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THE LIFE
OF
SIR J. J. THOMSON
O.M.

*Sometime Master of Trinity College
Cambridge*

by
LORD RAYLEIGH



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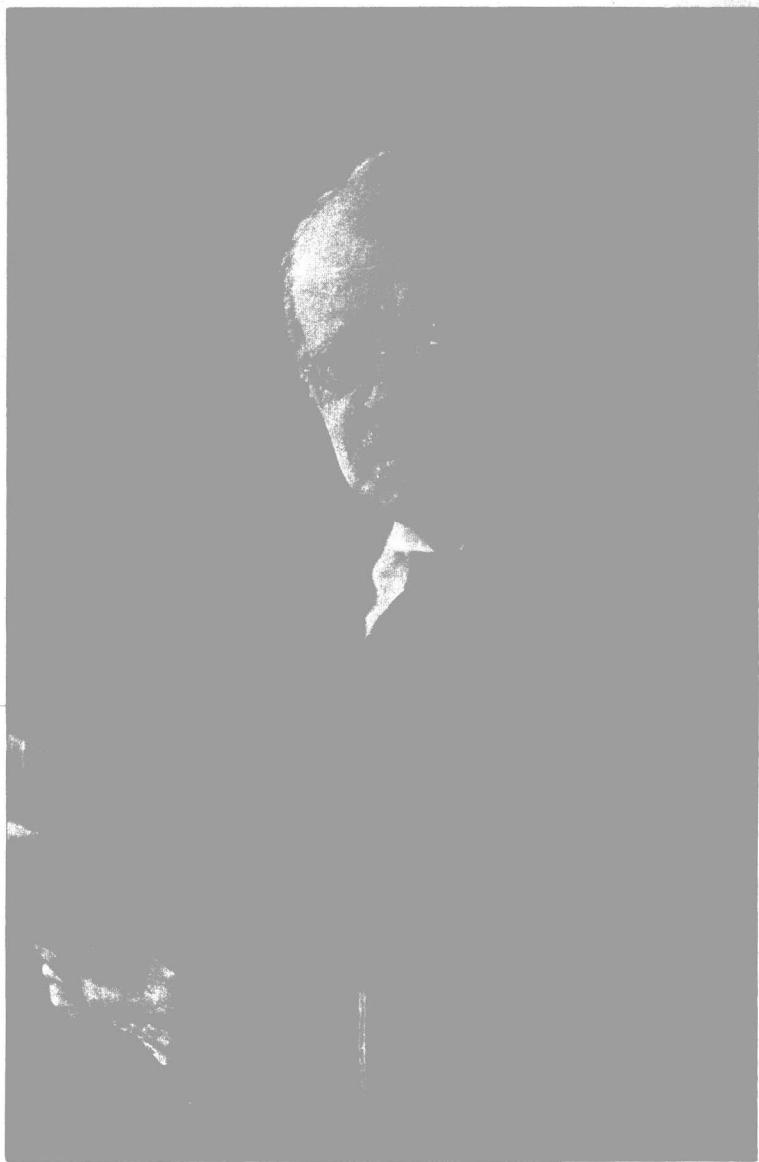
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J.J. Thomson in 1933

PREFACE

THE LIFE OF J.J. THOMSON was a full and vigorous one, and could be approached from various points of view. His own *Recollections and Reflections* (1936) must always have a first place with those who wish to understand his personality and achievements, and it must be admitted that he has himself skimmed much of the cream off what there is to be told. When it was suggested to me by his family that I might attempt a biography, I was inclined to take the view that the subject was almost exhausted. However, on further consideration, it seemed that there was room for a somewhat different treatment of his life. Some points which were prominent to outside observers were naturally omitted from his own book on grounds of modesty. Again, the account of his most important investigations, though admirable, is somewhat in the textbook style, and hardly gives much insight into the perplexities and technical difficulties which had to be overcome. Nor does it show in sufficient detail the complicated interactions between his own work and the work of his pupils, many of whom were men of power and originality, and started independent investigations which converged in a remarkable way on the final results attained by the School under his guidance. The present writer was fortunate enough to have observed much of this development at first hand, and should therefore be in a reasonably favourable position for relating it. The *Recollections and Reflections* has been consulted for facts and dates, but apart from this limited use, my account has been written independently.

If any reader is inclined to complain that the book is too scientific, I can only plead that I have tried to give due emphasis to the human side. A biographer cannot properly make the important events of his subject's life other than they were in fact, but I have put them in as easy a form as I could. No formulae have been used, in view of the protest of a well-known literary man, that he could not even skip a formula! A simple account

of J.J.'s chief researches without this limitation will be found in his *Recollections and Reflections*.

I must acknowledge the generous help I have received from many of those who were associated with J.J. Thomson at different stages of his career, and who have written their recollections at length. Among these are Prof. C.G. Barkla, Dr N.R. Campbell, Sir William Dampier, Prof. A.R. Forsyth, Mr W. Craig Henderson, K.C., Prof. F. Horton, Sir Owen Richardson, Prof. D.S. Robertson, Dr G.F.C. Searle, Mr S. Skinner, Prof. L.R. Wilberforce, Prof. C.T.R. Wilson, Prof. H.A. Wilson, Mr D.A. Winstanley and Dr Alexander Wood.

Many others have helped me with smaller contributions which appear in the course of the narrative. I have not scrupled on occasion to adopt their actual words without the use of inverted commas, which rather interrupt continuity.

Above all, I have referred constantly to Lady Thomson and Miss Joan Thomson. Miss Thomson has always been ready to help me by looking up references and making enquiries on special points. I am also indebted to her for the compilation of the index.

RAYLEIGH

TERLING PLACE
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July 1942

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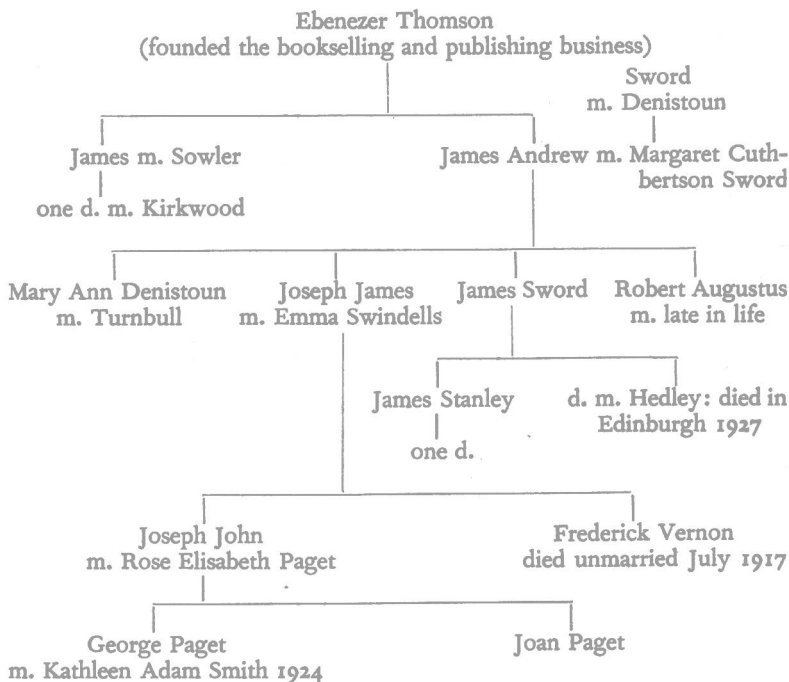
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CHAPTER I

EARLY YEARS. LIFE PREVIOUS TO APPOINTMENT AS CAVENDISH PROFESSOR

JOSEPH JOHN THOMSON came of a family who had been established in Manchester for several generations. The pedigree below gives what is known of his forbears, with a few notes about collateral relatives.



Emma Swindells was first cousin of the father of Percy Vernon (died), Charlie Vernon (died), Maud Vernon, Roland Vernon, Beatrice Vernon m. Ryan.

James Sword Thomson was a Cotton Broker in Liverpool.
Robert Augustus Thomson had no profession.

His father, Joseph James Thomson, carried on the family business of bookseller and publisher. Owing to his early death little

is now remembered about him. He was of purely Scottish descent. He had one sister and two brothers, one of whom was not competent to manage his own affairs.

The bookselling business was somewhat similar to that of Quaritch in London, specialising in rare and antique books. His son later shared this taste, and was fond of picking up old books on gardening from the stalls in the market-place and elsewhere in Cambridge.

Mrs Thomson, J.J.'s mother, was the daughter of a Mr Swindells. He had one inconvenient characteristic, namely of producing a bewildering untidiness in his room, which apparently he could not help, and one of his family had to be at hand to produce some sort of order before a housemaid could start work. This peculiarity was inherited by his daughter, Emma (Mrs Thomson), in the form of inability to find her way about in either town or country. Thus, after spending a four or five weeks' holiday at Whitby with her son and daughter-in-law, she happened to be left alone after they had started for Cambridge. The luggage had gone to the station, and she had planned to walk the distance of not very many yards along a familiar road, which she liked doing. But when the time came, the fear of being 'lost', and so missing the train, compelled her to send for a cab. It is believed that other cases similar to hers have been known.

The question will naturally be asked whether there was any indication of scientific ability in the family. J.J. Thomson's own answer to this was that one of his uncles took some interest in meteorology and (perhaps) in botany.

J.J. Thomson was born at Cheetham Hill, near Manchester, on December 18th, 1856. The house is one in a terrace, so his father's business must have been carried on elsewhere.

The earliest recollections of him which are available are from Miss Gertrude Mellor, who writes:

When my sister was married to Mr Vernon who lived quite near to us, I was only nine years old, and 'Joe' Thomson, who was then eleven, was his cousin.

My first and only recollection of him at that time was at my sister's house, one afternoon, a small boy in a little grey suit and a blue silk

tie, sitting on rather a high chair, with his legs dangling—very silent—and no doubt shy. The next time in the same place he must have been several years older because (apropos of what I can't say) he remarked that when he grew up, he intended to go in for 'Original Research' and I remember my brother-in-law laughed and tapped him on his head and said 'Don't be such a little prig, Joe'. Naturally I hadn't the faintest idea what he meant. . . .

They lived in Plymouth Grove, a residential part of Manchester: in as far as I can visualise it a smallish house, and I imagine in quite a simple way.

I remember going to tea there once, when Mrs Thomson said to her son, 'Joe, give your arm to Gertie, and bring her in', to his embarrassment I thought, for he stumbled over a footstool, and we both nearly came to grief. It was an incident I have always remembered! He must have been in his early teens and very shy.

I met him some years later, several times in Oxford Road near Owens College . . . when we exchanged a few words. The last time my chief remembrance was that he was wearing a nice brown suit, with a brown tie (I think it had white spots) the bow of which was under one ear, a fact of which I daresay he was quite unaware, and was possibly indifferent, and I longed to rectify . . .

Joe Thomson was sent by his father to Owens College, Manchester, in 1871, when he was only fourteen years of age.

His father died two years later, and his mother at once received the kindest possible offers of help from friends on whom she had no sort of claim of a financial kind—a testimonial as to how highly she and her husband were regarded. She removed her home shortly afterwards to 11 Egerton Terrace, Fallowfield (now part of Manchester), which had the advantage of being near the College. Joe was already so absorbed in his work that he was not helpful at home, but his brother, Frederick Vernon Thomson, who was two years younger, was of much more use in this respect, the more so that he could be depended on not to be absent-minded. He eventually went in for a business career with Claflin & Co., calico merchants, with a large connection in the U.S.A., for the financial means were lacking to send both sons to college, and there seems to have been no doubt which of them was best qualified to take advantage of it. Both he and his mother devoted much of their energies to helping with parochial church

work, and J.J.'s home life must have been passed largely in this atmosphere.

There is not much detailed information available about the home life of the Thomson family before J.J.'s marriage. Mrs Ryan (*née* Beatrice Vernon), a cousin, writes (abbreviated slightly):

My memories of the Thomsons are mainly of the annual pantomime party. All five of us with my mother were taken to a *matinée*. We met at the theatre, where we always sat in the middle of the front row of the dress circle, and after the performance drove out in 'growlers'* to their very comfortable Victorian house at Withington. There we had a sumptuous Lancashire high tea, and spent a lively evening, Joe being one of the liveliest of the party. He must have had a great liking for and understanding of children in those days; the parties probably took place when he was between twenty-five and thirty-five. When he was too lively his mother used to pull him up just as if he was a small boy himself, but he was quite irrepressible and her mild reproaches had little effect.

Mrs Thomson must have been a good deal older than my mother (whose hair had turned grey very early) but she still had dark hair and did not seem old to me. She wore it in a style then out of date, clusters of ringlets hanging over her ears, which I had only seen in the illustrations in Dickens' novels, and over it an arrangement of black lace and lavender ribbons. She was small, with bright dark eyes, beaming with kindness. On our departure each of us received a new florin and a large bar of chocolate cream.

Sometimes on other occasions two or three of us would tramp over to see her; we always had a very warm welcome, and a festive tea with home-made strawberry jam; and on leaving new silver and chocolate. She was obviously very proud of Joe, and used to sit and beam upon him; she showed us one of his early books, which was completely incomprehensible to her and to us!

When she heard of his engagement she was very nervous about meeting his fiancée; it would have been a great blow to her if they had not been sympathetic; when Joe brought Miss Paget† to Withington we were invited to meet her and I remember with what enthusiasm his mother spoke to us of her delight in her future daughter-in-law.

My sister used often to stay with them at the sea-side in her school holidays; Joe was about twelve years older, but an extremely enter-

* I.e. four-wheeled cabs.

† The marriage had in fact already taken place.

taining companion. He had a keen zest for the 'yellow backs' which preceded to-day's detective stories—and had a large repertoire of music-hall ditties, of which 'My Maria's a fairy queen' was a favourite. He used to sing these about the house.

We may here mention that Mrs Thomson's sons always spent their summer holidays with their mother, both before and after J.J.'s marriage. She died in 1901. J.J. chose the inscription on her monument: 'Her children rise up and call her blessed' (Proverbs xxxi. 28).

J.J. Thomson's home life had not given him any glimpse of science, and he considered that the decision to send him to Owens College was the turning-point in his life.

When there he came under the influence of Balfour Stewart, the Professor of Physics, and worked in his laboratory, which was situated in a series of attic rooms in a house in Quay Street, which had been the home of Cobden, the apostle of Free Trade. There were only about half a dozen students. The work was not much organised, and Thomson afterwards congratulated himself on having been trained under this loosely knit system. Towards the end of his life he said:

The teaching I got at Owens College sixty-three years ago was as good as I could get anywhere if I was beginning my studies now. My first introduction to Physics was the lectures of Balfour Stewart. These were so clear that, child as I was, I could understand them.

In 1887 he wrote to Mr C. Balfour Stewart:

Few can have been so indebted to [your father] as I was, it was he who first gave me a liking for physics and taught me most of what I know, and when I left the college I never saw him without receiving the wisest advice and the kindest encouragement, and now it is all over. Your father was the ideal man of science. No one since Faraday has ever combined such scientific genius and such deep piety.

Stewart, on his side, was accustomed to speak of Thomson as his best and most promising pupil.

His experimental work in Stewart's laboratory nearly had a tragic outcome in an explosion of a glass vessel, which injured his eyes. Mr C. Balfour Stewart writes:

My earliest recollection dates from 1874 or thereabouts when we as a family going home from church called at his mother's to enquire after J.J. who had an accident to his eyes the day before and my father felt some anxiety lest he should lose his eyesight.

However, all ended well, and his sight does not seem to have been permanently affected.

Besides Stewart, he learned much from Osborne Reynolds, Professor of Engineering, and Barker, Professor of Mathematics. The two former became, or perhaps were already, well-known names in the scientific world. Professor Barker did not achieve mathematical fame, but he was an able mathematician, and Thomson valued his teaching highly.

J.J. does not seem to have had any early training in chemistry, either at Owens College or afterwards at Cambridge; and it is possible that his later work on gases was somewhat hampered for lack of it. One observer who was favourably placed for judging did not think he had ever read a formal textbook on this subject. He got his information by asking questions; and sometimes his attitude on chemical matters seemed rather naïve. I remember when I got some unexpected results with sulphur dioxide, J.J. queried, rather unnecessarily as I thought, whether my sulphur dioxide was really sulphur dioxide at all!

Thomson's abilities made themselves felt very quickly. In June 1873 he won the Ashbury Engineering Scholarship, and the Dalton Junior Mathematical Scholarship, and in June 1874 the Dalton Senior Mathematical Scholarship and the Engineering Essay Prize.

Towards the end of his time at Owens College at the age of twenty he published in the *Proceedings of the Royal Society* a short experimental paper 'On Contact Electricity of Insulators'. It was communicated by Balfour Stewart, and made acknowledgements to him and to Dr Schuster.*

It was thus early that he came into contact with Schuster, and also with J.H. Poynting, for whom he had the greatest affection and regard, and who became a life-long friend.

* Afterwards Sir Arthur Schuster, F.R.S.