

EDMUND T. WHITTAKER, PHYSICS AND CATHOLICISM. THOUGHTS OF
A CONVERT

by

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In 1951, Pope Pius XII gave a long speech with the unequivocal title ‘The proofs for the existence of God in the light of modern natural science’, dealing with the relationship between modern science, Thomism and theology. The event was widely reported in the British press partly because the only living scientist quoted in that discourse was the Edinburgh emeritus professor of mathematics and convert to Catholicism, Edmund T. Whittaker (1873–1956), who was, in the 1930s and 1940s, producing his own corpus on the then-popular subject of science and religion. In this article, using the vast and unexplored correspondence between Whittaker and his son, the mathematician John M. Whittaker (1905–1984), I shall explore his thoughts and popular works, in which he mixed modern physics and mathematics, philosophy, apologetics, and theology. Whittaker is well known among historians of science for his *A history of the theories of aether and electricity*, the work of a hard-working, self-trained history aficionado. Similarly, after his conversion (in 1930, at the age of 57), Whittaker started reading and forming his own views around the official philosophy of the Catholic Church, Thomism. The core idea with which he justified his conversion and which would be the backbone of his speculations on natural theology was ‘sacramentality’. With it, he thought he could bridge the gap between mathematics, modern physics, and religion, and all with a *sui generis* embrace of Thomism.

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INTRODUCTION

On 22 November 1951, Pope Pius XII received in the Vatican Gardens the members of the Pontifical Academy of Sciences, an institution re-established in 1936 by his predecessor, Pius XI. The welcome event, which was also attended by a large number of cardinals and foreign ambassadors to the Holy See, included a long papal speech with the unequivocal title ‘The proofs for the existence of God in the light of modern natural science’, dealing with the relationship between modern science, Thomism and theology. The discourse made many references to recent scientific developments in chemistry, thermodynamics, and atomic and

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nuclear physics, and to the new relativistic cosmology; but it became famous for its indirect reference to the theory of the primaeval atom, later known as the Big Bang, as possible proof of the creation of the Universe:

Indeed, it seems that the science of today, by going back in one leap millions of centuries, has succeeded in being a witness to that primordial *Fiat Lux*, when, out of nothing, there burst forth with matter a sea of light and radiation, while the particles of chemical elements split and reunited in millions of galaxies.¹

Much has been written and speculated about the reaction of George Lemaître (1894–1966), the so-called father of the Big Bang and a member of the Pontifical Academy, to a discourse he did not hear live since he was not present at the meeting. Indeed, Lemaître had always wanted to keep the theory of the primaeval atom in the realm of the purely mathematical: the Belgian physicist and Catholic priest struggled to convince Albert Einstein and Arthur Eddington to pay attention only to the mathematical developments of his theory and disregard his clerical attire.² That is why the apparently concordist reference of Pius XII was probably not Lemaître’s cup of tea.³

The Pope’s speech was widely publicized in the generalist press, not least because many apostolic nunciatures distributed a copy in advance to national embassies and to relevant scientists and media outlets around the world.⁴ In Britain, papers like *The Times* and *The Manchester Guardian* reported about it on the following day. With headlines such as ‘Existence of God. The Pope on Proofs from Science’⁵ or ‘The Pope accepts evidence of Science on the Creation. No conflict with the Old Testament’,⁶ they reported about the speech. More enthusiastic was the headline in that weekend’s *The Catholic Herald*, ‘Science is discovering its Creator. Holy Father gives a 6,000-word survey on modern trends’, with a two-page-long article going beyond the limits of the actual content of the address.⁷ The piece also contained one picture, that of the retired professor of mathematics in Edinburgh, Edmund T. Whittaker (1873–1956), an influential voice in British science and, of late, a household name as a popularizer of science, and a public speaker on science and religion.

1 Pius XII, ‘The proofs for the existence of God in the light of modern natural science. Address to the Plenary Session and to the study week on the subject ‘The question of microseisms’, 22 November 1951, Pontifical Academy of Sciences, Vatican City, <https://www.pas.va/en/magisterium/servant-of-god-pius-xii/1951-22-november.html> (accessed 8 May 2024).

2 Helge Kragh, *Lemaître’s fireworks Universe, Cosmology and controversy: the historical development of two theories of the Universe* (Princeton University Press, 1996), ch. 2.

3 Dominique Lambert, *The atom of the Universe: the life and work of Georges Lemaître* (Copernicus Center Press, Krakow, 2015), ch. 15. See also Giuseppe Tanzella-Nitti, *The Pius XII - Lemaître affair (1951-1952) on Big Bang and Creation*, <https://inters.org/pius-xii-lemaître> (accessed 8 May 2024).

4 Walter Roberts, British Minister to the Holy See, sent Edmund T. Whittaker a copy of the Pope’s speech, adding that ‘Members of this Academy who live in the United Kingdom will no doubt receive a copy of the English text. It seems to me nevertheless that this Address, which is of unusual significance, deserves to be made available to a wider circle, and it is for this reason that I venture to send you a copy’. (He also sent copies to Professor Edgar D. Adrian, of Cambridge, Sydney Chapman, of Oxford, the Royal Society, the BBC, the Church of England Council of Foreign Relations, James Chadwick, of Cambridge, and Edward Appleton, of Edinburgh.) Walter Roberts, Letter to Edmund T. Whittaker, 27 November 1951, Edmund T. Whittaker archives, Box 9 Thomas Fisher Library, University of Toronto, Toronto. Unless otherwise stated, all correspondence to and from Whittaker comes from this archive.

5 ‘Existence of God. The Pope on proofs from Science’, *Times*, 23 November 1951, p. 3.

6 ‘The Pope accepts evidence of science on the Creation. No conflict with the Old Testament’, *Manchester Guardian*, 23 November 1951, p. 5.

7 ‘Science is discovering its Creator. Holy Father gives a 6,000-word survey on modern trends’, *Catholic Herald*, 30 November 1951.

This comes as no surprise since the Pope's address finished with a long quote from one of his books, *Space and spirit. Theories of the Universe and the arguments for the existence of God*, published five years earlier, which contained the text of his Donnellan Lectures given in June 1946 in Trinity College, Dublin.⁸ A convert to Catholicism, Whittaker could make the readers of *The Catholic Herald* proud: he was British, a well known scientist, a member of the Pontifical Academy of Sciences, and was now directly quoted by the Pope himself. Thus, the picture illustrating the news was not the Pope's but Whittaker's.

If so, was Whittaker involved in any way in drafting the Pope's address? One could speculate was it not for the fact that he first learnt about it a few days later, when his son, the mathematician John M. Whittaker (1905–1984)—Jack to his family—sent him the cutting from *The Times*. 'The Pope couldn't possibly have composed his Allocution entirely from his own knowledge', replied the father. 'I suspect it was chiefly the work of Father [Johan] Stein, S.J., the Director of the Vatican Observatory.'⁹ I know that he is acquainted with "Space and Spirit". The letter went on with some remarks about Thomism and the different attitudes of the Catholic and Anglican Churches towards science:

The frank acceptance of modern cosmology is very gratifying, as there are lots of Thomist philosophers in the Catholic Church whose outlook is completely obscurantist. Non-Catholics don't realise what tremendous conflicts are always going on within the Church, side by side with a complete homogeneity as regards the Faith. In the Anglican Church the exact opposite is the case – there is a hopeless discordance regarding the Faith, ranging from Bishop Barnes and Deans Hewlett Johnson and [Frederick] Dwelly on the one hand to the Anglo-Catholics on the other, but no discordance at all regarding the attitude of the Church to science and philosophy, except perhaps in the rejection of Evolution by some of the extreme Evangelical section.¹⁰

This story helps us introduce the purpose of this paper, which is a survey and analysis of Edmund Whittaker's views on science and religion. As we shall see, his conversion to Catholicism in 1930, when he was 57, seems to have been the result of a long personal and intellectual process. On the most intimate part of it, we have hardly any references; but his intellectual development on things related to religion and to Christianity is manifest in some of his writings, but especially in the preserved personal correspondence between him and Jack. As the quote above shows, his intellectual journey in relation to Catholicism continued after his conversion, developing his own views on the then-popular subject of science and religion, including a critical embracement of Thomism. The quote also shows his propensity to compare religious faiths and denominations and often to do so with a slight touch of a very English sense of humour.

⁸ Edmund T.W. Whittaker, *Space and spirit* (Nelson & Sons, Edinburgh, 1947).

⁹ The Dutch Jesuit Fr Johan Stein was an astronomer and director of the Vatican Observatory from 1930. During his tenure he moved the observatory to Castel Gandolfo. He died in December 1951, only a few weeks after the Pope's discourse.

¹⁰ Edmund T. Whittaker, Letter to John M. Whittaker, 8 December 1951, ETWA Box 5. [E.T.W. and J.M.W. hereinafter]. Emphasis in the original.

EDMUND T. WHITTAKER (1873–1956)

In spite of his very influential role as a mathematician, physicist, astronomer, science manager and amateur historian of physics, the life and work of Edmund T. Whittaker has received only partial attention by historians of science. The lack of relevant archival materials, together with the fact that he belongs to the generation of British mathematical physicists who had to navigate between classical and modern physics, may explain this scholarly gap ('old enough to have experienced the purely classical outlook, but young enough to have entered fully into the spirit of the revolution', as described by W. H. McCrea in his obituary).¹¹ The exceptions are, besides the generous biographical notes by academic societies like the Royal Society or the London Mathematical Society,¹² some studies on aspects of his mathematical work, his influential textbooks on calculus,¹³ his pioneering 'mathematical laboratory' in Edinburgh,¹⁴ and his role as historian of physics and the controversy around his apparently dismissive views on Einstein in the 1950s.¹⁵

Born in 1873 in Birkdale, a small coastal town just a few miles north of Liverpool, Whittaker can be characterized as a typical product of the Cambridge Mathematical Tripos of the late nineteenth century.¹⁶ Graduating as second wrangler in 1895, he won the Smith Prize in 1897 and became a fellow of Trinity College, starting a career as a teacher and a researcher in pure and applied mathematics. One fruit of his lectures was the publication of *A course of modern analysis* in 1902,¹⁷ a book that saw a number of translations and improved editions (in 1915, 1920 and 1927 with George N. Watson (1886–1965), a student of his in the Cambridge years), and which became a classic textbook, training generations of mathematicians in Britain and around the world.

It was also in Cambridge that Whittaker, who came from a traditional Anglican family, became a Presbyterian, the Christian denomination of Mary Boyd (1880–1975), to whom he was married in 1901.¹⁸ This made him officially a dissenter, and an activist one. Indeed, Whittaker joined the 'passive resistance' movement against the 1902 Education Act of Parliament, which meant, in practical terms, that Church schools, mainly Anglican but

11 William H. McCrea, 'Edmund Taylor Whittaker', *J. Lond. Math. Soc.* **s1-32**, 234–256 (1957), aWilliam H. McCrea, 'Edmund Taylor Whittaker', *J. Lond. Math. Soc.* Suppl. **s1-32**, 234–256 (1957), t p. 252.

12 George F. J. Temple, 'Edmund Taylor Whittaker. 1873–1956', *Biogr. Mem. Fell. R. Soc. Lond.* **2**, 299–325 (1956); McCrea, *op. cit.* (note 11); Daniel Martin, 'Sir Edmund Whittaker, FRS', *Proc. Edinb. Math. Soc.* **11**, 1–9 (1958). See also Alison Maidment and Mark McCartney, "'A man who has infinite capacity for making things go': Sir Edmund Taylor Whittaker (1873–1956)", *Br. J. Hist. Math.* **34**, 179–193 (2019); and the recent PhD dissertation, Alison Maidment, *The influence of Edmund Taylor Whittaker as mathematician and teacher*, Open University, Milton Keynes (2023).

13 Severino C. CoutinhoC, 'Whittaker's analytical dynamics: a biography', *Arch. Hist. Exact Sci.* **68**, 355–407 (2014); Severino C. CoutinhoC, 'A lost chapter in the pre-history of algebraic analysis: Whittaker on contact transformations', *Arch. Hist. Exact Sci.* **64**, 665–706 (2010).

14 Alison Maidment, 'The Edinburgh Mathematical Laboratory and Edmund Taylor Whittaker's role in the early development of numerical analysis in Britain', *Hist. Math.* **55**, 39–63 (2021).

15 Jaume Navarro, 'Whittaker, Einstein and the *History of the ether*. Alternative interpretation, blunder or bigotry?', *Hist. Sci.* **59**, 287–314 (2021); Kevin Brown, 'Whittaker and the ether', <https://www.mathpages.com/home/kmath571/kmath571.htm> (accessed 6 April 2020); Arthur IM. Miller, 'A précis of Edmund Whittaker's relativity theory of Poincaré and Lorentz', *Arch. Int. Hist. Sci.* **37**, 93–103 (1897); Jeffrey Crellin, *Einstein's jury: the race to test relativity*, Princeton University Press, 2006).

16 Andrew Warwick, *Masters of theory. Cambridge and the rise of Mathematical Physics*, Chicago University Press, 2003).

17 Edmund T. Whittaker, *A Course of Modern Analysis: An Introduction to the General Theory of Infinite Series and of Analytic Functions, with an Account of the Principal Transcendental Functions* (Cambridge: Cambridge University Press, 1902).

18 J. J. O'Connor and E. F. Robertson, 'John Macnaghten Whittaker', https://mathshistory.st-andrews.ac.uk/Biographies/Whittaker_John/ (accessed 14 May 2024): 'Her father, the Rev Thomas Boyd, was a Presbyterian minister who lived in Cambridge and was the Scottish Secretary of the Religious Tract Society. His father, Mary's grandfather, was Sir Thomas Boyd who had been Lord Provost of Edinburgh'.

also Catholic schools, would be funded by local taxation. Non-conformists regarded this as unfair use of their taxes and decided, as a symbol of resistance, not to pay that part of the local tax. As we read in the local newspaper, Whittaker auctioned six silver spoons to pay for the fine—spoons he had reluctantly acquired a few years before, at his mother's request.¹⁹

In 1906, at the age of 33, Whittaker was offered the post of Royal Astronomer of Ireland and Andrews Professor of Astronomy in Trinity College, Dublin. The years he spent living at the Dunsink Observatory were ideal for a young and growing family: by the time they moved to Ireland the Whittakers already had two of their five children. And, together with his relatively low teaching and research duties, he could cultivate two of his passions: gardening and history. As a matter of fact, it was during his Irish years, and thanks to the magnificent library at Trinity College, that Whittaker wrote the first edition of the influential book, *A history of the theories of ether and electricity*.²⁰ *From the Age of Descartes to the close of the nineteenth century*, which may be considered as the first major book on the history of physics. Much has been written about this book, especially about the second, enlarged edition he prepared in the early 1950s. Here I would only like to make a historiographical consideration. *A history* is, indeed, what later would be dismissed as purely internalist history, but not of a whiggish character. The book was the result of much bibliographical research and became a great source of information, also including many theories that did not bear fruit and were sooner or later abandoned, thus indirectly describing a somewhat pluralistic view of the practice of physics.

Six years later, in 1912, Whittaker was appointed Professor of Mathematics at the University of Edinburgh, where he remained until the end of his life. From there, he became one of the most influential mathematicians of his time, always well connected with the Cambridge network and the British and international scientific communities at large. All of his biographers agree that Whittaker was a creative mathematician, a very good pedagogue, an influential name in British and Scottish learned societies, and a very convivial and gentle person to be around.

All this did not prevent him from experiencing some bigoted rejection at the University of Edinburgh when, after more than fifteen years contributing to the institution, he converted to Catholicism and was, as a consequence, expelled from the Varsity Court. 'I was very sorry to hear ... that the religious fanaticism of the Scots had ousted you from the Court', wrote his son Jack a few weeks later. 'I had not thought that religious prejudice was so strong in the University. If it means that you will spend less time in the very tiring committee work there will be some consolation'.²¹ Whittaker was upset by this decision, as we read in a communication between Jack and a friend of his in New York: 'I can well imagine that your father was upset not to be reelected to the Varsity Court. It beats me altogether to understand that attitude. And it's poor comfort for your father to say that it's the Courts' loss'.²²

19 'I wouldn't buy silver spoons unless Mrs Taylor wants the money badly, for you know how I dislike gold watches, silver spoons and jewellery generally', E.T.W., Letter to his mother, Mary Whittaker, 12 March 1896. <https://www.maths.ed.ac.uk/%7Evlranick/whittakertrin.pdf> (accessed 14 May 2024).

20 Edmund T. Whittaker, *A History of the Theories of Aether and Electricity*, 1st ed. (London: Longmans Green, 1910); Edmund T. Whittaker, *A History of the Theories of Aether and Electricity*, 2nd ed. 2 volumes (London: T. Nelson, 1951 and 1953)

21 J.M.W., Letter to E.T.W., 23 November 1930, ETWA Box 8.

22 'Mannie' Letter to J.M.W., 8 February 1931, ETWA Box 6.

His conversion was also a setback for the plans of his former student, admirer and, eventually good friend, Eamon de Valera (1882–1975), who dreamt of Whittaker as the principal of Trinity College Dublin in the 1940s. As we read in a slightly nostalgic letter from Whittaker’s wife to their son Jack in 1951, congratulating the latter for his election as Vice-chancellor of the University of Sheffield,

Your father is greatly pleased at your elevation. I think he always hoped to become a Principal and would certainly have succeeded Sir Alfred Ewing here or gone to the Provost’s Lodge at TCD [Trinity College Dublin] if he had not joined the Roman Church. Even Mr De Valera with all his admiration for daddy could not go against the Protestant tradition at TCD. However all things work out for the best and I don’t think he had the strength for a Principal’s job.²³

Yet, these few setbacks were not representative of his ulterior stance as a public Catholic figure. In describing the sociology of Catholicism in Britain in the first decades of the twentieth century, historians tend to identify three groups of people: the ‘old Catholics’, mostly located in the north of England, the masses of Irish immigrants in urban industrial hubs, and the converts, ‘of whom a minority constituted the nucleus of a Catholic intelligentsia’.²⁴ Men such as the apologist Gilbert K. Chesterton (1874–1936), the religious bestseller Ronald Knox (1888–1957), the writers Evelyn Waugh (1903–1956) and Graham Greene (1904–1991), or the scholars Christopher Dawson (1889–1970) and Edward I. Watkin (1888–1981), became examples of intellectual conversions. They became Catholics because, in the words of the Catholic historian and theologian Aidan Nichols, ‘they saw the Church of Rome as enjoying legitimate authority in matters of faith and morals, and as representing not only a wider Christendom than that which they had inherited but a wider *humanitas* as well’.²⁵ In October 1930, Edmund T. Whittaker became part of this latter group. He was, no doubt, one of the highest-ranking scientists to do so. Thus, it comes as no surprise that, as we saw in the introduction, *The Catholic Herald* was keen to stress his mention by the Pope in 1951.

As his daughter Beatrice recalled, ‘my father’s two great interests apart from mathematics were theology and gardening. At one time, before he married, he even thought of going as missionary to China and indeed started to learn Chinese’.²⁶ Both passions are immediately corroborated reading the correspondence between Whittaker and Jack, with whom he exchanged weekly letters from 1929 until his death. Indeed, flowers, particularly species of bulbs, and religion were two common subjects in their exchange. It is with this material, together with his public speeches and publications, that we can get a sense of his ideas about religion at large, about Catholicism in particular and, perhaps more importantly for our discussion, about his views on the relationship between science, theology and religion.

23 Mary Whittaker Letter to J.M.W., 6 June 1951, ETWA Box 5.

24 Aidan Nichols, *Dominican gallery* (Gracewing, Leominster, 1997), p. 24. See also Edward Norman, *Roman Catholicism in England* (Oxford University Press, 1985); Adrian Hastings, *A history of English Christianity, 1920–2000* (SCM Press, London, 2001).

25 Nichols, *op. cit.* (note 22), p. 25.

26 Patrick Waymann, *Dunsink Observatory, 1785–1985: a bicentennial history* (Royal Dublin Society, 1987), p. 190.

LIFE OF A CATHOLIC CONVERT AND SCIENTIST

As a minority but growing group in British universities, the early twentieth century saw a surge in the number and activities of Catholic student unions. Following the lead of Oxford's Newman Society, founded in 1878, and Cambridge's Fisher Society, established in 1896, most universities had their own Catholic societies to cater for students and staff, with chaplains appointed by the local bishops or religious orders, and with an emphasis on the intellectual development of the faith. Immediately after his reception into the Catholic Church, Whittaker became a regular speaker and guest in many such societies.

For instance, as early as October 1931, he wrote to his son: 'On Thursday I am to speak to the University Catholic students' union on the Evolution of the Universe';²⁷ and a few weeks later, in early December, 'I am going to Newcastle to address the Alcuin Society (which consists of the Catholic graduates of Durham University)'.²⁸ The following year he 'accepted an invitation from Everett of Trinity to come as guest to the Annual Dinner of the Fisher Society at Cambridge'.²⁹ His old *alma mater* was, naturally, a usual destination for academic and social events, including specifically Catholic activities like the Fisher Dinner or a 'lecture to the Catholic Summer School on "The Physical Universe"'³⁰ in early August 1939, which 'went off well. There was an audience of about 20, with the bishop of Northampton in the chair'.³¹ It, thus, comes as no surprise that on his death, the bishop of St Andrews and Edinburgh, Gordon J. Gray (1910–1993) suggested the name Edmund Whittaker for a new student and graduate society in his archdiocese.³²

Recognition of his stance as a Catholic scientist soon came also from the Vatican. In late 1935 he was conferred the 'Cross pro Ecclesia et Pontifice', a distinction given to Catholic laypeople by the Popes since 1888 for their outstanding services to the Church. Amusingly, Whittaker wondered where and when to wear it: 'I think the Cross Pro Ecclesia et Pontifice is worn at Catholic full-dress functions (i.e. when bishops are present), but I don't suppose to wear it at the Trinity Commemoration Dinner, which I think is now held, in defiance of the rule of the Church, on a Friday in Lent'.³³ The following year, in 1936, he was elected member of the Pontifical Academy of Science, as part of the reform that Pope Pius XI introduced and by which the Academy became fully international and not simply Italian.

Becoming a Catholic also brought a sense of belonging into a new social group: 'Mammy and I went on Saturday to Bonaly Tower [a well-known mansion in Edinburgh] ... All the Catholic notables of the Edinburgh district were there'.³⁴ Among others, he became particularly close with Sir Archibald Edmonstone (1867–1954), who invited him and his wife on a few occasions to his mansion at Corehouse. Whittaker particularly enjoyed those visits because the library 'contains the best collection I have ever seen of records of the English and Scotch Catholics', where he spotted one Lawrence Whitaker, baptized a

27 E.T.W., Letter to J.M.W., 19 October 1931, ETWA Box 2.

28 E.T.W. Letter to J.M.W., 7 December 1931, ETWA Box 2.

29 E.T.W. Letter to J.M.W., 24 April 1933, ETWA Box 2.

30 E.T.W. Letter to J.M.W., 31 July 1939, ETWA Box 4.

31 E.T.W., Letter to J.M.W., 7 August 1939, ETWA Box 4.

32 Bishop Andrew McDonald, Letter to Michael R. E. Gough, 6 June 1956, SCA/DE/171/116, Scottish Catholic Archives, Edinburgh.

33 E.T.W., Letter to J.M.W., 9 December 1935, ETWA Box 3.

34 E.T.W., Letter to J.M.W., 24 April 1933, ETWA Box 2.

Catholic in 1719, and who might have been an ancestor of his.³⁵ He also enjoyed having ‘Mass in the private chapel in the house’, as a way to relate to old British Catholics:

It was strange to reflect that for over 200 years Catholicism in England and Scotland existed only in this form, Masses being said secretly in the houses of the Catholic gentry. Even as late as the beginning of Queen Victoria’s reign there were only a hundred thousand Catholics in Great Britain—now there are just under three millions.³⁶

Through these letters one can feel the youthful way in which Whittaker spoke of his newly found faith and community. He often happily reported about conversions of neighbours or Edinburgh acquaintances, but there is never a hint of him wanting to impose his Catholicism on family or friends. As a matter of fact, as far as I can tell, none of his children nor his wife (who, let us not forget, was the daughter of a well known Presbyterian minister) did become a Catholic. Moreover, on one occasion, when Jack’s children stayed with the grandparents in Edinburgh, Whittaker was very cautious not to influence one of them when he asked religious questions: ‘I felt my position was rather a delicate one, as I could not discuss religion with him without your and Iona’s [Jack’s wife] knowledge and approval’.³⁷

He was also often bemused with the religious diversity he found in his own department and elsewhere. A year before his official conversion, he mentioned two Irish researchers soon to join his laboratory whom Jack knew from Cambridge. ‘Are they both Protestants or is there one of each kind of Irishman?’, he asked. ‘We already have 2 Hinduist and a Mahomedan in the research room’.³⁸ And a few months later, at the start of academic year 1930–1, he was happy that he had five new research students, ‘more than I have ever had in one year before’, among which Ivor ‘Etherington ... a keen Quaker, ... brings something fresh to the already very representative collection of religions in the Research Room’.³⁹ Some years later he explained how Gustaf, the son of his good friend and physicist Max Born, was to be married to a Catholic girl. So ‘Gustaf has signed a document promising to have any children brought up as Catholics. It is remarkable’, he added with his sense of humour, ‘that all Born’s descendants of the name of Born will be henceforth not German Jews but English Catholics’.⁴⁰

But, what were his personal religious thoughts and how were they, if in any way, related to his scientific views? In the next section we shall try to infer the reasons for his conversion as a way to introduce us to his views on science, theology and religion to be discussed in the final section.

THE ROAD TO CATHOLICISM

In late May, 1930, a few weeks before his reception into the Catholic Church, and during an afternoon walk with his Edinburgh friend, the professor of natural science, diplomat and

35 E.T.W., Letter to J.M.W., 12 October 1931, ETWA Box 1.

36 E.T.W., Letter to J.M.W., 22 February 1932, ETWA Box 2.

37 E.T.W., Letter to J.M.W., 10 October 1944, ETWA Box 4.

38 E.T.W., Letter to J.M.W., 9 December 1929, ETWA Box 1.

39 E.T.W., Letter to J.M.W., 13 October 1930, ETWA Box 1.

40 E.T.W., Letter to J.M.W., 5 January 1950, ETWA Box 5.

theology aficionado James Young Simpson (1873–1934), Whittaker was bemused by some of his questions:

He was very anxious to get me to say how my knowledge of relativity etc reacted on my beliefs, but I told him that it didn't react on them at all, and in fact my religious beliefs were identical with those of St Bernard in the XII century or of St Augustine in the V: my scientific knowledge, such as it is, having made no difference whatever. He was evidently disappointed, and evidently thinks that religious belief ought to depend on the scientific hypotheses which have currency at the moment, so that Heisenberg's principle of Uncertainty would necessitate a re-wording of the Creeds and a course of lectures by JYS [James Young Simpson] about it.⁴¹

Whittaker and Simpson were close friends and enjoyed each other's company even though they seldom agreed on matters of theology and natural philosophy.⁴² At one point, the former privately described the latter as 'an extraordinary person: boundless command of an inexhaustible stock of highbrow philosophical and religious phraseology, and at the back of it a mentality no better than Michael Moore'.⁴³ When Simpson suddenly died of a heart attack in 1934, Whittaker expressed that he would 'miss him very much, for although I thought his writings on Religion and Science all bosh, I liked him personally and felt that he was one of my best friends in Edinburgh'.⁴⁴ Many of his ideas seemed extravagant to Whittaker, such as the time when he became 'enamoured [*sic*] of the idea that we live in a four-dimensional universe of space-time which has a sort of leak in it, communicating with a fifth dimension',⁴⁵ or when he questioned Whittaker about 'the latest proof of the existence of God by quantum mechanics, and whether the soul is possibly resident in Hilbert space'.⁴⁶

One might be tempted, as Simpson was, to speculate about the influence of scientific or mathematical theories in Whittaker's religiosity and his move towards Catholicism. But public and personal writings answer this question in the negative. As a matter of fact, the core of his religious itinerary from the 1920s well until the end of his life seems to be grounded on a central idea: sacramentality.⁴⁷ In 1925, five years before becoming a Catholic, and while Jack was preparing for confirmation in the Anglican Church in Cambridge, Whittaker made him this confession:

I feel more strongly as time goes on that the only form of worship which was directly commended by our Lord ('Do this in remembrance of Me') is the Communion, or Eucharist, or Mass, and that only those who participate in it regularly are truly Christians.

41 E.T.W., Letter to J.M.W., 30 May 1927, ETWA Box 1.

42 James Young Simpson had a prolific production in science and religion. His books include: *The spiritual interpretation of nature* (Hodder & Stoughton, London, 1912); *Man and the attainment of immortality* (Hodder & Stoughton, London, 1922); *Landmarks in the struggle between science and religion* (Hodder & Stoughton, 1925); *Nature: cosmic, human and divine* (Oxford University Press, 1929); *The garment of the living God. Studies in the relations of science and religion* (Hodder & Stoughton, London, 1934).

43 E.T.W., Letter to J.M.W., 12 February 1934, ETWA Box 2.

44 E.T.W. to J.M.W., 28 May 1934, ETWA Box 2.

45 E.T.W. to J.M.W., 24 November 1930, ETWA Box 1.

46 E.T.W., Letter to J.M.W., 17 October 1932, ETWA Box 2.

47 As this article progresses, we shall better understand what sacramentality meant for Whittaker. In most Christian denominations, and particularly in Catholicism, a sacrament is a material sign through which God's salvific effects are made available to humans. Broadly speaking, sacramentality stems from the Christian belief that God became incarnate in a material, human being (i.e. Jesus Christ).

I have also in later years come to believe that the Catholic interpretation, which takes the words ‘This is my body’ as literally true, is the right one.⁴⁸

This path was not uncommon among British converts. The prolific Oxford chaplain Ronald A. Knox,⁴⁹ for instance, in his autobiographical book *A spiritual Aeneid: being an account of a journey to the Catholic faith*, published in 1918, attributed to sacramentality one of the main reasons for his conversion.⁵⁰ I mention this book in relation to Whittaker for two reasons: first, because when asked about reasons for conversion he would recommend this book, and second, because from time to time Knox visited relatives in Edinburgh living almost next door to the Whittakers.⁵¹

His emphasis on sacramentality is, I would argue, also interesting coming from a mathematician, since it was a way for him to stress the materiality and not simply the symbolism of his Catholicism. As a matter of fact, he once confessed to feel uncomfortable with symbolic rites in the liturgy:

... I personally (having a temperament which finds its affinity in mathematical physics) have no use for symbolism, and accept Catholicism straightforwardly as a historical religion whose doctrines are statements of fact. Probably I am not representative of my co-religionists generally, in so far as I am bored by ritual and ceremonies: if there is any symbolism (as doubtless there is) I am blind to it. At any rate, our Lord’s incarnation was not symbolical but real; His presence in the Blessed Sacrament is not symbolical but real; and the love which the Catholic has for Christ is not symbolical but real.⁵²

Moreover, as we shall later see, Whittaker tried to stay in a middle ground between materialism and idealism. This is particularly clear in his review of *Scientific theory and religion*, the 1933 book by the very liberal Anglican bishop of Birmingham, and former mathematician, Ernest W. Barnes (1874–1953).⁵³ With his particular sense of humour, Whittaker was bemused by the fact that many popular books on science and religion in the late 1920s and early 1930s were written by mathematicians (he mentions Eddington, James Jeans, Alfred Whitehead and Bertrand Russell). He wondered whether this meant ‘that the mathematical physicists, in the course of their investigations regarding space and time, physical determinism and the origin and form and destiny of the universe, have lately come across something that is either religion or a substitute for religion?’, and ironically asked whether ‘the religious teachers of the future are to be mathematicians?’⁵⁴

But what he seriously disliked about Barnes’s book, besides his insults to Catholicism as ‘devilish’, ‘degenerate’ or ‘deplorable’,⁵⁵ was his rejection of ‘incarnational religion’, a

48 E.T.W., Letter to J.M.W., 10 February 1925, ETWA Box 1.

49 Knox was first the Anglican chaplain in Trinity College, Oxford, from 1911 to 1917. After his conversion to Catholicism, he eventually returned to Oxford, as a Catholic chaplain from 1926 to 1939.

50 Ronald A. Knox, *A spiritual aeneid* (London, Longmans, Green, 1918)

51 ‘Monsignor Ronald Knox has been with his relatives in George Square. ... I had a long discussion with him on St Thomas Aquinas’ Five Proofs of the Existence of God. He lent me some typescript-part of a forthcoming book – asking me to look over it to see if there were any scientific mistakes’, E.T.W., Letter to J.M.W., 5 September 1945, ETWA Box 4.

52 E.T.W., Letter to Leslie Walton, 19 September 1943, ETWA Box 9. This conversation was part of a long exchange where Leslie Walton, the classics professor in Edinburgh and a Protestant, asked about Catholicism. Thomas Hardy, a convert to Catholicism, was part of this conversation.

53 Ernest W. Barnes, *Scientific theory and religion: the world described by science and its spiritual interpretation* (Cambridge University Press, 1933).

54 Edmund T. Whittaker, ‘Bishop Barnes and the mathematical theists’, *Dublin Rev.* **193**, 286–298 (1933).

rejection that Whittaker saw as ‘really rooted not in science but in an extravagant form of philosophical idealism, which refuses to admit the dignity of matter and its capacity for becoming, in the Christian sacraments, the vehicle of the Divine’.⁵⁶ Barnes was, at the time, one of the most outspoken representatives of modernism in Anglicanism, a movement that tried to rationalize every aspect of the Christian doctrine and to dismiss any sense of the supernatural or of divine revelation. Indeed, Barnes claimed that ‘the great Jewish prophets, not excluding the Greatest of them [i.e. Jesus], were natural forerunners of modern men of science’;⁵⁷ thus placing modern science as the source of any claim, including religious claims. To be fair, it should be noted that, in spite of this profound disagreement on theological matters, on Barnes’s death, Whittaker wrote the obituary article for the Royal Society, in which he praised Barnes’s mathematical work and even managed to commend him for the ‘ability and industry which had enabled him, in the intervals of his duties as a Bishop, to become acquainted with such an immense field of new knowledge’⁵⁸ in the task of preparing *Scientific theory and religion*.

Sacramentality emerged again a few years later as a central tenet of his faith. In 1951, Whittaker was invited to Cambridge to give the annual Eddington Lecture. The astronomer and mathematician Arthur Eddington, well known for his role in the 1919 eclipse expedition that corroborated Einstein’s theory of general relativity, had been a student of Whittaker in Cambridge and they had kept a good relationship ever since. After his death in 1944, Whittaker undertook the task of editing and preparing for publication his posthumous manuscript *Fundamental theory*, an almost incomprehensible book that was the culmination of his very speculative work in the previous decade. Eddington had also been a prolific and successful writer on popular science and on science and religion, and his views were informed by his Quakerism and mathematical idealism.⁵⁹ When Whittaker prepared his lecture, and to the disappointment of the organizers, he chose to vindicate Eddington’s philosophy of science but to avoid any religious speculation. The following long quote from Whittaker’s response to the ethologist William H. Thorpe (1902–1986), one of the trustees of Eddington, is, from my point of view, a good testimony of his character as well as the persistence of his views on the question of sacramentality:

When I was considering what to say, I felt that this occasion had a rather special character, since the lecture would be addressed to the members of the B[ritish].A[cademy], ... Now as you probably know, all Eddington’s work from 1930 onwards is rejected by physicists and indeed men of science generally: he is honoured only for the work he did earlier; I am one of the very small number of those who accept his later work, ... [I]t seemed to me that occasion offered a unique opportunity of vindicating Eddington’s reputation by a vigorous defense of his position and an exposition of the importance of his principles for the phil[osophy] of science. This I have tried to do: but inevitably it meant that the lecture must be about phil[osophy] of science and it was difficult to see how the phil[osophy] of religion and ethics could be filled into it ...

55 *Ibid.*, p. 287.

56 *Ibid.*, p. 296.

57 Barnes, *op. cit.* (note 50), p. 650.

58 Edmund T. Whittaker, ‘Ernest William Barnes, 1874–1953’, *Obit. Notes Fell. R. Soc.* 9, 914–925 (1954), at p. 924.

59 Matthew Stanley, *Practical mystic. Religion, science, and A. S. Eddington* (Chicago University Press, 2007).

There was however another and quite different reason which I hope you will pardon me for mentioning. I am a Roman Catholic, and as you know, Catholicism is essentially a sacramental religion. I have a philosophy of religion, and am quite ready to expound and defend it in any appropriate occasion: but it is based entirely on the sacramental principle—that the Incarnation, in which God took mankind flesh, is continued in the bestowal of spiritual gifts by material channels, especially through the Real Presence in the consecrated bread and wine. This of course runs counter to the fundamental principle of Quakerism, and I felt that as any expression of the philosophy of religion I believe in would be inappropriate in a lecture delivered more or less under Quaker auspices, it would be better for me to knock off the subject. Perhaps I ought to have seen the difficulty earlier and declined the honour of giving the lecture: and indeed if you think that the lecture I have prepared gravely contravenes the Trust Deed, I am ready even now to resign, with profound apologies for the trouble I have caused.⁶⁰

SCIENCE AND RELIGION

Looking at the list of his published papers and books, one gets the feeling that Whittaker's interests shifted in 1930, after his embracement of Catholicism. Except for the 1910 history book *A history of the theories of the aether and electricity*, all his public production up to 1930 was on mathematics and physics. We cannot find a single paper or public talk on philosophical or religious matters. As we have seen, he was indeed very interested and an avid reader in such matters, as well as in history and gardening, but he did not publish on them. Now, in his late fifties, with his department and laboratory at the university fully consolidated, Whittaker became a public figure on science and religion, as well as on popular science and its history. This was particularly true in the 1940s, in the run-up to and after his retirement. In this section I shall explore some of his ideas, with a particular emphasis on the way he tried to amalgamate his knowledge of modern physics with his faith and with the then-predominant trend in Catholic theology of neo-Thomism.

Sui generis Thomism

Let us start with the latter. As a convert eager to engage with his new Christian denomination and the commitments that came with it, Whittaker felt the need to learn more about the philosophy of Thomas Aquinas. Much has been written about the many ways, often contradictory, theologians in the late nineteenth and early twentieth centuries interpreted Pope Leo XIII's call, in 1879, to go back to Aquinas. Aware of his insufficient knowledge about it ('I should like to understand Scholastic Philosophy better',⁶¹ he told his son in 1932), Whittaker engaged in conversations with scholars such as the above-mentioned Ronald Knox, as well as with the Jesuits and Dominicans in Edinburgh (the latter set up a house in Edinburgh in 1930 next to the Whittakers, on George Square).

As a matter of fact, only a few weeks after his reception into the Catholic Church, Whittaker engaged in conversations with philosophers at the university, particularly with Alfred E. Taylor (1869–1945), the professor of moral philosophy, to promote a lectureship

60 E.T.W., Letter to W. H. Thorpe, 22 May 1951, ETWA Box 9.

61 E.T.W., Letter to J.M.W., 8 February 1932, ETWA Box 2.

on scholastic philosophy. As we have seen, the university was not very friendly to Catholicism, and Whittaker, under Taylor's advice, realized that the best way to 'pilot through the rocks and whirlpools of anti-Catholic prejudice within the university and outside it'⁶² was to slowly introduce an optional course on scholastic philosophy, possibly given by the young philosopher A. C. A. Rainer, himself also a recent convert. This did not materialize, but the interesting thing is that, as we see in the correspondence with the bishop, Whittaker seems to have thought that the promotion of such a lectureship was a duty he had as a Catholic academic.

Yet, his interaction with some long-standing neo-scholastics was often disappointing. He felt that they were too keen on a literal version of Aquinas and too ignorant on modern science. For instance, and in response to his 1944 article 'The new physics and the philosophy of Catholics'⁶³ published in 1944 in *The Month*, a magazine run by the Jesuits, Whittaker received 'an attack' by his neighbour, the Edinburgh-based Dominican and sculptor Father Aelred Whitacre (1882–1945), 'who is very conservative scholastic philosopher';⁶⁴ 'one of the last survivors of the Old Guard who still hold to the physics with St Thomas adopted from Aristotle, and refuse to accept modern science *in toto*'.⁶⁵ Similarly, in 1949, when the University of Edinburgh awarded an honorary degree to Jacques Maritain, also a convert and one of the major names of French neo-Thomism, Whittaker made it clear that he disagreed with his philosophy.⁶⁶ Thus, although he nominally followed the Catholic hierarchy in defending Aquinas, Whittaker did so only with a *sui generis* reading of it.

At stake was the role he attributed to modern physics as the basic source for *meta*-physics. 'Evidently', he wrote in several places, 'the crux of the problem that lies before us to-day is to establish a proper and harmonious relation between neo-Thomism and the new physics',⁶³ something that Aquinas himself would have done, he claimed, had he lived in the twentieth century: 'St Thomas no doubt realised that any harmonisation between religion and science can only be a harmonisation of religion with the current phase of science, and that in a later generation, when science has entered on a new phase, the work has to be done over again'.⁶⁷ Thus, Whittaker followed an invented modern Aquinas, one that was subsidiary to modern physics; one with which 'we may entertain the hope that the recovery of the lost territory of physical science will presage the reconquest of the intellectual world for the philosophy of St Thomas, and the restoration of the unity of European thought'.⁶⁸

As we can see, his nominal support of some sort of Thomism, which he could not and did not elaborate at length, was secondary to his realist stance in physics. His understanding of metaphysics, far from the mainstream Thomistic tradition, was a result of his training and work as a physicist. He was a realist in physics and a believer in the progress and truth of the science of his time. The 'true aim of metaphysics' was, for Whittaker, 'to complete the direct scrutiny of nature by reflecting on, and laying bare, its presuppositions, concepts and principles; so that philosophy follows mathematical and physical science, and does not

62 E.T.W., Letter to Bishop Andrew McDonald, 7 December 1930, SCA/DE/67/3, Scottish Catholic Archives, Edinburgh.

63 Edmund T. Whittaker, 'The new physics and the philosophy of Catholics'. *Month* **180**, 103–117 (1944), **181**, 59–61 (1945).

64 E.T.W., Letter to J.M.W., 14 December 1943, ETWA Box 4.

65 E.T.W., Letter to J.M.W., 22 August 1944, ETWA Box 4.

66 E.T.W., Letter to J.M.W., 14 July 1949, ETWA Box 5: 'I took him to the Chaplaincy and had a pleasant talk with him, though I don't agree with him philosophically'.

67 Edmund T. Whittaker, 'The mind behind material nature', *Listener* **37**, 626–627.

68 Whittaker, *op. cit.* (note 63) vol. **180**, p. 117.

precede it'.⁶⁹ In other words, philosophy was dependent on physics, and the latter was the bearer of the prime matter for philosophy, not the other way around.

That is why he did not agree with the philosophy of the French physicist, philosopher and Catholic controversialist Pierre Duhem (1861–1916). According to Whittaker, Duhem should be remembered for some of his work in thermodynamics but, above all, for his work on medieval history of science. Yet, 'his essays in criticism and philosophy were less meritorious, indeed much of them of no merit at all',⁷⁰ he claimed. The problem was that Duhem was an instrumentalist in science, holding that there 'was essentially a delimitation of the boundary between physics and metaphysics'. Ironically, Whittaker ended up playing the role of the Catholic physicist–philosopher *par excellence*, similar to Duhem's status only a few decades earlier. In 1954, for instance, the Gilmory Society, a Catholic publisher in the USA, invited Whittaker to write an up-to-date continuing article on 'physics' for an intended supplement of *The Catholic encyclopedia*.⁷¹ The editors thought that Whittaker was the natural choice to succeed Duhem, the author of the 1911 article in the same encyclopaedia.⁷²

Another trait of Whittaker's stance on science, philosophy and religion was his disregard for the spiritualism that was still in fashion in Britain. In March 1932, he engaged in a public dispute with spiritualists in the local press that went on for a few weeks.⁷³ Whittaker dismissed the whole thing as unscientific, partly because its supposed scientific character relied on the existence of the ether, which modern science had rejected. In response, one opponent wrote that if relativity claimed to have abolished the ether, 'no doubt in a few years' time there will be another theory that will abolish relativity' and bring back the ether, as, indeed, the 'discovery' of 'aetherial waves' (i.e. wireless technologies) had already proved.⁷⁴ And another member of the public advised him to attend a spiritualist 'séance of first-class', where he 'would get more information about relativity and ether in one hour's sitting ... than he will get in his laboratory'.⁷⁵ In this newspaper controversy he was also accused of not being truly Catholic because he had an excessive faith in science, which might throw away all talk of miracles and intercessory prayer.

As is well known, the great scientific authority of British spiritualists was Oliver Lodge. In 1935, Whittaker received 'as a New Year's present a book of his called "Beyond Physics"'. His private reaction could not be more dismissive:

He interprets 'incarnation' as a 'conversion between ether and matter which has still to be understood' by which 'the undifferentiated mind develops into separate personality'. The 'Absolute Mind', he says, 'whether differentiated or not, must exist in the continuous ether: for 'that is the only physical entity with perfect properties known to us'. This

69 Edmund T. Whittaker, *The modern approach to Descartes' problem: the relation of the mathematical and physical sciences to philosophy* (Nelson & Sons, Edinburgh, 1948), p. 13.

70 *Ibid.*, p. 33.

71 *The Catholic Encyclopedia* was a multi-volume work, published between 1907 and 1913, with some supplementary volumes published thereafter.

72 The Gilmory Society, Letter to E.T.W., 29 April 1954; in private hands. Whittaker accepted and wrote a manuscript but it was never published. The *Encyclopedia* changed altogether into a *New Catholic Encyclopedia*, published in the 1960s. Berard L. Marthaler, 'The making and remaking of the "Catholic Encyclopedia"', *U.S. Cath. Hist.*, **18**, 53–61 (2000).

73 See *Scotsman*, 5, 7, 8, 18, 22, and 23 March 1932.

74 F. Sainsbury, 'The blessed dead', *Scotsman*, 7 March 1932, p. 13. On the relationship between wireless technologies and spiritualism, see Jaume Navarro, 'Ether and wireless: an old medium into new media', *Hist. Stud. Nat. Sci.* **46**, 460–489 (2016).

75 E.M. 'The blessed dead', *Scotsman*, 8 March 1932, p. 13.

is what millions of our fellow-countrymen regard as a harmonizing of Religion with Modern Science.⁷⁶

Together with spiritualism and its pseudo-scientific legitimation, Whittaker rejected what he regarded as the two extreme and opposite philosophical approaches on science and religion, namely scientific materialism and idealism. The former, which, according to him, had its 'hayday [sic]' in the second half of the nineteenth century, and which claimed 'that only brute matter located in space was the only reality, and that the mind was a mere epiphenomenon of certain states and motions of matter', had recently 'collapsed when matter itself collapsed into a mathematical theory of corporundals [his pet-name for wave-particle duality]: for mathematics is unquestionably a function of the mind'.⁷⁷ But, if mathematics had, through this interpretation, falsified materialism, Whittaker also rejected 'the philosophical movement of modern mathematical physicists such as Jeans and Eddington ... of subjective idealism'.

As we have seen, he was very explicit in rejecting what he called extreme idealism in his review of Bishop Barnes's 1933 book *Scientific theory and religion*. As time went by and as he was becoming more knowledgeable of Thomism, Whittaker linked his emphasis on sacramentality to hylomorphism.⁷⁸ One did not need to choose between materialism and idealism, nor 'accept the simple doctrine' of a complete separation between form and matter. Neither was one forced to assume agnosticism on the substantiality of material entities and opt for an instrumentalist philosophy of science. One way out, he argued, might come from an updated version of Thomism: 'it perhaps is allowable to conjecture that the view which will finally prevail among men of science will be a dualism, of the same general character in this respect as the teaching of the Scholastics'.⁷⁹ The wave-particle dualism and the transformation in the notion of an elementary particle due to the discovery of new particles in the 1930s were, from his point of view, pointing in that direction. As Aquinas had done in the thirteenth century, Whittaker envisaged a connection between hylomorphism as a key element in natural philosophy and the theological notion of sacramentality.

Creation

Finally we examine *The beginning and end of the world*, the published version of the Riddell Memorial Lectures delivered at the University of Durham in February 1942. At the end of the final lecture, he confessed that his purpose was to 'maintain the doctrine which the Church has expressed in these words ...: 'That God, the first cause and last end of all things, can, from created things, be known with certainty by the natural light of human reason'.⁸⁰ Indeed, this was the formulation that the Catholic Church declared in the First Vatican Council, in 1860, and which was later put into practice with the official promotion of Aquinas's philosophy.⁸¹ Whittaker's strategy was, first, to prevent the audience from identifying reason with science ('by reason I mean not the narrow deduction of syllogism,

76 E.T.W., Letter to J.M.W., 14 January 1935, ETWA Box 3.

77 Edmd T. Whittaker, *The beginning and end of the world* (Oxford University Press, 1942), p. 25.

78 Hylomorphism is one of the building blocks of Aristotelian and Thomist natural philosophy: every natural entity (i.e. every substance) can be thought of in terms of two metaphysical principles (prime matter and substantial form).

79 Whittaker, *op. cit.* (note 74), p. 25.

80 *Ibid.*, p. 64.

but the wider faculty by which man comprehends himself and the world⁸²), and to state that ‘science has no significance for theology’, but that ‘it has a very great significance for apologetics’.⁸³ With that distinction in mind, he then offered a detailed explanation of many developments in nineteenth and twentieth century physics and astronomy (from thermodynamics to atomic and nuclear physics, from astronomy to cosmology) with the implicit message that modern science (by which he meant only physics and mathematics) was now opening the door to proving the finitude of the world and, as we shall see, the existence of a Creator.

But *The beginning and end of the world* is a confusing work if read as one book. The three lectures remind us of Whittaker’s passion for history since they follow a chronological line (ancient, classical and contemporary physics) that may mislead the reader. In the second lecture, for instance, Whittaker mentioned an argument that many physicists had used in the second half of the nineteenth century to argue for a creator; i.e. the principle of entropy. ‘The universe, then, is running down, and ... eventually it will attain its state of maximum entropy, when ... all life will have ended’. But, ‘since entropy is essentially positive, its steady increase must have had a beginning—a *creation*, when the total entropy of the universe was less than it had ever been’.⁸⁴ In his books on the history of cosmological controversies, Helge Kragh argues that Whittaker was one of the last scientists to use the principle of entropy to argue for creation.⁸⁵ But a decade earlier he had already cautioned against this argument in a short review of William R. Ingle’s 1933 book *God and the astronomers*.⁸⁶ Although Whittaker’s ‘opinion’ was that this doctrine was ‘highly probable’, it was ‘not established beyond dispute’.⁸⁷ In the popular, apologetic tone of the Riddell Memorial Lectures, however, he had no qualms in appealing to classical thermodynamics as a way to plant the seed that science was close to showing a beginning and end of the world.

For someone claiming to have grasped some of the principles of Aquinas, Whittaker’s use of the notion of creation is both confusing and disappointing since he, at times, identifies creation simply with the beginning of movement or of life, while later on explaining that ‘*creatio ex nihilo*’ is an altogether different notion, one that understands the world as different from, but intrinsically dependent on, a creator (thus, as he argues, rejecting both deism and pantheism). This dual use of the word creation is perhaps more evident at the end of the third and last Riddell Memorial Lecture. Having spent the whole chapter giving a detailed account of current atomic and nuclear physics, astronomy, radioactivity, and the expanding Universe, Whittaker argued that in spite of there being multiple estimates as to the age of the Universe, ‘there is good evidence for a crisis, happening around 10^9

81 On Vatican I and its aftermath see John W. O’Malley, *Vatican I: the council and the making of the ultramontane church* (Belknap Press, Cambridge, MA, 2018).

82 Whittaker, *op. cit.* (note 74), p. 42.

83 *Ibid.*, p. 4.

84 *Ibid.*, p. 40. Italics in the original.

85 Helge Kragh, *Entropic creation: religious contexts of thermodynamics and cosmology* (Ashgate, Farnham, 2008); Kragh, *op. cit.* (note 2).

86 Richard C. Tolman, *Relativity, thermodynamics and cosmology* (Clarendon Press, Oxford, 1934). See also Kragh, *op. cit.* (note 2), ch. 2. As a matter of fact, Tolman, whom Whittaker mentions, was at that time working on the mathematics of an expanding Universe from the point of view of relativistic thermodynamics and challenging the necessity of a thermal death and, thus, the inference of a beginning. The expansion of the Universe, which by the early 1930s had been empirically demonstrated through the observations of Hubble, could have started not from a singularity but from a Universe in equilibrium.

87 Edmund T. Whittaker, ‘God and the astronomers’, *Cambr. Rev.* 146–147 (1 December 1933).

or 10^{10} years ago, in which the nebulae, the stars and even the earth originated almost simultaneously'. And he continues:

Whether a date of this order ultimately proves correct or not, we are justified in saying that, when the development of the system of the world is traced backwards by the light of the laws of nature, we arrive finally at a moment when that development begins. This is the ultimate point of physical science, the farthest glimpse that we can obtain of the material universe that matter (or energy, which is the same as matter) existed before this in an inert condition, and was in some way galvanised into activity at a certain instant: for what could have determined this instant rather than all the other instants of past eternity? It is simpler to postulate a creation *ex nihilo*, an operation of the Divine Will to constitute Nature from nothingness.⁸⁸

Whittaker was here implying that there were two creative acts of God: the creation of inert matter and the later action of setting everything in movement; and that only out of convenience both acts should be thought of as happening at the same time.

Incidentally, let us mention that nowhere in these 1942 talks does he mention the theory of the Primaevial Atom of George Lemaître, formulated ten years earlier and which he had had occasion to discuss with this Belgian physicist during the latter's visit to Edinburgh. Indeed, in 1934, on his way back from the USA, Lemaître, 'who is a delightful person',⁸⁹ spent a weekend with the Whittakers in Edinburgh not only talking about physics and religion but also demonstrating other skills: 'He is very musical and has been playing duets with Edge (pianoforte) and Aitken (p and violin), as well as solos'.⁹⁰ The mathematical intricacies of general relativity had no place in the Riddell Memorial Lectures. The beginning and end of the Universe could simply be inferred from the expansion of the Universe and the impressive processes of formation and death of stars.

In the following years, Whittaker tried to improve his arguments by engaging with the oft-quoted Five Ways of Aquinas. In the late summer of 1945 he had 'a long discussion with [Ronald Knox] on St Thomas Aquinas' Five Proofs of the Existence of God. He lent me some typescript-part of a forthcoming book—asking me to look over it to see if there were any scientific mistakes'.⁹¹ We know nothing more about this conversation unless we assume that the dialogue he reported at the beginning of the Donnellan Lectures he gave in Trinity College, Dublin, the following year refers to Knox. In that dialogue, a clergyman was disappointed that the Five Ways had proven useless with a young agnostic who had studied physics. 'I asked', Whittaker continued, 'if this was because the inquirer did not accept the preliminary assumptions from which St. Thomas proofs started ... "But", my friend said, "the assumptions are true"'.⁹² This was, from Whittaker's point of view, the problem that many contemporary Thomists had: that their arguments did not start with modern physics but with an outdated natural philosophy. 'We may be assured that, if he were alive now, he would start from the science of Nature as we know it, a science that is immensely richer than was dreamt of in his day'. And this was the task he set himself to undertake.

88 Whittaker, *op. cit.* (note 74), p. 63.

89 E.T.W., Letter to J.M.W., 12 February 1934, ETWA Box 2.

90 *Ibid.*

91 E.T.W., Letter to J.M.W., 5 September 1945, ETWA Box 4.

92 Whittaker, *op. cit.* (note 8), p. 3.

True to his style, *Space and spirit*⁸ (the outcome of the Donnellan Lectures and the book that, as we saw at the beginning, Pope Pius XII would cite in 1951) is again mostly a work about the history of science, mainly physics, since Ancient Greek times. I would like to highlight only a few things that stand out in his narrative. First, he does not advocate for a return to any past philosophy. Most philosophical schools involved, in their day, a positive transformation towards the emergence of some aspect of modern science; but no school should perpetuate and remain unchallenged: 'The introduction of Aristotle by St Albert the Great and St Thomas had brought life and liberty; the attempt to retain him in the sixteenth century would ... have brought intellectual death'.⁹³ He makes one exception to this rule: the Neoplatonism of the early Christian era was an altogether huge mistake for it rejected the dignity and importance of matter, it 'disjoined mathematics in the earlier Middle Ages from experimental science, and caused numerical work to be ignored in favour of logical developments'.⁹⁴ This interpretation comes as no surprise from a mathematician, and also if we recall the centrality of sacramentality (and, thus, of materiality) in Whittaker's understanding of the world.

Second, his goal is not to give a logical proof of the existence of God. That was, in his view, never Aquinas's purpose, since his so-called proofs 'belong rather to the ontological and transcendental domain—to metaphysics, in fact; and this explains why the proofs have no coercive character; it is because there is no general agreement on questions of metaphysics'.⁹⁵ Whittaker's project is, thus, apologetic rather than logical; and, if so, it cannot start from the natural philosophy of the thirteenth century but from the physics of the twentieth.

Third, just as he had indicated in the 1942 Riddell Memorial Lectures, the finitude of the age of the cosmos brought about by contemporary astronomy and astrophysics (yet again without a mention of Lemaître or the Primaeval Atom) plays a central role in his line of thought. But rather to the disappointment of the reader, and in spite of Whittaker's promise in the introduction, *Space and spirit* did not develop the Five Ways according to modern science except for one thing: his reinterpretation of the impossibility of an infinite causal chain on which Aquinas' proofs rested. Here, the gap between the Scholastic interpretation and Whittaker's could not be wider. At stake was the reduction of the four Aristotelian causes to only the efficient cause, and the latter to a mechanical, temporal causation. Where Aquinas had to postulate the impossibility of an infinite regress in causality, modern science, so Whittaker argued, with its certainty that the cosmos had a beginning and will have an end, came to the rescue:

From the point of view of Natural Theology, the insertion of a creation into the scientific picture of the cosmos is an event of immense importance. St Thomas doubtless realised what a powerful argument for the existence of God could be built up if it could be shown by pure reason based on observation that the universe had a definite beginning in time. But in the thirteenth century scientific cosmogony was as yet unborn, and, as is well known, St. Thomas held that the belief of Christians in a creation was based on revelation, and cannot be established independently by rational science.⁹⁶

93 *Ibid.*, p. 50.

94 *Ibid.*, p. 51.

95 *Ibid.*, p. 37.

96 *Ibid.*, p. 121.

Statements like this show, from my point of view, that Whittaker's understanding of the fundamentals of Thomism were mistaken. As is well known, Aquinas's Ways have nothing to say about a temporal cosmos; an eternal cosmos would also be a created one. For Whittaker it appears to be the other way around: since modern cosmology seems to say that the world had a beginning and will have an end, a creator is needed. But, as we saw earlier, Whittaker is far from precise with his use of the word 'creation', for he also says that even if the theory of an expanding cosmos were correct, this would not challenge the need for a creator but, on the contrary, simply prove that God is always acting, always creating with a 'continual succession of intrusions or new creations'.⁹⁷ This latter aspect should be highlighted. In the account of the controversy within cosmology between the theory of the *primaeva* atom and the steady-state model that Helge Kragh gave years ago, Whittaker and Lemaître, as much as Pope Pius XII, are placed on the side of the *primaeva* atom against the ideas of James Jeans of continuous creation and the theory that Fred Hoyle, Thomas Gold and Hermann Bondi had first developed in 1947.⁹⁸ But, while indeed Lemaître and the Pope were, for different reasons, on the side of the Big Bang, Whittaker did not see a problem with either approach, since they both were consistent with one of his ideas of creation.

In any case, Whittaker did have a public argument with Fred Hoyle on the theological implications of cosmology and continuous creation. It took place *in the ether waves*, after the public lectures that Hoyle, by then an accomplished physicist and popularizer, gave on the BBC in 1949 and 1950.⁹⁹ This is the context in which Hoyle coined the expression 'Big Bang' as a way to explain the *primaeva* atom of Lemaître.¹⁰⁰ A militant atheist, Hoyle rejected the idea of creation that many saw behind modern cosmology and finished his series of lectures by saying that 'the cosmology of the ancient Hebrews is only the merest daub compared with the sweeping grandeur of the picture revealed by modern science'.¹⁰¹ Moreover, 'religion is but a blind attempt to find an escape from the truly dreadful situation in which we find ourselves ... in this fantastic Universe with scarcely a clue as to whether our existence has any real significance'.¹⁰² In response, Whittaker did not contradict any of the tenets of Hoyle's cosmology but made a defence of religion, this time based on another modern principle: the equivalence of matter and energy and its indirect relation to sacramentality:

When we reflect on the way in which the laws [of physics] have been derived from experiments with material objects, we come to understand that the nature of man is to be led by things corporal to things intelligible and spiritual: ordinary gross matter, in and through we approach this higher learning, comes to be conceived as the outward sign of inner non-material realities. This is essentially what is called in theology the sacramental system: it is the manifestation to our senses of realities greater than itself, whose unveiling is the chief end of knowledge. Herein lies the confluence of science and religion: for almost all religions are built round the sacramental principle, which binds together the two aspects of human life—the spiritual and the material.¹⁰³

97 *Ibid.*, p. 127.

98 Kragh, *op. cit.* (note 2), p. 409, fn 115.

99 The series of five lectures was first broadcast in 1949 on the BBC Third Programme and was so successful that it was broadcast again in 1950.

100 Helge Kragh, 'How the Big Bang got its name', *Nature* **627**, 726–728 (2024).

101 Fred Hoyle, 'Man's place in the expanding Universe', *Listener* **42**, 419–424 (1950), p. 423.

102 *Ibid.*

103 Edmund T. Whittaker, 'Religion and the nature of the Universe', *Listener* **43**, 943–944 (1950), at p. 944.

To finish this section with a smile, let us follow Whittaker's reaction when he learnt that an American magazine, *Vogue*, 'which I have never seen but which I understand is a ladies' paper', wanted to republish this text. 'The readers will be surprised when they try to come across, among all the advertisements of undies, an article dealing with a very different subject'.¹⁰⁴ The hypothesis he received from one of his favourite disciples and successor in his chair, Alexander Aitken (1895–1967), bemused him: '... this mystified me until Aitken guessed the explanation—the broadcast is called "the new cosmology and religion", and the proprietors of *Vogue* evidently think that cosmology is the science of cosmetics, and that the broadcast will include the religiously-minded to abate their disapproval of rouge and lipstick'.¹⁰⁵

CONCLUSION

In this article, partly thanks to the private correspondence between father and son, I have been able to trace the private and public ideas of Edmund T. Whittaker on science and religion and the reasons behind his conversion to Catholicism in 1930. Interestingly, this conversion triggered a role as public figure in the world of popular science that he had not played so far, thus joining the ranks of best-sellers like Jeans, Eddington and Lodge. As we saw, religion and Christianity had always been a favourite topic in his private conversations; but after embracing a new denomination he seemed to experience a sort of rejuvenation which, together with his already settled stature as a prominent scientist, enabled this new public activity. At the same time, his new faith came hand in hand with his embracement of a certain type of Thomism for his philosophical and apologetic discourses. Indeed, as a solid physicist and mathematician he felt he had the duty to update the language of scholastic philosophy into the language of modern science. But as a self-trained philosopher and amateur historian of ideas, his results were no different in quality from those of other scientists-turned-popular-philosophers of his generation. Moreover, an in-depth analysis of his writings would show quite a number of contradictions. And yet, the apologetic dimension of his works managed to dazzle even the Pope's speechwriters.

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DATA ACCESSIBILITY

This article has no additional data.

104 E.T.W., Letter to J.M.W., 22 June 1950, ETWA Box 5.

105 E.T.W., Letter to J.M.W., 14 July 1950, ETWA Box 5.

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