



Samuel de Valera

EAMON DE VALERA

14 October 1882 — 29 August 1975

Elected F.R.S. 1968

BY J. L. SYNGE, F.R.S.

EAMON DE VALERA will go down in history as the man who won independence for Eire (Ireland, in the English language) or the Irish Republic, a political unit covering twenty-six counties of the island. His ambition was to make the whole island a single independent nation, but in that he did not succeed. His personal and political lives have been covered by several biographies, and at the end of this memoir I give references to these and to some other articles and documents bearing on him and on the country he did so much to set in its present form. But the main purpose of this memoir is to explore an enigmatic personality who combined with his more obvious gifts an enduring passion for science, and in particular for mathematics, a passion which led him, at the height of his political power, to act as a patron of learning in general, with the establishment of the Dublin Institute for Advanced Studies as his most significant achievement.

This memoir consists of five parts: (1) chronology of a long and active public life, (2) brief sketch of his personal history—birth, marriage, family, (3) exploration of him as scientist and mathematician, (4) establishment of the Institute, (5) reminiscences of three men well qualified to write about him.

CHRONOLOGY

- 1882 Born in New York.
- 1885 Brought to Ireland.
- 1898 Went to Blackrock Intermediate College as student.
- 1901 Matriculated in the Royal University of Ireland with second-class honours in mathematics.
- 1904 Graduated B.A. (pass) in R.U.I.
- 1906 Appointed Professor of Mathematics at Carysfort Training College, Blackrock.
- 1908 Joined Gaelic League.
- 1910 Married Sinead Flanagan. Received Higher Diploma in Education.
- 1913 Joined Irish Volunteers.
- 1914 Received B.Sc. degree automatically after foundation of the National University of Ireland.
- 1916 Fought as Commandant in Easter Rising. Sentence to death commuted to penal servitude for life. Imprisoned in Dartmoor and later in Lewes Jail.

- 1917 Released in general amnesty. Elected M.P. for East Clare, demanding an Irish Republic. Elected President of Sinn Fein and of the Irish Volunteers.
- 1918 Arrested and imprisoned in Lincoln Jail.
- 1919 Elected President of Irish Republic by Dail Eireann. Escaped from Lincoln Jail. Smuggled to U.S.A., seeking recognition of Irish Republic and loan for Dail administration.
- 1920 Returned to Ireland secretly. Warfare between Irish Volunteers and British Forces.
- 1921 Elected Chancellor of the National University of Ireland. Truce proclaimed. Negotiations with Lloyd George. Anglo-Irish Treaty signed, but rejected by de Valera.
- 1922 Irish Free State established. Civil war.
- 1923 Civil war ended. De Valera imprisoned by Free State Government in Kilmainham Jail.
- 1924 Released.
- 1926 Founded Fianna Fail party, a new Republican organization, but refused to enter Dail Eireann on account of oath of allegiance.
- 1927 Entered Dail Eireann with his party, regarding oath as an empty political formula. Leader of opposition.
- 1932 Fianna Fail came to power, with de Valera as President of Executive Council and Minister for External Affairs. President of Council of League of Nations.
- 1933 Abolished oath of allegiance. Reduced status of Governor-General.
- 1937 Introduced new constitution, with some change in titles: the Irish Free State became Ireland, the Governor-General was replaced by the President of Ireland, and his own office became Taoiseach (Prime Minister).
- 1938 Secured return of Irish ports by Great Britain. President of Assembly of League of Nations.
- 1939-45 Maintained neutrality in World War II.
- 1940 Established Dublin Institute for Advanced Studies with Schools of Celtic Studies and Theoretical Physics.
- 1947 Established School of Cosmic Physics in the Institute.
- 1948-51 and 1954-57 Leader of opposition.
- 1951-54 and 1957-59 Taoiseach.
- 1959-73 President of Ireland.
- 1975 Died after a brief illness.

He received the following decorations and honours:

- Grand Cross of Order of Pius IX—1933.
 Grand Cross of the Order of Charles—1961.
 Supreme Order of Christ—1962.
 Fellow of the Royal Society—1968.
 Honoris causa—LL.D., Ph.D. (N.U.I.), Sc.D. (Dublin), Dr (Louvain).
 Honorary Bencher of the Honourable Society of King's Inns.
 Hon. F.R.C.S.I., Hon. F.R.C.P.I.

He was a member of the Royal Irish Academy and Patron of the Irish Mathematics Teachers Association.

BIRTH, MARRIAGE AND FAMILY

Patrick Coll, a farm labourer, living near Bruree, Co. Limerick, married Elizabeth Carroll. They had four children, of whom the eldest, Catherine or Kate Coll, was born in 1856. After her father's death in 1874, she worked for neighbouring farmers for five years. In 1879 she emigrated to New York and

went into domestic service there. A photograph shows Kate Coll as a handsome and resolute young woman. She was the mother of Eamon de Valera.

Of his father little is known with certainty. In books of reference Eamon de Valera gave his father's name as Vivion de Valera, born in Spain. But both birth and baptismal records of Eamon de Valera give the surname as De Valero, while the latter gives the first name as Vevian, erased at a later date and Vivion substituted. The birth record shows George as the first name of the baby, while the baptismal record gives Edward, erased at a later date and Eamon substituted. (Eamon is the Irish equivalent of Edward; he was known as Edward or Eddie until about 1908 when he joined the Gaelic League.) The birth record gives the age of the father as 28, his occupation artist, born in Spain. Longford and O'Neill (see references) give the father's name as Vivion Juan de Valera, and say he was the son of Juan de Valera, a sugar merchant in Cuba, and Amelia Acosta. They further state that Vivion Juan de Valera died in Denver, Colorado, in 1884 or 1885.*

The history of Eamon de Valera becomes clearer from 1885 when he was brought to Ireland by his uncle Edmund Coll to live in a labourer's cottage at Bruree with his grandmother, his uncle Patrick Coll and an aunt. Space does not permit a detailed account of his education. The family was poor and he was able to obtain secondary and university education only by winning prizes and later by teaching. The records show him to have been well above the average, particularly in mathematics, but not outstanding.

In 1910 he married Sinead Flanagan and they had seven children as follows:

- (1) Vivion Senior Counsel, T.D.; now chief executive of the Irish Press Ltd (Controlling Director). He has some academic interests, the only one of the sons and daughters who has inherited in some measure their father's passion for mathematics.
- (2) Mairin Professor of Botany in University College, Galway.
- (3) Eamonn Professor of Gynaecology in University College, Dublin.
- (4) Brian Killed in a riding accident in 1936.
- (5) Ruaidhri Professor of Celtic Archaeology in University College, Dublin.
- (6) Emer Wife of Brian O Cuiv, formerly Professor of Classical Irish Language and Literature in University College, Dublin, and later Director of the School of Celtic Studies in the Dublin Institute for Advanced Studies. Her daughter, Nora O Cuiv, is a mathematician.
- (7) Toirleach Solicitor and Taxing Master of the High Court.

* Attempts to explore the Spanish connection have been unsuccessful. In the fifteenth and sixteenth centuries one finds the writer Diego de Valera, the sailor Carlos de Valera and the Protestant exile Cipriano de Valera. But by the eighteenth century the prefix *de* seems to have disappeared, and one finds the Capuchin Bernardo María Valera; in the nineteenth century the Venezuelan soldier and politician José Gregorio Valera and two Spanish diplomat-writers, Juan Valera (1824-1905) and Luis Valera (1870-1926). I am obliged to Professor V. F. Dixon for the above information. As a spot-check of the present, Mr H. C. Norminton informs me that the Barcelona telephone directory has the following numbers of entries: Valera 63, Valero 360, with no appearance of the prefixes *de* or *De*; incidentally the name Coll has 840 entries. I have not been able to trace the name Vivion.

Mrs de Valera was a rather shy and retiring person, a sweet and gentle old lady of over eighty when I first met her. It appears that she did not share in the political activities of her husband, the care of the family devolving on her. She wrote little plays and stories for children in Irish. A long and happy marriage ended with her death on 7 January 1975.

MATHEMATICIAN

When I returned to Dublin in 1948 after spending eighteen years in Canada and the United States, I knew very little about de Valera except that he was a dominating political figure and founder of the Dublin Institute for Advanced Studies, to which I was at that time appointed as a Senior Professor. I accepted what seemed to be the general view that his rôle was that of benevolent patron of learning, but not a participant, not one who involved himself with scientific detail. After he became President of Ireland in 1959, and consequently had more leisure, he attended many scientific meetings and listened with great attention to what was said, but to the best of my recollection he never said anything himself. As he was then almost totally blind, it seemed to me that his attendance represented little more than the kindly patronage of his high office. I met him from time to time, but the conversation never turned to scientific matters. I remember feeling a little alarm when we were told one day that President de Valera was coming that afternoon to one of our weekly seminars in the School of Theoretical Physics, for I feared that this might introduce a note of formality into what was a small and informal gathering. But he desired no formality and appeared punctually with his aide-de-camp Colonel Brennan and his personal secretary, Miss Marie O'Kelly, who sat at the back and made notes. The lecturer was introduced to him and he listened with great attention, leaving at the end with a few polite words. After that he came to a number of our seminars and the same pattern followed. Finally he came to a lecture by a member of the staff who had been at a conference on elementary particles and was reporting on it. At the end de Valera turned to me and said quietly: 'I shall not come again'. I could think of no fitting reply because I too did not understand the lecture.

It was not until a month after his death that I came to feel that I was wrong in thinking that de Valera's interest in the mathematical sciences was sentimental and superficial. That was when I first read the letter from Lewes Jail, printed later in this memoir. I regretted that I had never made an attempt to enter into any sort of mathematical dialogue with him to explore a little the working of his mind. I have now to rely on the testimony of others and it was suggested to me that I should consult his personal secretary, Miss O'Kelly, who, though no mathematician, was his assistant in his private mathematical studies. But she felt unable to give me any statement beyond the following, approved by him and given to the *New York Journal* in 1965 (he was then 82 or 83) 're President de Valera's mathematical reading and studies':

'The President's great regret is that the time he can devote to maths is necessarily very limited. However, he has read to him from time to time

articles on modern physics—atomic particles, quantum dynamics, etc., and books such as those by Professors Synge and Lanczos, Dr. McConnell, etc. etc.

‘He works from time to time in Analysis—tensor analysis, biquaternions and octonions, Grassmann’s Algebra of Extension and Boolean and other algebras.

‘The President uses dark green linoleum (found to be most effective from his eyesight point of view), covering the top of his large desk in his private study here in Arus an Uachtarain, as a blackboard on which with chalk he draws geometrical figures and pursues such algebraical expressions as he might find difficult to visualize otherwise.’

That statement is not very informative, and I then asked Dr Vivion de Valera, his eldest son, for a contribution. He wrote me a letter going back to the time when his father was student and teacher of mathematics:

‘After matriculating in the old Royal University my father first studied at the Blackrock post-secondary College officially called the “University and Civil Service House” but more often referred to as the “University College” or simply “The Castle”. Here students prepared for degree and civil service examinations. Before his final degree he went as a teacher to Rockwell College where he taught mathematics. His activities there were to the detriment of his own studies.’

Dr Vivion de Valera proceeded with a quotation from the obituary in the current issue of the *Blackrock College Annual*, which shows his father as a very successful teacher of mathematics:

‘Due to his lack of time and tuition throughout that year De Valera secured only a pass degree in mathematical science. This was a big disappointment to him and was to militate against his chances of securing a first class post in the teaching profession or in the civil service. . . . Dev spent some eighteen months in residence in the Castle going out to teach at Carysfort Training College and at St. Mary’s Rathmines, where his former Dean of Studies Fr. O’Hanlon was the Superior. He also gave grinds to individual students studying for University examinations, among them being his former student Paddy, later Monsignor, Browne, who from De Valera’s class in Rockwell got second place in Ireland in mathematics in Senior Grade; and Cornelius Gregg of Blackrock, who beat Paddy for first place! Another of his students at this period was Dick Butler, past-pupil of Blackrock, who is reported to have similarly coached the Prince of Wales, later King Edward VIII. Gregg, incidentally, who was later to be rated as one of the great minds of the British Civil Service, was highly valued by Churchill as Chancellor of the Exchequer, and later, with his mathematical acumen, was invaluable in cipher-breaking during the war. He was later knighted.’

Dr Vivion de Valera’s letter continued as follows:

‘He had strong interests as a teacher and teaching senior students at Rockwell naturally developed techniques and facility in the mathematical

subjects then included in the Senior Grade curriculum. Later he became interested in the basics of analysis. I remember him telling me that he found the current English texts he then knew unsatisfactory. It was not until somebody—I regret I cannot remember who—recommended Jordan's "Cours d'Analyse" that he found a book which gave him the entrée to the subject that he sought. From then onward he liked the French texts and studied the first edition of De la Vallée Poussin's "Cours d'Analyse Infinitésimale" rather thoroughly. For his students he used Hedrick's translation of "Goursat".

'In later years he liked, when time allowed, to go back to these books and compare the approach of say Hobson (Real Variable) or Whittaker (Modern Analysis).

'His teaching of arithmetic at Carysfort induced him to take an interest in the foundations of the subject and with the background above mentioned he was particularly interested in Tannery's "Leçons d'Arithmétique". I suspect he may have gone rather more deeply into his subject than the student primary teachers in his class would need!

'I fear I never took the trouble to find out how he first came in contact with Professor Conway for whom he had a great admiration and who proved to be a good friend to him. He commenced studying under Conway for an M.A. degree but owing to events from 1913 onwards never completed the project. I have not been able to locate any relevant manuscripts as yet but I think the problem was essentially geometric. The book he most relied on, and enjoyed, was Joly's "Manual of Quaternions". Again his spare time recreation often was to apply quaternions to various problems. He read Hamilton with a disciple's zeal.

'In prison he used the time to read mathematical subjects when he could. You know already the story of his letter to Conway about Drayson's theory.* When he was in Arbour Hill, 1923–24, he tried to master relativity theory. I have two books sent in to him by Dr. Paddy Browne at that time—Weyl's "Space Time Matter" and Eddington's "Mathematical Theory of Relativity". Dr. Browne inscribed the latter book—"Dom chéad-threoruidhe ar bhóithribh diamhaire na healadhan so" ("To my first guide on the obscure road of this science"). He was always interested in this theory but his failing eyesight became an insuperable difficulty in later years.

'He often discussed mathematical subjects with me. It depended on the interest of the moment. One incident may be of interest. In 1938, on the night he was leaving for London to negotiate the Agreement with Mr. Chamberlain, the Prime Minister, he noticed I was doing something involving changing variables in multiple integrals. On the way over on the boat he wrote me a note, a photostat of which I enclose.

'Altogether, he maintained a real interest in mathematics and mathematical physics until age and inability to read prevented him from going

* See later.

further. He never really had time for any sustained study but he had a capacity for "keeping in touch" until almost the end. It is unnecessary for me to write anything to you about his interest in the Institute but its progress was very dear to his heart.'

When one recalls that in 1938 de Valera was at the height of his power and that the Agreement he was about to negotiate involved no less than the return of the naval bases by Great Britain, the letter to his son reveals his infatuation with mathematics. A brief quotation must suffice:

'Dear Viv,

When I was in the play-room last evening I noted you were working at Jacobians and the change-of-variable formulae in the calculus On my way here last night in the boat I was unable to go to sleep and to keep my thoughts off the likelihood of my being sick with the rolling of the boat I began to think over the change of variable problem for definite integrals and it flashed on me that the following would be more satisfactory than any line of treatment I know of'

He then gives a lucid treatment of change of variables in a triple integral, proceeding in a direct three-dimensional manner instead of changing the variables one by one, as is favoured by some textbooks.

In a letter to me, his biographer, Mr T. P. O'Neill, deals with the time when de Valera was over eighty: 'I may add that de Valera's interest in mathematics never waned. I can remember well the chalk symbols on the lino covered desk which he used and the way in which he would agree to take a walk, on doctor's instructions, only when his secretary had read to him a mathematics problem which he could ponder over as he walked. Indeed I heard him bargain with her! He would agree to do at once some of the less agreeable chores of answering letters or autographing books etc. if she would read some mathematics to him afterwards.'

THE LETTER FROM LEWES JAIL

The letter printed below was presented to the Dublin Institute for Advanced Studies in October 1975 by Mrs May Conan, Conway's daughter, and is here printed with the permission of Professor Mairin de Valera, her father's executor. It has several points of interest. The bold round handwriting suggests a character full of quiet self-confidence. The style is simple and graceful. The content gives us a cross-section of the mind of this unusual felon, covering some astronomy, quaternions* and the discomforts of prison life. The treatment of Drayson's theory is judicial and the verdict agrees with that of modern astronomers. But the matter does not end there. It appears that about 1935 de Valera asked Conway to return the letter to him, and sent it back to Conway having retained a copy. This copy was available some thirty years later when de Valera's biographer, Mr T. P. O'Neill, was interviewing him, and part of it was translated into Irish for the biography. When O'Neill found difficulty in understanding

* The formula in the letter occurs on p. 116 of C. J. Joly, *Manual of Quaternions*.

about the precession of the equinoxes, an offprint was produced from de Valera's papers and duly referred to in a footnote in the Irish biography: 'Feic *The Draysonian Heresy* le Sir Harold Spencer Jones (1944)'. Being anxious to round off the matter, I consulted Professor P. A. Wayman at Dunsink Observatory and the Librarian of the Royal Society, but, after careful search, neither could locate any such publication by Spencer Jones. Nor has any such offprint or pamphlet been found among de Valera's papers now in the custody of the Franciscan Order at Dun Mhuire, Killiney, Co. Dublin, nor among those held by Dr Vivion de Valera. Yet Mr O'Neill is positive that it was seen by him. The Spencer Jones mystery remains.

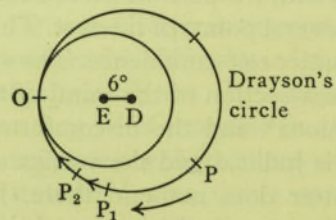
Here is the letter:

21.2.1917

'Dear Dr Conway: A rather curious pamphlet by one Major Gen. Drayson (at one time prof. of Astronomy at Woolwich) has come my way here. In it he criticises what he represents as the present official view held by astronomers as to the nature of the conical motion of the earth's axis—or perhaps better, the motion of the pole of the equator round the pole of the ecliptic—and maintains that the motion is really that of uniform motion in a circle round a point 6° approximately from the pole of the ecliptic, the radius of the circle being $29^\circ 25' 47''$ very nearly.

'As far as the destructive part of the work is concerned it seems to me to be due to a misunderstanding of what the Astronomers' position is. For example he doesn't seem to appreciate that what is called "the circular motion of celestial pole round the pole of the ecliptic" is admittedly only a *first approximation*—at least my recollection of the explanation of the Precession of the Equinoxes is that this circular motion is only such an approximation. His attacks on several other points fall similarly flat. In fact it is very hard, on reading this part of the pamphlet, not to think that Drayson was a "sorehead and a crank" who had read only *Popular Astronomies* and who was ignorant of Math. Physics in particular. It was indeed, to my mind, his ignorance of the true position that led him on patiently to the constructive part of his work.

'The observed decrease in the obliquity, from 24° in AD 30 to $23^\circ 27'$ (roughly) of the present day led him to believe that the centre of the circular motion was not E the pole of the ecliptic but D. He did not discard the circ. motion but retained it as *rigidly exact* with the new centre D and new rad.



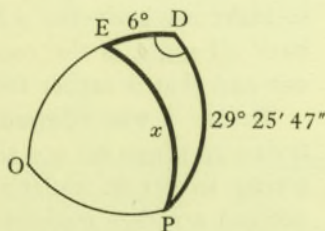
'This circle is described in about 31,700 yrs—the accepted cycle is 25868 yrs he says and the figure shows the decreasing obliquity EP as P travels thro positions $P_1 P_2$ etc to O where the obliquity will be a minimum about the year 2295 AD, its amount being then $23^\circ 25' 47''$.

'He got his centre and circle as far as I can make out after a laborious hunt by trial and failure to find a circle which would fit in with a series of observed obliquities recorded thro. the centuries paying special attention to the more recent determinations.

'His result is very good certainly. Apparently it is easy to calculate from it with a very high degree of accuracy (to within a second of arc in the past century) the obliquity for any date—the calcul. being based on $\triangle EDP$ of which two sides and included angle are given—the decrease of $\angle ODP$ being $40''.9$ yearly. Also the rt. asc. and declination of fixed stars, the precession of the Equinoxes etc.

'At first sight this is rather impressing. It impressed Drayson himself so much as to make him believe that he must be *theoretically* correct in his description of the motion as a circle round D. But of course when we think of the fact that the observations on which we can test its truth lie on some 2° to 3° of arc and when the idea of circle of curvature occurs to us we see that his circle is simply the circle of curvature of the spherical curve described by P; D being the pole of that circle. The tallying of his calculations with facts are no longer strange. That a disciple of his Admiral De Horsey gave as the error of sidereal time as $41.28''$ in 1892 as deduced from Drayson's *Theory*, whilst Stone in the same year independently gave the error as $41.51''$, is not astonishing unless the statement be true that "astronomers deny any such time-error". There is a claim that the acceleration of the moon's mean motion as well as the apparent drift of the stars towards Lyra can also be adequately explained by D's hypothesis. I have not examined these claims yet. Were I sure of the latter I'd be inclined to think that there was more in his theory than merely the circle of curvature, which completely explains the consistency of his results in the cases I have examined. The only practical value of his work if his theory be incorrect would be, by giving this circle, that it enables one to dispense with looking up the Nautical Almanac for the obliquity etc—since they can be easily got from his data by calculation.

'I am sure you are asking yourself why the deuce I am writing to you about this at all since the explanation of the consistency of his results is so apparent. The reason is this. His theory would furnish a delightfully simple astronomical explanation of the Ice Age. The maximum obliquity of $35^\circ 25' 47''$ would more than double the area of the ice cap at each of the poles, and the period of the cycle etc would fit in so beautifully with the most modern views as to the date nature extent etc of the glaciations that were his theory not to run directly counter to the *certain* deductions from mechanical principles I for one would feel fairly convinced of its truth. I am anxious then to lay my hands on some good work on celestial



mechanics. I have my Appell here and he refers to *Mécanique céleste* de Tisserand. I wonder is it possible to get books from Paris at present? The librarian of the College would know and as the College has £1 library deposit of mine it struck me that you might be able to have the book ordered for me. The deposit would cover the price of one vol, in all probability, and that would do for a start. Unfortunately I have very little time here for Maths. Lights out at 8 pm. I am just about getting warm into a piece of work when the inexorable bell goes—and I have to rush to make my bed—not a hard job by the way—but an icy breeze about my back all night is the consequence of not making it before the light goes out and that is rather too heavy a price to pay for any math. pleasures.

‘Before I was allowed any books from home I used to amuse myself trying to prove on my slate all the classical theorems I could think of. In trying to get at Euler’s co-ordinates from Quaternions in Mountjoy I noticed a rather curious theorem on rotations which I found very useful at times since. I did some work also on quaternion identities, on the linear quat. function (following the lines of Hamilton’s treatment of the vector function) with its application in some detail to Quadrics e.g. rectilinear generators which suggested a neater way of getting Joly’s

$$\rho = \pm \sqrt{-1/m} \alpha^{-1} \phi \alpha + y \alpha.$$

I got in this connection too some nice quat. identities. I was delighted at being able to recover Waring’s formula from a standpoint which I think must be that from which you attacked it at one time. I was able to get at Green’s theorem also but only by the tetrahedron method. I failed hopelessly several times to get it by a method which I know Joly applied in the appendix to Vol. II of Hamilton’s Elements. Since I got Appell my principal amusement has been to turn him into quaternions and if I get Tisserand I will try to do the same with him. I am never at a loss now for something to do.

‘Give my sincerest respects to Mrs. Conway. I often think when I have a look at myself in this “rig out” of her comments on the motor cycle overalls. There were a couple of occasions over a year ago when I felt I should have gone to offer you my congratulations—but I had done so little with the “conformal representation” problems (further than the first problem I showed you) that I was ashamed to meet you. On my way to Dartmoor thro. Wales I thought of Prof. Bryan. I suppose you will be soon arranging exam papers with him. Harper I believe was killed at the front. I suppose Alfred Rahilly got his place. I hope Mrs. Conway May Morgan and . . . are all quite well.

‘Prof. McNeill is quite well. I suppose the College building is not yet complete.

‘I am very sincerely yours

E. de Valera Q.95’

An insertion in the letter reads:

'Besides the pamphlet "Important facts and calculations for the consideration of Astron. and Geologists" 1896, Drayson was the author of

- (1) The Earth's Past History (Chapman and Hall)
- (2) Motion of the Fixed Stars
- (3) Untrodden ground in Astronomy and Geology (Kegan Paul).

Disciples (a) De Horsey 'Draysonia' (Longmans)

- (b) Major Marriott,* Change of climate and its cause (Marlborough and Co.); Changes of Climate, the Glacial Period explained etc. etc.'

THE DUBLIN INSTITUTE FOR ADVANCED STUDIES†

On 6 July 1939 de Valera (then Taoiseach and Minister for Education) introduced a bill in Dail Eireann 'entitled an Act to make provision for the establishment and maintenance in Dublin of an Institute for Advanced Studies, consisting of a school of Celtic studies and a school of theoretical physics, to authorize the addition to such institute of schools in other subjects and to provide for matter incidental or ancillary to the matters aforesaid'. This Bill became law when the Institute for Advanced Studies Act was signed by the President 19 June 1940.

In introducing the Bill, de Valera held that Ireland ought to be a world centre for Celtic Studies, and of the proposed School of Theoretical Physics he said: 'There is however a branch of science in which you want no elaborate equipment, in which all you want is an adequate library, the brains and the men, and just paper. We have already in the world an important place, or had in the past an important place, in mathematics and theoretical physics. The name of Hamilton is known wherever there is a mathematical physicist or theoretical physicist. This is the country of Hamilton, a country of great mathematicians. We have the opportunity now of establishing a school of theoretical physics which could be specialized as the school of Celtic studies can be specialized, and which I think will again enable us to achieve a reputation in that direction comparable to the reputation which Dublin and Ireland had in the middle of the last century.' In conclusion he said that the schools would be 'devoted solely to the advance of learning and the establishment of the reputation of our country as a centre of learning which will bring students of the post graduate type from abroad'.

The Act sets out that the Institute shall be a body corporate, situated in the County Borough of Dublin, with very wide functions: 'to provide facilities for the furtherance of advanced study and the conduct of research in specialized branches of knowledge and for the publication of the results of advanced study and research whether carried on under the auspices of the Institute or otherwise'. The Schools of Celtic Studies and Theoretical Physics are to be

* Marriott, a geologist, was Governor of Lewes Jail and kindly disposed towards de Valera.

† Relevant documents are listed at the end of the memoir.

established as soon as convenient; other Constituent Schools may be established later, and disestablished if that appears to the Government to be in the public interest. The Act proceeds to describe the functions and duties of the two above-mentioned Schools in some detail. The School of Theoretical Physics is to investigate 'the mathematical principles of natural philosophy and the application of those principles to the physical and chemical group of sciences and to geophysics and cosmology'. Advanced students are to be trained in methods of original research; provision is to be made for university professors and lecturers on leave of absence; seminars, conferences and lectures are to be organized; recent accessions to knowledge are to be published; competent scholars are to be commissioned to write or edit works dealing with theoretical physics. The Act was followed by Establishment Orders setting out in further detail the functions and duties of the Schools of Celtic Studies and Theoretical Physics.

Seven years later, in 1947, came the Establishment Order for the School of Cosmic Physics, its functions and duties including 'the theoretical, observational and experimental investigation of the problems of cosmic physics, including astronomy and astrophysics, cosmic rays, geophysics, meteorology and oceanography'. This School is less homogeneous than the School of Theoretical Physics, being divided into three sections (Astronomy, Cosmic Rays, Geophysics) each in charge of a Senior Professor, but with a Governing Board over all three.

No other Constituent School has been established; there have been suggestions, but none has materialized.

On account of the similarity in title, one is naturally led to compare the Dublin Institute with the Institute for Advanced Study at Princeton. Their aims are similar, their circumstances very different, one supported out of public funds in a small and rather poor country, the other out of private endowment in a large and wealthy country. Each was the brain-child of a man of tenacious purpose—Eamon de Valera in Dublin and Oswald Veblen (1880–1960) in Princeton. De Valera's task was the harder in that he had to impose his will on his Cabinet to ask the taxpayer to support an Institute for research without any apparent economic purpose; I have never heard that any of his political colleagues had personal enthusiasm for the proposed Institute, and I believe that they let him have his way as a tribute to the high respect they had for him as a great leader. Veblen had merely to persuade a wealthy family that the endowment of the Princeton Institute was the best way in which to dispose of their wealth. As I think of the two men—I knew Veblen well, better than I knew de Valera—I see in both of them a quiet relentless obstinacy in achieving what they sought. To complete the comparison, de Valera was an astute politician and private mathematician, Veblen a distinguished geometer and politician only on the academic level.

There follow three reminiscences concerning de Valera and the Institute, dealing mostly with the early years when he was most intimately connected with it.

REMINISCENCES

From Dr A. J. McConnell, Provost of Trinity College, Dublin 1952-74

I first met Eamon de Valera in the late 1930s when he was planning the establishment of the Dublin Institute for Advanced Studies, and we saw each other frequently when he came to the Institute to attend lectures or seminars, but it was not until some ten years later that I got to know him well. After the death of A. W. Conway, his former professor and lifelong friend, he turned to me for help and advice in his mathematical reading, and it was only then that I realized that in the evenings when the day's work was done he would turn to a period of mathematical study—a practice which he maintained over the whole of a very busy public life and in spite of the fact that even then his eyesight was rapidly failing him.

When he graduated in 1904 in the Royal University of Ireland, de Valera was dissatisfied with his performance in the degree examination and a few months later he entered Trinity College, Dublin, as an undergraduate with the object of improving his academic record. He sat for the scholarship examination of 1905 but was unsuccessful and then, finding it impossible to continue his whole time studies because of the necessity to earn a living, he retired from Trinity the following year. However, he was not discouraged by this setback and continued his studies while holding several teaching posts. He was fortunate that there were at this time in Dublin two young inspiring teachers, whose public lectures he was able to attend and who gave him help and encouragement. The first was his old professor at the Royal University, Arthur William Conway, who later became professor of mathematical physics at University College, Dublin, and finally President of that College; the second was Edmund Taylor Whittaker, who was professor of astronomy at Trinity College, Dublin, from 1906 to 1912 when he became professor of mathematics at Edinburgh University. From them he acquired a deep interest in the mathematics of William Rowan Hamilton, who indeed became one of his great heroes. Conway in particular inculcated in him a love for quaternions, which remained with him all his life, and in 1943 when the Royal Irish Academy celebrated the centenary of their discovery, de Valera had the Irish government join in the celebrations; a postage stamp with Hamilton's head was issued to commemorate the occasion. Some years later a plaque was placed on the canal bridge outside Dublin on the spot where Hamilton had his famous inspiration.

Between 1906 and 1912 de Valera held various teaching posts and gave lectures to students preparing for the examinations of the Royal University until it ceased to exist in 1909. In 1912 he was a candidate for the professorship of mathematics at University College, Galway, but retired before an appointment was made, and in October of that year he became temporary head of the mathematics department of St Patrick's College, Maynooth. The following year he applied for the vacant chair of mathematical physics in University College, Cork, but was unsuccessful. As his dream of obtaining a permanent university post gradually faded he became more and more caught up in the

activities of the Gaelic League and in republican politics. It has more than once been suggested that the history of Ireland might have been very different had he succeeded in gaining his longed-for professorship. Some of his political opponents were afterwards said to have declared in jest that University College, Cork, had a lot to answer for.

De Valera certainly regarded the foundation of the Institute for Advanced Studies as one of his greatest achievements. He admired the success of the Princeton Institute of similar name and it was on that model that the new institution was established. His primary aim was to have in Dublin a centre of the highest international standards in the two academic disciplines in which he was passionately interested—Celtic studies and theoretical physics. Conway and Whittaker were his chief mathematical advisers on the project and it was indeed the latter who was mainly instrumental in securing Erwin Schrödinger as the first head of its school of theoretical physics.

However, he had also a secondary aim in establishing the Institute. He was very conscious of the divisions that existed in the field of higher education in Ireland and was concerned in particular at the isolation, due to historical and religious reasons, in which Trinity College found itself after the foundation of the new state. He often expressed to me his great admiration for the contribution that Trinity College had made to Irish scholarship and learning and his desire to help bring that isolation to an end. He was careful to make the new Institute independent of the universities, but at the same time to ensure that it would fully cooperate with them in post-graduate studies, thus providing a neutral ground where the staffs and senior students of all the Irish universities (both North and South) could meet and work together on equal terms. In this aim the Institute was singularly successful. In 1947 the government gave Trinity College its first annual state grant and the present cordial relations that exist between all the university colleges owe much to de Valera's encouragement and support. Higher education in the Republic of Ireland is greatly in his debt.

He was extremely proud of being Chancellor of the National University of Ireland, to which post he was elected in 1921 and which he continued to hold until his death, and of the many honours he received during his life none gave him more pleasure than the Fellowship of the Royal Society.

From Rev. James R. McConnell, Senior Professor in the School of Theoretical Physics, Dublin Institute for Advanced Studies

In July 1942 a colloquium was held at the Dublin Institute for Advanced Studies on the combination of relativity and quantum theory. A few months earlier I had succeeded in returning to Ireland from Italy, and in the meantime I had been appointed research scholar in the Institute. International scientific meetings were practically non-existent in those grim days and it was an exciting experience for a young man to attend the colloquium, in which the participants included such notables as Dirac, Eddington, Heitler and Schrödinger.

In the front row sat Eamon de Valera and during the tea-break I was introduced to him by the late Professor F. E. Hackett. I had previously known him only as a controversial political figure; indeed since the civil war of the early 1920s the political divide in Ireland was whether you were for or against 'Dev'. I was now seeing him in a new light. His conversation was devoted entirely to mathematics and physics. He excused himself for taking time off to attend the colloquium by explaining that he had not had a holiday for some years and that the colloquium was really a relaxation for him.

De Valera's deep personal interest in the Institute and its staff later became evident. He would telephone Schrödinger for information on some mathematical point. He was easily available to Schrödinger, then Director of the School of Theoretical Physics, when various difficulties arose. Anxious that no crisis would endanger the life or future of the Institute in its early years he patiently listened to all problems whether they concerned the academic personnel or were routine administrative matters, even those concerning the cleaners of the building. When I had spent one year in the School of Theoretical Physics, I was appointed to teach ecclesiastical history and elementary science at the local diocesan seminary. This would have meant discontinuing research. On hearing of the situation from the Chairman of the Institute Council, de Valera without my knowledge intervened with the late Archbishop McQuaid of Dublin and he, who owed his nomination as archbishop to an earlier intervention of de Valera, though it better to cancel my appointment.

De Valera was receptive to suggestions for the improvement and expansion of facilities in the Institute. In 1946 I wrote to him saying I had met in Cambridge an astronomer in whom he might be interested as a person who could reopen Dunsink Observatory. By return of post he requested me to ask the astronomer, H. A. Brück, who later became Astronomer Royal for Scotland, to come to Dublin to discuss the matter. After about six months Brück was appointed director of the observatory, and the School of Cosmic Physics was established. During the negotiations it became clear that de Valera had for many years dreamed of re-establishing astronomical studies in Ireland and had sought advice from a previous director of Dunsink, the late Sir Edmund T. Whittaker.

In the year 1959 I asked for an interview with de Valera for the purpose of seeking government aid to establish a new chemical laboratory at Maynooth, where I was then Dean of the Faculty of Science. I was received in the Prime Minister's office at 9 p.m., where I found him studying Knopp's *Theory and applications of infinite series*. Having concluded our business satisfactorily we discussed mathematics.

During the Third General Conference of the European Physical Society held at Bucharest in September 1975 a physicist from Israel informed me that the old gentleman, who had founded the Dublin Institute for Advanced Studies, had recently died. He could not recall his name. That is how I learned of the death of Eamon de Valera.

From Dr W. H. Heitler, F.R.S., Professor of Theoretical Physics in the University of Zürich

In the midst of European tension, at the brink of the outbreak of World War II, de Valera, then Taoiseach (Prime Minister) of Ireland, decided to create an Institute in his country which would serve purely cultural purposes. In his younger years he was a mathematician. So science was perhaps closer to his heart than, for example, art, excepting Celtic studies. His ambition was high; it was not to have a mean scientific standard. The famous Institute for Advanced Study in Princeton, U.S.A., which could boast of Einstein as one of its members, stood before his eyes. It was to be an Institute which would be known for its scientific achievements in the world. I believe de Valera succeeded. Almost thirty years later, he was rewarded by being elected Fellow of the Royal Society for conspicuous service to science—the foundation of the Dublin Institute for Advanced Studies.

The Institute had to be cheap. No expensive laboratories could be afforded. So, to start with, two 'schools' were established representing the two subjects for which de Valera cared most: the School of Celtic Studies and the School of Theoretical Physics. That the latter was not Mathematics was on the advice of Professor Schrödinger, the first director of the School of Theoretical Physics. Both Schools needed no more than books and writing paper.

The next problem was how to get the good scientists able to make a start, and that in wartime. In particular for theoretical physics this was not so easy. De Valera had the good idea to draw on the still large reservoir of continental scientists who had had to leave their home country because of Hitler persecution and who had not yet been integrated by the country of their refuge.

I joined the School of Theoretical Physics as soon as I could complete all the wartime formalities for moving from England to officially neutral Ireland. That was in the early summer of 1941. I do not remember when the official opening day was, but the practical opening was an international conference on high energy physics in July 1941. Famous scientists came from England, among them Professor Dirac from Cambridge who ranks as one of the most outstanding theoretical physicists. He became a frequent visitor to the Institute in the years to come. De Valera attended nearly all the lectures and discussions of this conference. It was a brilliant start for a new scientific institution.

High energy physics became one of the main subjects of research in the Institute. A seminar was held once a week and very often de Valera was present. It also belonged to the duties of the professors to give once a year a public lecture on some scientific subject presented in a form which non-specialists could also understand. For de Valera these lectures were always a great joy. I remember once to have chosen Cantor's set theory and I gave it the title 'Counting beyond infinity'. This can be presented in a fairly simple manner. De Valera was fascinated by the wealth of Cantor's ideas and enjoyed (and understood) it all.

Soon gifted young scientists joined the staff as scholars to do research. Most of them became well known scientists and some reached high positions in the

academic world. I mention a few names of those who for some years in the initial period worked in the Institute on problems of cosmic rays, meson theory and other high energy topics: the Rev. James McConnell, later a professor in Maynooth and senior professor in the Institute (for a time Director of the School of Theoretical Physics); James Hamilton, now a professor in the Nordic Institute in Copenhagen, founded by Niels Bohr; Sheila Power, now a professor in University College, Dublin. One of the most beloved members of the staff was the Chinese H. W. Peng. He joined the Institute after having finished his studies in Edinburgh. An unflinching cheerfulness combined with unusual gifts made him a most valuable member of the staff. He was promoted assistant professor and elected a member of the Royal Irish Academy. He returned to China while the civil war was on (hoping for the best) and is now, I believe, professor in Peking. De Valera remained the spiritual patron of his creation through all these years.

Some years later (1947) a third School was added, the School of Cosmic Physics. It consisted of three sections: astronomy, first headed by Professor Brück (now Astronomer Royal for Scotland), geophysics, which is of great practical importance for Ireland, first headed by Professor Pollak who died in Dublin in 1963; and experimental Cosmic Ray research which was at the time comparatively cheap. This section was first headed by Professor Janossy, now head of a physics institute in Budapest. Between the cosmic ray section and the School of Theoretical Physics there existed a close and fruitful scientific collaboration. By this time de Valera's Dublin Institute for Advanced Studies was definitely established as an internationally known research centre.

After having accepted an appointment in Zürich, Switzerland, I paid frequent visits to Dublin, and a visit to the Institute was usually included. From de Valera, as Chancellor of the National University, I received my first honorary degree. Quite often my wife and I paid personal visits to him who meanwhile had become President of the Republic. One visit to his beautiful presidential residence in Phoenix Park will always remain in our minds. Sooner or later, conversation turned towards general problems of science. De Valera was not a narrow materialist who believed that there was nothing in the world but molecules and physics which rules them. I told him of my late philosophical work which led me to the conviction that life cannot be explained by the laws of physics and chemistry alone. In his charming manner he told us of his boyhood and how he developed a passion for collecting frogs' eggs, like so many boys. The reason was that he could not have enough of watching the ever-recurring miracle of the birth of a tadpole and then the transformation into a frog. He added that this confirmed for him, more than many a learned proof, that there must have been a creator at work. He was deeply religious, but we also agreed about the difficulty of understanding the world in general, living nature to start with. I suppose that many scientists who still think that their primary task is the understanding of nature will agree with de Valera when in the end he said with a sigh: 'I wish the Lord had made it a bit easier for us'.

I thank all those who have made contributions to this memoir and in particular Mr T. P. O'Neill for correspondence. For correspondence about the Spanish connection I thank Professor V. F. Dixon of Trinity College, Dublin; Mr H. C. Norminton, Director of the British Institute in Barcelona; Señor Joaquín Juste, Spanish Ambassador to Ireland; and Dr Raul Valera (no relative) of Caracas, Venezuela. For inquiries in the U.S.A. I thank my daughter, Professor C. S. Morawetz. For translations I thank Miss M. Devoy and Miss P. Walsh, and for much general assistance I thank Miss Eva Wills.

The photograph, supplied by Irish Press Ltd, shows Eamon de Valera in his robes as Chancellor of the National University of Ireland.

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ADDENDUM, 25 August 1976: Thanks to unremitting inquiries by Miss Eva Wills and the kind cooperation of Major R. C. Bartelot of the Royal Artillery Institution at Woolwich, the mystery mentioned in connection with the letter from Lewes Jail has now been resolved. In the years 1944–45 a number of articles dealing with Drayson's theory appeared in the magazine *The nineteenth century and after* published by Constable. Some of the writers support Drayson, but he (and they) are vigorously attacked by Sir Harold Spencer Jones in an article entitled 'The Draysonian heresy and climatic changes' (1944, vol. 136, pp. 14–19) and in a further note (1945, vol. 137, pp. 142–144). The controversy is bitter, even vitriolic. The articles have been collected under the title *Drayson controversy* in a book in the possession of the Royal Artillery Institution, but not available for loan on account of its rarity.