10/1992; retrieved 29/10/2021 from <http://www.pas.va/content/accademia/en/magisterium/johnpaulii/31october1992.html>.

⁶⁸ Segre, *op. cit.*, p. 20; See also McMullin, E. ed., *The Church and Galileo*. South Bend, IN: Notre Dame Press, 2005, *passim*.

⁶⁹ Pope Benedict XVI, Address to PAS, 08/09/2006. Retrieved 29/10/2021 from <http://www.pas.va/content/accademia/en/magisterium/benedictxvi/8september2006.html>.

⁷⁰ *Ibid.*

the process of interpreting the accomplishments of science. He freely admitted that in the course of the twentieth century alone 'man certainly made more progress – if not always in his knowledge of himself and of God, then certainly in his knowledge of the macro- and microcosms – than in the entire previous history of humanity.' He added that, nevertheless scientists need to be open to philosophy if they are to discover the logical and epistemological foundation for their methodology and their conclusions. He stressed the point that the Church was a friend of science, declaring in 2010,

Our meeting here today, dear friends, is a proof of the Church's esteem for ongoing scientific research and of her gratitude for scientific endeavour, which she both encourages and benefits from.⁷¹

In his address to the plenary session of PAS on 28/10/2010, he proposed two 'thoughts' for further reflection by the members. The first 'thought' harked back to one of his familiar themes of previous addresses to members of PAS: it was 'the need for an interdisciplinary approach tied with philosophical reflection leading to a synthesis' in all scientific activity. His second thought was a reminder to the world of scholarship and research that all scientific research must ultimately serve humankind's need for peace and a better life for human beings:

Secondly, scientific achievement in this new century should always be informed by the imperatives of fraternity and peace, helping to solve the great problems of humanity, and directing everyone's efforts towards the true good of man and the integral development of the peoples of the world.⁷²

Some Difficulties

Pope Benedict has been quite emphatic in his acceptance of the process of evolution. One can find several affirmative statements by him on this aspect of the topic in his speeches.

⁷¹ *Ibid.*, 28/10/2010. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/benedict-xvi/2010-28-october.html>.

⁷² *Ibid.*, 28/10/2010.

One such statement made in 1968 is both clear and unambivalent: ‘the direction of evolution and its progressive character are ultimately indisputable’.⁷³ He made his acceptance of evolution even clearer by adding that ‘faith today no longer has any difficulty in allowing the scientific hypothesis of evolution to develop in peace according to its own methods’.⁷⁴ At the same time, he evidently had misgivings about the danger of extending the range and implications of the process of evolution so that it becomes a philosophy, claiming to explain everything. As Cardinal Ratzinger, he began to express these doubts as early as 1986, when, in his native Germany, he criticised the naturalistic extension of the concept of evolution:

Today a new stage of the debate has been reached, inasmuch as 'evolution' has been exalted above and beyond its scientific content and made into an intellectual model that claims to explain the who of reality and thus has become a sort of first philosophy... The fact that this philosophy presents itself as an apparently net explanation of the findings of the natural sciences and frankly identifies itself with that knowledge gives it an almost incontestable plausibility, which in the midst of the general crisis in philosophical thought is all the more effective.⁷⁵

These misgivings have not gone unnoticed by members of PAS, Professor Gereon Wolters drawing attention to it in his lecture on 'The Catholic and Evolutionary Theory: A Conflict Model' at the PAS conference held in Rome in October 2008.⁷⁶

Cardinal Christoph Schönborn took it upon himself to laud and explain Pope Benedict’s understanding of evolution on at least two occasions. The first was at the *Schülerkreis* organised in honour of Benedict by his former students at Castel Gandolfo in September 2006.⁷⁷ The second was at a PAS conference in October 2008. In each instance,

⁷³ Horn, S. O., and Wiedenhofer, S. eds, *Creation and Evolution. A conference with Pope Benedict XVI in Castel Gandolfo*. trans. M. J. Miller. San Francisco: Ignatius Press., 2008, p. 12.

⁷⁴ *Ibid.* p. 10.

⁷⁵ Wolters, G, 'The Catholic Church and Evolutionary Theory: A Conflict Model', PAS, 2008, p. 467. Retrieved 29/10/2021 from <http://www.pas.va/content/accademia/en/publications/acta/evolution.html>.

⁷⁶ *Ibid.*

⁷⁷ Horn, S. O., and Wiedenhofer, S., *op. cit.*

Schönborn made the same point: it is not the process of evolution which Benedict objects to but the act of making it into a philosophy that purports to explain everything:

It is not the exact scientific work on the theory of evolution that is the problem, but its 'remodelling' into a philosophical explanatory model with a claim of totality.⁷⁸

Schönborn went on to add that when evolution is elevated to the level of a philosophy, then it should be debated at a philosophical level:

The real level of discourse is that of philosophical thought: when natural science becomes a philosophy, it is up to philosophy to grapple with it. Only in that way is the contentious issue framed correctly; only then does it remain clear what we are dealing with: a rational, philosophical debate that aims at the objectivity of rational knowledge, and not a protest of faith against reason.⁷⁹

This thesis acknowledges that the philosophical implications of evolution are far-reaching and will ultimately change our intellectual landscape in profound ways. Not least are the insights which evolution will continue to reveal about how we think and what sorts of creatures we are. Nevertheless, a discussion about the philosophical aspects of evolution is outside the remit of this thesis.⁸⁰

Schönborn's Public Statements on Evolution

Though statements by both Pius XII in 1950 and John Paul II in 1996, as we have seen, confirmed that the Catholic Church had no problem with evolution, Christoph Cardinal Schönborn expressed serious doubts about it in 2005. Moreover, he chose to do this in a very public manner by means of an article in the *New York Times* on 7 July 2005.⁸¹ The public reaction to this article, in the Cardinal's own words was 'overwhelming and not

⁷⁸ Pope Benedict XVI, Address to PAS 31/10/2008, p. 18. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/benedict-xvi/2008-31-october.html>.

⁷⁹ Horn, S. O., and Wiedenhofer, S., *op. cit.*, pp. 10ff.

⁸⁰ Richards, R. A., 'Philosophical Challenges in Teaching Evolution'. *Evolution: Education and Outreach* volume 1, 2008, pp.158–164. retrieved 23/11/2021 from <https://evolution-outreach.biomedcentral.com/articles/10.1007/s12052-008-0029-8>

⁸¹ Schönborn, Cardinal C., 'Finding Design in Nature'. *New York Times*, 07/07/2005.

overwhelmingly positive.⁸² Perhaps the most significant point about the article was that it dismissed the recently deceased Pope John Paul II's position on theology and science as 'rather vague and unimportant'.⁸³ In addition, the article was perceived by some as siding with the so-called, Intelligent Design Theory (ID), which is vigorously opposed to Darwinism.⁸⁴

The Schönborn *New York Times* article caused some upset among Catholic scholars, not only for its implied rethink by the Church on evolution but also because of its apparent attempt to dilute Pope John Paul's approval of it, even though the Director of the Vatican Observatory called the 1996 statement 'epoch-making'.⁸⁵ The Schönborn article also upset members of PAS and was the subject of debate during the 2008 PAS conference on 'Scientific Insights into the Evolution of the Universe and of Life'.⁸⁶ In subsequent writings, the Cardinal sought to explain how he was misunderstood by his readers and went on to deal at some length about the philosophical implications of evolution. His real target, it appeared, was positivism and materialistic evolutionism.⁸⁷ In the 'Foreword' to the proceedings of the Schülerkreis of 2006 mentioned above, Schönborn also took the opportunity to explain his position at length. Some felt that he attempted to open a new debate in the Church on evolution when he wrote:

Many apprehensions have been voiced in recent months, as though the Church might revise her position with regard to belief in the creation and the teaching of evolution. But what exactly is the Church's view about this question?⁸⁸

⁸² Schönborn, Cardinal C., 'The Designs of Science'. *First Things*, January 2006.

⁸³ *Ibid.*

⁸⁴ PAS, 4/11/2008, discussion on Professor Wolter's Paper, p. 471. Retrieved 29/10/2021 from <https://www.pas.va/content/dam/casinapioiv/pas/pdf-volumi/acta/acta20pas.pdf>.

⁸⁵ Coyne, G., 'God's Chance Creation', *The Tablet*, 06/08/2005, p. 6.

⁸⁶ PAS, 4/11/2008, Discussion on Professor Wolter's Paper, p. 471. Retrieved 29/10/2021 from <https://www.pas.va/content/dam/casinapioiv/pas/pdf-volumi/acta/acta20pas.pdf>.

⁸⁷ Schönborn, Cardinal C., 'The Designs of Science'. *First Things*, January 2006.

⁸⁸ Horn, S. O., and Wiedenhofer, S., *op. cit.*, p. 8.

Schönborn also tried to involve Pope Benedict in the debate by examining closely any writings of the Pope about evolution over a period of some forty years even citing lengthy extracts from them. His conclusion about evolution, however, drawn from his lengthy analysis of Pope Benedict's writings on the subject did not in any way seem startling:

The Christian picture of the world is this, that the world in its details is the product of a long process of evolution but that at its most profound level it comes from the Logos. Thus, it carries rationality within itself.⁸⁹

4.3.6 Pope Francis

Owing to the Covid 19 pandemic, PAS has been unable to meet in plenary session since 2018. Pope Francis, consequently, has had opportunity to address the members of PAS only four times. Nevertheless, it is possible to discern a recurring theme in his addresses to academicians. This theme is the role of PAS in promoting 'wise and responsible commitment on the part of the scientific community' to the long-term welfare of people, society and our planet. He perceives that 'never before has there been such a clear need for science to be at the service of a new global ecological equilibrium.'⁹⁰ He also sees scientists as ideally free of political economic and ideological interests and warns against the perversion of this ideal through the unwise pursuit of national or short-term gains.⁹¹

He welcomes the attention of PAS to worldwide issues such as ensuring water for everyone, devising accessible forms of renewable energy and ensuring food safety.⁹² With his encouragement, PAS has issued a strong statement condemning new evils such as organ

⁸⁹ *Ibid*, p. 22.

⁹⁰ Pope Francis, Address to PAS 24/11/2016. Retrieved from <http://www.pas.va/content/accademia/en/magisterium/francis/24november2016.html>.

⁹¹ *Ibid*.

⁹² Pope Francis, Address to PAS, 24/02/2017. Retrieved from <https://www.pas.va/en/magisterium/francis/2017-24-february.html>.

trafficking and ‘transplant tourism’.⁹³ He warns that the misuse of drugs is becoming a new form of slavery and sees parts of his native continent as unfortunate victims of this scourge. He also detects the letters M-A-F-I-A pervading the entire narcotic industry, from start to finish. The campaign to counteract the evils of drug abuse must start with education but we must also work for the rehabilitation of the victims of drug abuse:

The neediest of our brothers, who seem to have nothing to give, hold a treasure for us: the face of God who speaks to us and challenges us. I encourage you to move forward with your work and to implement, to the best of your ability, the successful initiatives you have launched at the service of those who suffer most on this battlefield. It is a tough battle.⁹⁴

The Popes and PAS: An Overview

Though the speeches and addresses of each Pope to the Pontifical Academy of Sciences reflect to a greater or less degree their personalities and priorities, as well as the particular concerns of the era, the sayings of some Popes would seem to stand out more than those of others. In the context of their influence on PAS, the speeches of four of the Popes are selected for special mention. The four Popes were Pius XI, Pius XII, John Paul II and Benedict XVI.

Pope Pius XI was the founder of the Pontifical Academy of Sciences in its present form. He showed remarkable vision in granting membership to scientists on the basis of their scientific expertise and ‘acknowledged moral personality’, irrespective of nationality and religion. Moreover, he gave PAS a beautiful headquarters, Casina di Pio IV, in the Vatican.⁹⁵ He called the academy his ‘Academic Senate’ and took an obvious pride in the great

⁹³ PAS, Statement on ‘Organ Trafficking and Transplant Tourism’, 08/03/2017, retrieved 31/10/2021 from http://www.academiascientiarium.va/content/dam/accademia/booklet/booklet_organtrafficking.pdf.

⁹⁴ Pope Francis, Address to PAS, 28/11/2016. Retrieved 29/10/2021 from <http://www.pas.va/content/accademia/en/magisterium/francis/28november2016.html>.

⁹⁵ PAS, *Yearbook, 2008, Moto Proprio, In Multis Solaciis*, 1936, p. 316, retrieved 30/10/2021 from <http://www.pas.va/content/accademia/en/publications/extraseries/yearbook2008.html>.

scientific accomplishments of the members. He could justly be called a pioneer in setting up a structure for formal dialogue between the Church and modern science. Moreover, he appointed some of the greatest scientists in the world as life-long members, including Ernest Rutherford, Max Planck, Niels Bohr, Paul Dirac and Guglielmo Marconi, to name but a few.⁹⁶

The speeches of Pius XII to the Pontifical Academy of Sciences reveal an appreciation of science, particularly modern physics, which no other Pontiff before or after him seemed to have. Many of these speeches stand out for their clarity and are virtually a summary of the scientific research of the period. His discussion of topics such as the significance of Einstein's energy-mass equation, or the way in which quantum theory changes our perception of Earth and the universe bespeak a brilliant probing mind, welcoming the extension of the boundaries of scientific knowledge. It should also be remembered that in *Humani Generis*, he made one of the two most significant statements about evolution by the Catholic Church during the past one hundred and sixty years.⁹⁷

The speeches of Pope John Paul II stand out for their courageous determination to face the facts about the origin and development of humankind which the sciences related to evolution were increasingly uncovering. Some of his utterances were historic, especially his more-than-a-hypothesis speech in 1996 and his letter to Rev George Coyne SJ in 1998.⁹⁸ He foresaw the ethical problems to which the determination of the human genome would lead, especially the manipulation of the DNA of human zygotes and the ever-expanding use of

⁹⁶ *Ibid.*, Deceased Academicians, p. 269.

⁹⁷ Pope Pius XII, *Humani Generis*, retrieved 03/11/2021 from www.papalencyclicals.net.

⁹⁸ Pope John Paul II, Address to PAS, 22/10/1996. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1996-22-october.html>; *Ibid.*, letter to Rev George Coyne 01/06/1984. Retrieved 21/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1988-1-june.html>.

stem cells in medicine.⁹⁹ Despite his at times barely concealed hopes that the Pontifical Academy of Sciences would overtly support his policies, he refrained from any attempt at compelling its assent, allowing the academicians their traditional freedom.¹⁰⁰

It would only be true to say that some scientists suspected Pope Benedict of ambivalence towards evolution.¹⁰¹ Catholic scholars have not forgotten that fact that the *Catechism of the Catholic Church*, the editorial board of which he was chair, did not even mention the word evolution.¹⁰² Bearing in mind our earlier discussion, however, this thesis would contend that ‘caution’ would be a more appropriate word than ‘ambivalence’ and that it was not the process of evolution but the philosophy with which it gradually became associated, which led to Pope Benedict’s caution. No other Pope was as detailed in the examination of the philosophical roots of Neo-Darwinism as was he. At the same time, he honoured the traditional rights of the Academy by continuing to allow it to nominate its own members and to choose the topics for study and discussion. He also emphasised the traditional multi-religious membership of the Academy by appointing its first non-Catholic, President, Professor Werner Arber, a Nobel Laureate.¹⁰³

4.4 How Effective was PAS as an agency for Dialogue?

⁹⁹ *Ibid.*, 23/10/1982; 21/10/1985; 26/10/1986.

¹⁰⁰ Hepplewaite, P., ‘Science, Magisterium at Odds’, *National Catholic Reporter*, 15/07/1994, pp. 7-8.

¹⁰¹ Cartledge, *op. cit.*, p. 13; see also Cardinal Schönborn’s paper, ‘Pope Benedict XVI on “Creation and Evolution”’ at PAS 31/10/2008, p. 18, especially the following: ‘Joseph Ratzinger sees the theory of evolution as part of that movement of intellectual history which wishes to steadily cancel ‘the separation of physics from metaphysics achieved by Christian thinking. Everything is to become “physics” again. The theory of evolution has increasingly emerged as the way to make metaphysics disappear, to make the hypothesis of God” (Laplace) superfluous, and to formulate a strictly “scientific” explanation of the world.’ Retrieved 30/10/2021 from <http://www.pas.va/content/accademia/en/publications/acta/evolution.html>.

¹⁰² *Catechism of the Catholic Church* (CCC), London: Burns & Oates, 2012; for relevant commentary on CCC, see Daly, G., ‘Creation and Original Sin’ in Walsh M. J. ed., *Commentary on Catechism of the Catholic Church*. London: Geoffrey Chapman, 1994, p. 82.

¹⁰³ PAS *Yearbook* 2008, p. 13. Retrieved 22/12/2021 from <https://www.pas.va/en/publications/extra-series/es14pas.html>.

Since this thesis suggests that the Pontifical Academy of Sciences (PAS) is and has been an effective means of fostering dialogue between the Catholic Church and evolution, it is reasonable to ask what evidence exists to support this claim. To answer this question, we will look at what some of the indicators say. The first indicator is the extent to which PAS has fulfilled its purpose as specified in its statutes. Another indicator is what the Popes said or say about PAS. Then it would be helpful to know what the academicians themselves think of the role they play. Neither should we neglect public opinion as indicated by what the world press writes about PAS.

The Statutes of PAS list the purpose of the organisation as follows:

The aim of the Pontifical Academy of Sciences is to promote the progress of the mathematical, physical and natural sciences and the study of epistemological problems related thereto.¹⁰⁴

When listing the ways in which PAS fulfils its purpose, the statutes add, that it ‘promotes scientific investigations and researches which can contribute, in the appropriate quarters, to the exploration of moral, social and spiritual problems.’¹⁰⁵ In the course of more than eighty years of its existence, since its reorganisation in its modern form by Pope Pius XI in 1936, PAS has organised regular annual scientific conferences, in addition to specialised workshops and study weeks, during each of these years, apart from those spanning World War II (1939-1945) and the recent Covid 19 Pandemic (2019-2022), when normal life was interrupted. At these conferences scientists openly discussed the latest research in topics chosen by their council. Each of these conferences, included not only scientists at the cutting edge of scientific research but also a small number of clerical academicians, selected for their special knowledge and skill in dealing with aspects of the subject matter deemed to be of

¹⁰⁴ *Ibid.*, Statutes, Article 2., p. 319.

¹⁰⁵ *Ibid.*

special interest to the Church. In recent decades, these clerical academicians have included some of the Church's finest scholars, such as Cardinal Carlo Martini SJ (1927-2012) Scripture Scholar; Pope Benedict XVI (before his election as Supreme Pontiff); Cardinal Georges MM Cottier, Papal Household theologian (1922-2016); Rev Stanley Jaki OSB (1924-2009), Physicist and theologian and winner of a Templeton Award; Rev Agostino Gemelli OFM (1878-1959), physician and psychiatrist; Jean-Michel Maldamé, philosopher; Rev George Coyne SJ (1933-2020), Director of the Vatican Observatory, to name only a few.¹⁰⁶

The supreme Pontiffs, from Pius XI to Francis, have consistently expressed their appreciation of the contribution of PAS to science and the world. In 1982, Pope John Paul II told members of PAS that their work 'besides having a high scientific value, is also of great interest for religion.'¹⁰⁷ In 1994, the same Pope said that PAS had filled the purpose which had been assigned to it.¹⁰⁸ In 1996, on the sixtieth anniversary of the reorganisation of PAS by Pope Pius XI, John Paul II recalled that his predecessor had called PAS the Church's *Senatus Scientificus* and asked it to continue 'to serve truth'.¹⁰⁹

In a speech at a PAS conference in 2003, President Professor Nicolo Cabibbo remarked that, in PAS, the Vatican had the best scientific information and advice to hand whenever it required it.¹¹⁰ The same holds true for the most up-to-date advice on evolution. If

¹⁰⁶ PAS, *Yearbook*, 2008, Academicians *vide*
<http://www.pas.va/content/accademia/en/extraseries/yearbook2008.html>.

¹⁰⁷ Pope John Paul II, Address to PAS 23/10/1982. Retrieved 22/12/2021 from
<https://www.pas.va/en/magisterium/saint-john-paul-ii/1982-23-october.html>.

¹⁰⁸ *Ibid.*, 28/10/1994. Retrieved 22/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1994-28-october.html>.

¹⁰⁹ *Ibid.*, 22/10/1996. Retrieved 22/12/2021 from <https://www.pas.va/en/magisterium/saint-john-paul-ii/1996-22-october.html>.

¹¹⁰ Cabibbo, N., Address to PAS, 09/11/2003, pp. 115-120. Retrieved 31/10/2021 from
<http://www.pas.va/content/accademia/en/publications/acta/anniversary.html>.

we focus on evolution only and look at just the titles of the conferences held over recent years, we see that PAS discussed some of the most important advances in evolution. Topics like 'Recent advances in the Evolution of Primates' (1982), 'Developmental Neurobiology in Mammals' (1985), 'The Human Genome' (1993 & 1994) 'Stem Cell Technology and Other Innovative Therapies' (2003) 'Scientific Insights into the Evolution of the Universe and of Life' (2008) are just a few of the topics discussed. It is evident from the titles that the topics discussed are of critical importance not only in the ongoing research into evolutionary biology but also for their implications in Catholic theology. From a study of the reports of these conferences and the texts of the papers presented, they would appear to be models of effective dialogue between scientists from every part of the world and well-informed church representatives.¹¹¹

As an example of the 'direct line of communication' which PAS President Nicolo Cabibbo maintained existed between the Vatican and the Scientific community, the 2008 PAS Conference on 'Scientific Insights into the Evolution of the Universe and of Life' is a good example.¹¹² This conference could be rated at the top of the academic scale when judged by the scholarly eminence of the participants and scientific research interest in the subject matter. The theme of the conference was divided into three sections: the first section dealt with 'Insights into the evolution of the Universe'; the second section dealt with 'Insights into the Evolution of Life'; the third section dealt with 'Insights into Human Evolution' while the fourth section dealt with 'Theological, Philosophical and Societal Aspects'. There were three speakers in each section and each lecture was followed by discussion. Among the better-known experts were Lord Martin Rees, Astronomer Royal; Francis S Collins, Director

¹¹¹ PAS, *Yearbook* 2008. Please see, *Scientific Meetings, 1949-2010*, p. 322 and *Publications 1936-2008*, p. 326. Retrieved 31/10/2021 from <http://www.pas.va/content/accademia/en/extraseries/yearbook2008.html>.

¹¹² PAS 'Scientific Insights into the Evolution of the Universe and of Life', 31/10/2008-4/11/2008: retrieved 30/10/2021 from <http://www.pas.va/content/accademia/en/publications/acta/evolution.html>.

of the Human Genome Project; Professor Stephen Hawking, Lucasian Professor of Applied Mathematics at the University of Cambridge; Nobel Laureate Werner Arber; Professor Antonina Zichichi, of the CERN European Organisation for Nuclear Research, Professor Vera Rubin, American Institute of Physics; Professor José Funes, Director of the Vatican Observatory. Other participants were no less famous for their achievements in their own countries, but not as well known in the English-speaking world.¹¹³

This (2008) conference gives a sense of the relevance of the lectures delivered to ongoing dialogue between Catholicism and evolution merely by perusing the titles. These titles included: 'Scientific Quest into the Evolution of life in the Universe' by Professor Govind Swarup of India; 'The Origin of the Universe' by Professor Stephen Hawking; 'Rigorous Logic in the Theory of Evolution' by Professor Antonino Zichichi; 'The Search for the Chemistry of Life's Origin' by Professor Albert Eschenmoser; 'Prehumans and the Emergence of the Genus Homo' by Professor Yves Coppens; 'The Language of God' by Professor Francis Collins; *'La doctrine philosophique et théologique de la Création chez Thomas D'Aquin'* by Cardinal Georges Cottier; 'Evolution as a Science and Ideology' by Rev Stanley Jaki; 'The Human Being -God's Plan or Just Sheer Chance?' by Professor Ulrich Luke; 'Evolution and Creation: How to Terminate a False Opposition between Chance and Creation, An Epistemological Note' by Rev Jean-Michel Maldamé OP.¹¹⁴

The languages normally used at conferences were English and French, though not a few of the participants would also have some knowledge of Italian. Many of the papers delivered at the conference would subsequently be published in science journals, often after amendment in the light of criticism from PAS colleagues. Nobel Laureate and President of

¹¹³ *Ibid.*

¹¹⁴ *Ibid.*

PAS Werner Arber believed that, generally speaking, the Vatican followed the advice of PAS ‘for many scientific questions.’ He qualified this however, by admitting that sexuality was an exception.¹¹⁵ Professor C Pavan, a geneticist at the University of Sao Paulo, Brazil, pointed out that it was the advice of PAS to Pope John Paul II which led to the Pontiff giving approval for the promotion of genetic research. Professor Chintmani Rao, who was President of the Third World Academy of Sciences (TWAS), said that the inspiration for that organisation came directly from PAS. ‘This campus (PAS)’, he said, ‘is its birthplace’¹¹⁶ TWAS has now been renamed The World Academy of Sciences with headquarters in Trieste, Italy.¹¹⁷

Pius XII took a very courageous step when he gave members of PAS complete freedom in the choice of topics for discussion and comment. PAS, moreover, has also taken this freedom seriously and has not hesitated to express opinions that, at times, have not been in accord with those of the Pope of the day. Pope John Paul II spelled out clearly, however, what he wanted from PAS. In 1991, when PAS met to consider that important subject of ‘Resources and Population’, the Pope said:

The data emerging from your research and discussions will therefore prove important and very useful in enabling the Holy See to formulate and clarify – in accordance with its proper mission and responsibilities – appropriate guidelines and suggestions. The Academy’s independence and scientific competence enable it to provide a valuable service to the Church. The Church in turn can then make use of the Academy’s analysis of reliable data in order to develop – in the field of her own competence and autonomy – a carefully considered judgment of a religious and ethical nature.¹¹⁸

PAS has taken this advice to heart and has steadfastly adhered to it. This was the case

¹¹⁵ Cartlidge, *op. cit.*, p. 12.

¹¹⁶ Seife, C., *op. cit.*, p.1472.

¹¹⁷ Retrieved 30/10/2021 from <http://www.unesco.org/new/en/natural-sciences/science-technology/basic-sciences/international-basic-sciences-programme/world-academy-of-sciences-twas/>.

¹¹⁸ Pope John Paul II, Address to PAS 22/11/1991. Retrieved 30/10/2021 from <http://www.pas.va/content/accademia/en/magisterium/johnpaulii/22november1991.html>

in the matter of genetically modified organisms (GMOs), which has been a subject of vigorous, if not fierce debate throughout the world. PAS become involved in a scientific investigation of this question in 2000, and it has continued to be a topic about which the Papacy and PAS differ.¹¹⁹ Suffice it to say here that, while PAS favours the controlled and responsible use of genetically modified seed and animal breeding stock, Pope Benedict is strongly opposed to this.¹²⁰ A full discussion of the rationale of each side is, however, beyond the scope of this thesis.

Another example where there is a difference of opinion between the Papacy and PAS is the matter of world resources and world population. In 1991, PAS organised a study week on Resources and Population'. Its report was published in June 1994 in *Vitae Pensiero*, a scholarly journal of the Catholic University of Milan. The report warned that a worldwide effort toward population control is needed to save future generations from 'insoluble problems.'¹²¹

While the academy report was silent on methods for controlling population, it declared that with increasing lower mortality from disease, 'it is unthinkable that one can indefinitely sustain a birth rate that goes much above the level of two children per couple, which is enough to guarantee the replacement of generations.'¹²² The response of Pope John Paul, however, was quite different. In his meeting with Nafis Sadik, Executive director of the United Nations Fund for Population Activities on 18 March 2004, Pope John Paul said that 'all propaganda and misinformation directed at persuading couples that they must limit their

¹¹⁹ Coghlan, A., 'Vatican to Support Engineered Crops', *New Scientist*, 02624079, 12/04/2010, Vol. 208, Issue, 2789.

¹²⁰ *The Catholic Herald*, 20/10/2016, 'Pope Claims GMOs could have "Ruinous Impact" on environment. Retrieved 31/10/2021 from <https://geneticliteracyproject.org/2016/10/20/pope-claims-gmos-ruinous-impact-environment/>.

¹²¹ Hepplewaite, P., *National Catholic Reporter*, 15/07/1994, pp. 7-8.

¹²² *Ibid.*

family to one or two children must be steadfastly avoided'.¹²³

Loyalty and Appreciation

It should also be noted that in an organisation like PAS, composed of high achieving but also noble and idealistic human beings, one inevitably encounters exemplars of some of the finest qualities of *Homo sapiens*. Not a few of his former colleagues would place Max Perutz (1914- 2002) among this group. Max was born and educated in Vienna but moved to the University of Cambridge to do his postgraduate studies. Following his doctorate, he continued his research in the Cavendish laboratory, Cambridge, studying the globular structure of proteins, something of special interest to evolutionary biologists. He received the Nobel Prize in Chemistry for this work in 1962. He spent the remainder of his life in Cambridge researching problems in molecular biology. He was appointed a lifetime member of PAS in 1961 and led many workshops and study weeks for PAS during the following forty years.¹²⁴ A few months before his death, he wrote as follows in a farewell letter to Bishop Sanchez-Sorondo, Chancellor of PAS:

I feel that my days are numbered, and I feel like expressing to you and the President my deep appreciation of having been a member. I received the Pope's telegram appointing me to the Academy at the same moment as the news of the attempt to assassinate him. It aroused a terrible conflict of emotion in me, on the one hand my great pleasure about this Honour, and on the other hand my deep sorrow at that tragic crime. I attended a study-week in 1961, in fact organised it myself, which you could almost call 'the Birth of Molecular Biology'... Since then, I have attended and organised other study-weeks and much enjoyed that privilege, but the greatest privilege was being a Member of that unique body, a truly international Academy, covering all the natural sciences.¹²⁵

Professor Max Perutz died three weeks after writing this letter on 6 February 2002,

¹²³ *Ibid.*

¹²⁴ PAS, Deceased Academicians, Max F Perutz, retrieved 31/10/2021 from <http://www.pas.va/content/accademia/en/academicians/deceased/perutz.html>.

¹²⁵ *Ibid.*

aged eighty-seven years, for forty-one of which he had been a devoted member of PAS.¹²⁶

4.5 Conclusions

This thesis set out to review and critique the discourse between Catholicism and organic evolution over a period of one hundred and sixty years, from the first publication of Charles Darwin's *Origin of Species* in 1859 to 2019.

It has been shown that, though the concept of evolution of plants and animals was an ancient one, the first cogent explanation of the process by which it happens was proposed by the French Catholic biologist, Chevalier Lamarck in 1810. More than half a century later, Charles Darwin published his famous book, *On the Origin of Species* (hereafter called *Origin*), which asserted that natural selection was the chief driving force behind all evolution. Almost immediately after the publication of *Origin*, Catholics began a dialogue with the proponents of evolution that has lasted to the present day.

The first three chapters of this thesis discuss the research material within the context of three consecutive historical periods: the nineteenth, twentieth and twenty-first centuries. The last chapter concentrates on a study of the contribution of the Pontifical Academy of Sciences (PAS) as a means of promoting discourse between Catholicism and evolution.

Among the best informed and convincing of early Catholic participants in the dialogue was Bishop Cuthbert Hedley OSB, who anticipated by more than half a century what Pope Pius later said about evolution in the encyclical, *Humani Generis*, in 1950. Hedley was, however, delated to the Holy Office for statements in his articles and barely escaped censure from the Vatican. He was followed by Dr St George Mivart, who, though an able and enthusiastic supporter of evolution, felt that Darwin had overstated the role of natural

¹²⁶ *Ibid.*

selection. Though Mivart later fell afoul of the Church and was excommunicated, his positive attitude towards evolution, though less so towards natural selection, was adopted by a significant number of Catholic writers at home and abroad.

Other prominent Catholics in Great Britain joined in the debate about evolution in the Catholic press, which was facilitated, if not encouraged by the editor of *The Tablet*, who also wrote some well-informed leaders on the subject. During the last decades of the nineteenth century, the Jesuit journal in Rome, *La Civiltá Cattolica*, adopted a policy of overt opposition to evolution, eagerly seeking out and castigating any Catholic who seemed to entertain or support it. Largely as a result of this campaign, some Catholics, including clergymen, had their books on evolution banned or placed on the Index of Forbidden Books. Meantime, there was a small but articulate group of Catholic writers, some with a scientific background, who wrote favourably and encouragingly about evolution in the American Catholic press.

Early in the twentieth century, one brilliant Catholic researcher, the monk, Gregor Mendel, changed the course of evolutionary studies by unlocking the secrets of heredity. Justly regarded as the father of the modern science of genetics, Mendel, in addition to helping raise evolution to the level of a modern science, arguably managed to associate genetics, and by extension, evolution, with Catholicism. Mendel was followed by Erich Wasmann, another Catholic model of a religious man devoted to reconciling evolution and Catholicism. Wasmann, through his research and public engagement with Ernst Haeckel, then regarded as one of the greatest scientists in Europe, brought Roman Catholicism in Germany to the forefront of the debate on evolution.

Wasmann also influenced other young biologists such as Jaime Pujiula SJ, who helped popularise evolution in Spain. Juan Gonzales Arinteros OP, a professional theologian, was another dedicated Spanish evolutionist. During the pontificate of Pope Pius X, there was a concerted attempt to root out Modernism from Catholic theology and culture. Darwinism

was regarded as one of the means which facilitated the introduction and spread of ideas that either threatened or were suspected of threatening the stability of Catholic theology and doctrine.

The names of Rev Canon Henry de Dorlodot, a Belgian priest and geologist, and Rev Ernest Messenger, a theology lecturer in England, can scarcely be separated because the latter was De Dorlodot's translator and populariser in the English-speaking world. Both were enthusiastic advocates of evolution while exemplifying the best of Catholic theology and ministry. Sir Bertram Windle, President of University College, Cork, together with a small number of Irish Jesuits helped to popularise the concept of evolution in Ireland, while professional Catholic biologist, Philip Fothergill, did similar work in England. William Robert Thompson, a Canadian, with international connections, was a significant figure in the dialogue between evolution and Catholicism in his own country.

Teilhard de Chardin was a major, and arguably the most significant, figure in the discourse between Catholicism and evolution during the twentieth century. His influence has continued to grow since his death in 1965. It would probably be true to say that one will rarely, if ever, encounter a Catholic publication on evolution today that does not mention his name.

The twenty-first century witnessed the rise of a group of more scientifically literate Catholic scholars and theologians, for whom evolution was an indispensable part of their world view. In science, the outstanding event of the early years, and possibly of the entire century, was the determination and publication, with open access, of the chemical structure of the human genome. This galvanised studies in genetics and led to revolutionary techniques in regenerative medicine and, in the words of Pope John Paul II, in preventing 'the recurrence of

genetic diseases and their transmission'.¹²⁷ The same Pope, however, warned of the danger of the immoral and illegal use of human embryos for scientific research and for use in the development of vaccines to counteract diseases. Knowledge of genomes, not only of humans, but of other organisms, has paved the way for the genetic control of pathogens and the modification of plant and animal genomes with a view to rendering them more beneficial to humankind.

The ongoing discovery of new species of the genus *Homo* raises the question of their recognition as beneficiaries of the redeeming sacrifice of Christ. The opinions of a range of theologians on the ongoing challenge of reconciling the doctrine of Original Sin with our knowledge of the palaeoanthropology and history of human beings was discussed. Catholic scholars continue to be fascinated by the latest findings about matter and energy, while physicists, in turn, are intrigued by increasingly widespread beliefs about phenomena, such as the consciousness of the universe. Such sharing of interests by members of professions, which traditionally had little in common, while welcomed by ordinary people, is viewed with suspicion, if not disapproval by the more conservative representatives of each profession. The twentieth century was one of great scientific advancement and those writers who managed to absorb the ideas and the language of contemporary science, in addition to being religiously literate, were best equipped to engage in a dialogue with evolution in the twenty-first century.

In our final chapter we discussed the Pontifical Academy of Sciences (PAS) as an effective agency for fostering dialogue between Catholicism and evolution. The organisation is somewhat unusual in that, though founded and supported by the Catholic Church, it, nonetheless, enjoys complete freedom of expression. Since its foundation in 1936 by Pope Pius XI, each of the subsequent six Popes has affirmed and supported it. The academy

¹²⁷ Pope John Paul II, Address to Plenary Session PAS, 28/10/1994, par. 3. Retrieved 16/09/2021 from www.casinapioiv.va/content/accademia/en/magisterium/johnpaulii/28october1994/html.

manifested its independence on more than one occasion by offering advice which differed from the policy of the reigning Pontiff. More than three hundred years ago, the Catholic Church made a serious mistake in ignoring the advice of a great Catholic scientist, Galileo, and ever since then the Church has not been allowed to forget this. The Pontifical Academy of Science has ensured that, since its foundation, the Church has not lacked sound scientific advice. Moreover, this same academy is arguably one of the most effective agencies for dialogue between the Church and science and, by extension, the most effective agency possible for dialogue between Catholicism and evolution. Pius XII saw this and made a most significant statement about PAS: in his first address to members of the Academy on 3 December 1939, he said that PAS was the greatest achievement of his predecessor.¹²⁸

Among the insights, which a study of the relationship between the Vatican and the Pontifical Academy of Sciences reveals is the high degree of scientific literacy of the modern Popes. The Popes listen to and regularly talk to the most knowledgeable scientists in the world. This is not to say that there is a corresponding evolution in Catholic teaching and dogma. Nor is it the role of this thesis to investigate what factors bring about such an evolution. But what is evident from this study is that the Roman Pontiffs are much better informed about matters like evolution than they are given credit for. And among the agencies that help to accomplish this effectively is the Pontifical Academy of Sciences. And this, we would contend, is discourse between Catholicism and evolution where it matters most.

¹²⁸ PAS, Pope Pius XII, Address 3/12/1939. Retrieved 03/11/2021 from <http://www.pas.va/content/accademia/en/magisterium/piusxii/3december1939.html>.

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