

SIR WILLIAM McCREA AT 90: A GREAT IRISH ASTRONOMER

D. McNALLY

University of London Observatory, Mill Hill Park, London, NW7 2QS, UK

ABSTRACT. Ireland can rightly claim some proprietorial rights to Sir William Hunter McCrea for he was born in Dublin, he was Professor of Mathematics at the Queen's University Belfast, and he has made significant contributions to the development of scientific life in Ireland. Indeed, those aspects of science in a whole Ireland which McCrea worked to foster may be counted a hopeful precedent for further continued growth of cooperation within the island. The author presents a personal profile of the great Irish astronomer with a brief description of the contemporary Irish astronomical scene.

1. INTRODUCTION

William Hunter (Bill) McCrea was born on 13th December 1904 in Dublin. His family roots spring from Donegall in the North to Cork in the South. But his father, Robert Hunter McCrea, a schoolmaster, felt the lure of the mysterious East - like many another Irishman before and since. When Bill was two years old he moved to England - first to Kent before settling in Chesterfield to take up a teaching post at Staveley. Bill's father had interests in astronomy and interested Bill at an early age in the popular writings on astronomy by Sir Robert Ball (4th Royal Astronomer for Ireland, and 5th Director of the Dunsink Observatory 1874-1892). The youthful Bill spent his formative years in the North Midlands, receiving his school education at Chesterfield Grammar School. From there he went to Cambridge where his career was distinguished and it was no surprise at all that he opted for postgraduate study. The year Bill graduated and began his Ph.D. studies was the year - 1926 - of first publication of Arthur Eddington's influential work, *The Internal Constitution of the Stars*.

It is all too easy to slip into a view of the past that is unnecessarily, and indeed unreasonably, rosy. But the period between the two World Wars was a remarkable one for scientific achievement by any standard. The excitement of that time may be hard to imagine now but some idea can be gauged from a notable scientific advance of our own times - namely the possibility to observe from above the Earth's atmosphere, to sample the Moon and Mars and to fly by, or systematically map, other bodies of the solar system. We are still in the early stages of that endeavour which has completely revolutionised thinking on the nature of the solar system and beyond. In the period between the Wars it was the confluence of physical understanding - particularly in quantum theory, atomic and nuclear physics - coupled with mastery of the construction of large reflecting telescopes and refinement of photographic technique that was leading to rapid advance in astrophysical understanding. It is salutary to recall that in the 1920s the nature of the abundances of the elements in stars was not understood and that Eddington wrote his *Internal Constitution of the Stars*, without the knowledge of the primary energy source in stars. Yet by the end of the 1930s, that understanding was just about established. It was an astonishing era of spectacular advance and must have been an extraordinarily stimulating period in which to begin postgraduate studies.

Bill would be well versed in applied mathematics and theoretical physics and aware of the impact of quantum mechanics, in particular, on the resolution of age-old astronomical puzzles and problems. It was not long before Bill began his output of astrophysical papers (as well as his papers on relativity theory and applied mathematics). His thinking was always clear and direct, leading to his very well-deserved reputation as a leading UK theoretical astrophysicist.

2. THE QUEEN'S UNIVERSITY BELFAST

In 1932, Bill took up an appointment as lecturer in Mathematics at the University of Edinburgh. Sir Edmund Whittaker (7th Royal Astronomer for Ireland, and 8th Director of the Dunsink Observatory 1906-1912) was then Professor of Mathematics at Edinburgh. As Whittaker regarded his Dunsink years as among the happiest of his life, Bill no doubt had his father's awareness of Dunsink, reinforced and extended. As Bill recalls, he began to know Dunsink almost as though he had lived there himself. When he was appointed Professor of (Pure) Mathematics at the Queen's University Belfast in 1936, Dunsink was in course of being closed down following the death of Charles Martin that summer. Martin maintained the Observatory following the departure of Henry Plummer (8th and last Royal Astronomer for Ireland, and 9th Director of the Dunsink Observatory 1912-1921), consequent upon the upheaval leading to the establishment of the Irish Free State.

But here were more pressing matters to attend to. When Bill arrived at Queen's, the Vice Chancellor was Frederick Ogilvie (1934-38). For reasons that are not clear to Bill, Ogilvie had been looking at the 1790 Act founding the Armagh Observatory. Ogilvie had determined that it had been Archbishop Richard Robinson's (1709-1794) intention that his arrangements for the governance of the Observatory were to be temporary pending its incorporation into a new university to be founded (and for which Archbishop Robinson had made provision in his will) in the north of Ireland. It had been Robinson's intention that Armagh would be developed as a consequence to his munificence to the City, and that a university would follow in Armagh in the fullness of time. A university of Armagh never materialised, the development of tertiary education in Ireland taking a rather different form in the 19th century. However,



Fig. 1. Sir William Hunter McCrea

Ogilvie, noting that the Queen's University was (then) the only university in the North of Ireland, advanced the view that perhaps Archbishop Robinson's long delayed intentions could be put into effect. While Archbishop Robinson's temporary arrangements still stand (though now in modified form) after 200 years, and the Ogilvie interpretation has not prevailed, his efforts did lead to Bill being appointed a Governor of the Armagh Observatory in 1937 - the first University representative on the Board.

It was a fortunate time for Bill to become a Governor of the Observatory. W. F. A. Ellison (6th Director of the Armagh Observatory 1918 - 1936) had died and a successor was being sought. After decades of under-funding the Armagh Observatory was in a state of decline, and indeed, like Dunsink, closure might not have been unexpected. But the Governors must have been gladdened to receive an application for the Directorship from Eric Lindsay (7th Director of the Armagh Observatory 1937-74) then working for Harlow Shapley at the Harvard University Observatory. Lindsay, born in County Armagh in 1907, graduated from Queen's in 1928 and completed his Ph.D. at Harvard in 1934. It seems that Armagh Observatory's young director and its new Governor, just three years his senior, had an immediate rapport, and so began a friendship only ending with Lindsay's death in 1974. Very clearly Lindsay found great benefit from discussions - apparently as often as once a week - with Bill who could bring his astrophysical insights and relativistic skills to bear on current problems of astronomy and cosmology, and to discuss Lindsay's plans for the Observatory - even then he was considering establishing a planetarium. No doubt too, Bill had some influence on the way in which Lindsay re-established the Armagh Observatory as a viable and vigorous research institution.

Bill himself, while in Belfast, continued his high rate of publication. However, the bulk of his published work at the time was in the theory of relativity. In his postgraduate days Bill had hoped to use his Rouse Ball Travelling Fellowship to visit Göttingen to study relativity theory. In the event he studied astrophysics. But his relativity interest developed at Edinburgh where his first published papers in relativity and cosmology were co-authored with George McVittie (later Secretary of the American Astronomical Society). In Belfast he developed his cosmological ideas and wrote two out of the three papers which he published in the *Zeitschrift für Astrophysik*, on "Observables in Relativistic Cosmology", as well as his Methuen Monograph on "Relativity Physics". The latter, at 6 shillings, served me well in my undergraduate days and beyond. Bill was at pains to find measurable parameters sensitive to relativistic effects in order to relate cosmology to observation. Much of his astrophysical work at this time is to be found in his succinct critiques of astrophysical papers for the *Zentralblatt für Mathematik*. Bill has the gift of encapsulating a lengthy and erudite paper in a few illuminating paragraphs and his abstracts are a splendid way of following the exciting astrophysics of the 1930s. They paint a picture of considerable ingenuity and creativity in using quantum physics to elucidate astrophysics and to using astrophysical observation to place limits on physical parameters not yet susceptible to quantum mechanical attack. Problems such as stellar stability, the abundances of the elements, the sources of stellar energy, the nature of stellar opacity were the stock-in-trade of these abstracts. The remarkable way those problems were yielding to sustained attack by the end of the 1930s makes a fascinating kaleidoscope of astrophys-

ical activity. Bill, too, was making important contributions on his own account - perhaps one of the most important topics he then addressed was the transport of radiation in moving media, which remains to this day a taxing theoretical problem of major importance.

The second half of Bill's tenure of the Chair of Mathematics at Queen's was clouded by the advent of the second World War. Bill recalls that at first he joined, as a private, the Queen's University Home Guard Company where he trained vigorously for all-night duty in the adjoining Botanic Gardens. After a year, Bill moved to the University Air Squadron for two years and was joined there by Lindsay - whom Bill notes had a certain disregard for important military niceties such as saluting. Bill himself, though on the National Central Register of Scientists set up a year or so before the outbreak of war, was not called upon until 1943, when he joined Blackett's Group doing what is now known as "Operational Research". Bill suggested other Queen's graduates, such as Hamilton (later director of NORDITA), Ramsey (later to become a distinguished geophysicist) and Lindsay. Lindsay thereby came into contact with some of the top minds of contemporary science.

It is also worth recalling that Bill was joined at Queen's by (later Sir) Harrie Massey. Between them they were responsible for stimulating D. R. Bates - distinguished atomic physicist and later Professor of Applied Mathematics at Queen's. After the end of the War, Bill moved from Queen's to the Chair of Mathematics at Royal Holloway College in 1944, accordingly his direct association with Ireland came to an end.

3. IRELAND

It must not be imagined that Bill lost all contact with Ireland on his return to England. While still at the Queen's University in 1940, Bill received a telephone call from the Prime Minister of a State not in good standing with the UK. Bill was at the time in course of conversation with the Vice Chancellor - Lindsay Keir - when a university porter told Bill that he was wanted on the phone by an "important person". The important person was Eamon de Valéra - Prime Minister of Ireland. He wished to consult Bill on his plans for founding a School of Theoretical Physics within the Dublin Institute for Advanced Studies - long a dream for de Valéra. Bill's substantial reserves of tact and diplomacy were seriously stretched on returning to his conversation with Keir - a Scot of little humour - who Bill did not feel sure would see the proper irony of the situation.

While the name of de Valéra is well known in political circles for his dedication to the concept of an Irish State, for his role in the Easter Rising, for his avoidance of the British executioner, and for his devotion to the restoration of Celtic scholarship in its widest sense, it is not so widely known that he was a mathematician in his own right. While teaching mathematics at a teacher training college, de Valéra attended lecture courses by Whittaker at Trinity College Dublin on "Spectroscopy, Astrophysics and Electro-Optics" in the period 1906-1908. That seems to be the foundation for a friendship between de Valéra and Whittaker which was to last until Whittaker's death in 1956. De Valéra's plan for the Dublin Institute of Advanced Study allowed for two initial founding schools of Celtic Studies and Theoretical Physics. Not unnaturally de Valéra turned to his friend and former teacher for advice. Whittaker recommended Bill as a suitable person to consult, and hence the mysterious phone call of 1940. Bill must have given good



Fig. 2. Prof. McCrea at the 9th IAU General Assembly, Dublin, with (left to right) Eamon de Valéra, Mgr. Pádraig de Brun (DIAS & Maynooth) and Sir Harold Spencer Jones (Astronomer Royal).

service on the Governing Board of the School for Theoretical Physics as its subsequent record demonstrates. A founding Senior Professor was Schrödinger whom de Valéra managed to bring to Ireland after he had been dismissed from his post in Nazi Germany in 1938. De Valéra was also keen to revive the Dunsink Observatory, and this he eventually succeeded in bringing within the new School of Cosmic Physics in 1947. De Valéra's interest in science derives in part from his training and interests in mathematics and theoretical physics and his vision for a celtic Ireland. He must have been aware of the great contributions made by Ireland to science in the 19th century, e.g. Fitzgerald (Fitzgerald Contraction) at the end of the century, Hamilton in the mid century, to the modern formulation of dynamics and non-commutative operators. To take astronomy in particular, Ireland had made significant contributions. Two observatories were established at the end of the 18th century - Dunsink in 1785 and Armagh in 1790. There is almost a perverse glee to be taken in the fact that photoelectric photometry was pioneered in 1892 by Monck and Fitzgerald (of the Contraction) in a Dublin back-garden using a 9-inch telescope (as reported by Minchen in his paper in *Proceedings of the Royal Society* (1895, Volume 58), outlining the first successful photoelectric observation of stars). Given the obsessive drive of modern astronomers to find the best photometric sites worldwide during this century, it is an Irish irony

of the first-order that the first attempt was made from a city site not world renowned for its climatic desirability - a veritable triumph of hope over (subsequent) experience. Minchen used the 24-inch telescope of W. E. Wilson (later presented to the University of London in 1925) to achieve his photoelectric detection of stars - calibrated by a candle at 10 feet. W. E. Wilson, FRS, was a noted amateur astronomer who *inter alia* made an early accurate measurement of the temperature of the Sun and was a pioneer of dry-plate astronomical photography at his observatory in County Westmeath. Given these achievements in science in Ireland, it is small wonder that de Valéra wished to support them through a School of Theoretical Physics and, later, a School of Cosmic Physics. Another example of de Valéra's support for astronomy comes from his acting on a suggestion made by Eric Lindsay in 1942 that the Irish observatories might join with Harvard University in constructing a telescope at Harvard's Boyden Station in South Africa. A Schmidt telescope - the Armagh - Dunsink - Harvard (ADH) Telescope - (36-inch primary mirror and 32-inch corrector plate) designed by J. G. Baker, built by Perkin-Elmer and utilising the mount of the 24-inch Bruce telescope, was the result.

In 1948 the then Prime Minister, J. A. Costello, took Ireland out of the British Commonwealth. Irish scientists feared isolation in consequence. Bill was then a Secretary of the Royal



Fig. 3. With Prof Alec Boksenberg (left) and visitors
(photograph by courtesy of RGO, kindly supplied by Margaret Penston).

Astronomical Society. He had persuaded the Society to establish a summer meeting outside London, and was able to diplomatically arrange an invitation from the Royal Irish Academy and Dunsink Observatory in such a way that the Council of the RAS agreed to hold the 3rd such meeting in 1950 in Dublin - the first to be held outside the UK. That meeting proved a considerable success, being attended by many UK professional and amateur astronomers, so sustaining contacts with Irish astronomers. Indeed, two further such meetings have been held subsequently in 1965 and 1992. The success of that first meeting encouraged Ireland to offer to host a General Assembly of the International Astronomical Union in 1955. As Adriaan Blaauw's *History of the IAU*, (Kluwer Academic Publishers, 1994) makes clear, the Cold War was having a very ugly impact on the pattern of IAU General Assemblies. Indeed, an intensification of the Cold War caused the cancellation of the Leningrad (now St.Petersburg) General Assembly of 1951. Not unnaturally, this cancellation caused the Soviet Union much chagrin, and at the hurriedly arranged General Assembly of 1952 in Rome, there was a great deal of debate on the venue for the next General Assembly in 1955. Again the USSR gave an invitation and so did the UK. Neither was acceptable. Hermann Brück (Director of the recently re-founded Dunsink Observatory) suggested to McCrea that Ireland might be the next venue, and together they were able to promote the advantages of Ireland for the 1955 General Assembly - a view which even-

tually carried the day. Even so, it took all the, not inconsiderable, clout of Mgr. Pádraig ("Paddy") de Brun (then Chairman of the Council of Dublin Institute for Advanced Study and Professor of Mathematics at Maynooth College) to ensure that no astronomer from the Communist Bloc was denied a visa to attend. It is a matter of history that the Dublin General Assembly was a splendid event. During the Opening Ceremony the President of the IAU, Otto Struve pointed to the role played by de Valéra in bringing the Armagh - Dunsink - Harvard Schmidt Telescope, sited at Bloemfontein, South Africa, to fruition. This was a fore-runner to international cooperation to put telescopes on good sites - cooperation which would now be regarded as "normal". It is particularly striking that a project, proposed by Lindsay in 1942, taken up by de Valéra in 1946 and brought to fruition in 1950, that two of the major partners were the Governments of Northern and Southern Ireland (at the time this was the first instance of an agreement signed between the Belfast and Dublin Governments) - once again a happy precedent for cross-border cooperation. Indeed some 500 of the 800 General Assembly participants travelled by special train to Northern Ireland where they were addressed by the Prime Minister, Sir Basil Brooke (later Lord Brookeborough).

In 1957, Bill again helped to persuade the British Association for the Advancement of Science to hold its annual meeting in Dublin. As a recent graduate, I was able to attend that meet-

ing, and witnessed another example of Bill's more-muscular diplomacy as he escorted Ernst Öpik - the final speaker of the meeting - from the rostrum - after over-running his allocated time on the "Prospects of Space Astronomy" by several factors of two - still speaking until out of the lecture room. It was done with great charm. I afterwards came to know that Ernst made a habit of over-running his time! But of Ernst, one can only have the warmest of recollections - his erudition and enthusiasm knew no bounds, and, indeed, it was that well-known double act of the seminar circuit at QUB - Lindsay and Öpik - that first made me realise that astronomers had that essential *je ne sais quoi* which marked them as men apart from mere physicists.

Bill continued to encourage young scientists from Ireland - I had the very good fortune to do my Ph.D work with Bill, having had my interest in astronomy awakened by Lindsay and Öpik. It is perhaps another Irish irony that I am now Director of the observatory (University of London Observatory) founded as a consequence of the donation of W. E. Wilson's 24-inch telescope to the University of London, and that I played a role in honourably retiring that telescope (now at the National Museum, in Merseyside) in 1974. While a postgraduate with Bill, his group was enlivened by the arrival of Patrick Dolan from Dublin, now a relativist in the Department of Mathematics at Imperial College and the mover behind the establishment of the annual Schrödinger Lectureship at Imperial College. A contemporary of us both was Petros Florides (from London) - another relativist and co-author with Bill in his third paper on "Observables in Relativistic Cosmology" - and now Professor of Mathematics at Trinity College Dublin. Bill clearly believed in a two-way traffic!

4. CONCLUDING REMARKS

Throughout Bill's life, Ireland has played a considerable role. He was born in Dublin, was Professor of Mathematics at the Queen's University Belfast and played a considerable role in maintaining a viable Irish astronomy and physics. He helped maintain North/South contacts in a practical and productive way and to keep Ireland in the mainstream of international scientific life. At a time when the concept of cross-border co-operation and institutions are again considered novel, it is salutary to remember that Bill McCrea played a role in encouraging and cementing such, unfashionable then, cooperation. Although most of Bill's life has been spent outside Ireland, the 32 counties of that country owe him a considerable debt of gratitude for his encouragement and stimulation of the physical, mathematical and, above all, astronomical sciences.

Acknowledgements

In writing this paper I have drawn heavily on Bill McCrea's memory. I have drawn on my paper celebrating Bill's 90th Birthday given at the Royal Astronomical Society in December 1994 (see *Observatory*, 1995, 115, 167 and *QJRAS*, 1995, 36, 181). I have also consulted P. Wayman's *Dunsink Observatory 1785-1985* (Royal Dublin Society and Dublin Institute for Advanced Studies, 1987). It is a great pleasure to record the help of Sheelagh Grew, Administrator, Armagh Observatory, with several items of recent history but especially for her great fund of knowledge of the Armagh Observatory which she has shared with me over the nearly 20 years I have been associated with

either the Board of Management, first of the Planetarium, or, more recently, Observatory and Planetarium. Indeed, this paper would not have been written had not Sheelagh made the suggestion. I can only hope I have correctly interpreted the information vouchsafed to me in the preparation of this paper - I am most grateful to all who helped in its production and in the supply of photographs.