

CHAPTER 1

THE BEGINNING OF THE CAVENDISH TRADITIONS, 1871-1879

Our principal work, however, in the Laboratory must be to acquaint ourselves with all kinds of scientific methods, to compare them, and to estimate their values

Maxwell in his Introductory Lecture¹

1.1. Preparing the Way

In 1868 the University of Cambridge, after much debate, finally added the subjects of heat, electricity, and magnetism to the new scheme of testing for Honours in the Mathematical Tripos. To facilitate teaching of the newly required subjects, on November 25, 1868, a Physical Science Syndicate was appointed “to consider the best means of giving instruction to students in physics, especially in Heat, Electricity and Magnetism, and the methods of providing apparatus for this purpose.” After three months of thorough study, the Syndicate issued a detailed report on February 27, 1869 confirming the necessity for incorporating these subjects into the curriculum.² “No reason can be assigned,” the Syndicate concluded, why the University should not become “a great school of physical and experimental as it is already of mathematical and classical instruction.” To this end, the Syndicate recommended that the University found a new professorship and establish a “well appointed Laboratory” “to render the Professor’s teaching practical.” The chief duties of the new professor were “to teach and illustrate the laws of Heat, Electricity and Magnetism, to apply himself to the advancement of the knowledge of such subjects and to promote their study in the University.”

Certain aspects of the Syndicate’s report are noteworthy. First, in recommending the establishment of a new professorship, the Syndicate strongly emphasized the new professor’s role as lecturer, not as researcher. The new professor was to provide “the large amount of additional teaching” needed to train the candidates for several examinations: the Mathematical Tripos (MT), the Natural Sciences Tripos (NST), and the ordinary degree examinations in chemistry and in mechanism and applied

¹ J. C. Maxwell, “Introductory Lecture on Experimental Physics,” in W. D. Niven (ed.), *Scientific Papers of James Clerk Maxwell*, 2 vols. (Cambridge: Cambridge University Press, 1890), vol. 1, 241-255 on 250.

² *CUR* (16 November 1870): 93-96.

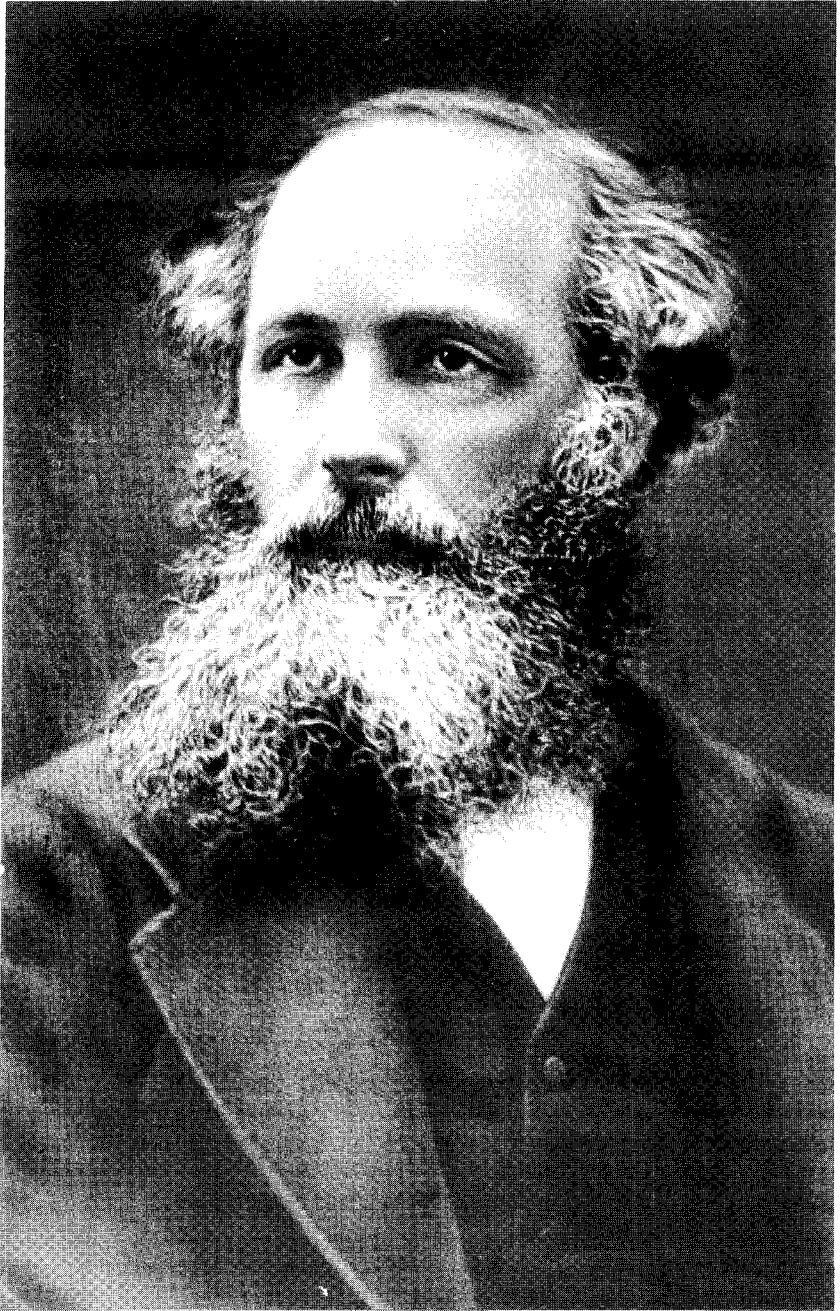


Figure 1.1. James Clerk Maxwell, the first Cavendish Professor of Experimental Physics (1871-1879) [Courtesy of the Cavendish Laboratory].

science. The new professor also would be responsible for providing additional training for candidates for the first examination for the medical degree (M. B.).

Second, the Syndicate stressed that the foundation of the new professorship “would be incomplete” without the establishment of a properly equipped laboratory. Building such a facility, the Syndicate estimated, would require the sum of £6,300: £5,000 for a new building and £1,300 for apparatus, cases, and furniture. The Syndicate also recommended that the annual salaries for the men who filled the new laboratory posts should be £500 for the professor, £100 for the professor’s demonstrator, and £60 for a lecture-room attendant.

Third, the Syndicate recommended simultaneous establishment of the new professorship and laboratory. This emphasis on simultaneity indicated that the future laboratory was intended to be used as a property of the University for practical examinations, teaching, and occasional research rather than functioning as the private possession of its lead professor. As a University property, the future laboratory would have the benefit of automatic official recognition. By comparison, the laboratory of William Thomson at the University of Glasgow had not received official university recognition for its first sixteen years.³

The realization of this visionary scheme, however, depended on the University’s ability to finance it. On May 13, 1869, another syndicate was appointed “to consider the means of raising the necessary funds for establishing a Professor and Demonstrator of Experimental Physics, and for providing buildings and apparatus required for that department of Science.” The new Syndicate first asked several wealthy colleges “whether they would be willing to make contributions from their corporate funds,” but the colleges approached were reluctant to share their resources for a University purpose. Next, the Syndicate investigated the possibility of funding the laboratory by raising the University’s capitation tax and by using the financial resources of Cambridge’s two building funds.⁴ However, the financial problems raised by these possibilities were so complicated and proved so divisive that the new professorship would probably have to be delayed for a few years.⁵ The future of the whole plan became uncertain.

Then, suddenly, after the Long Vacation, the Vice-Chancellor made the startling announcement of a “munificent offer of his Grace the Duke of Devonshire, the Chancellor of the University.”

³ Romualdas Svidrysis, “The Rise of Physical Science at Victorian Cambridge,” *HSPS* 2 (1970): 127-151 on 138. For more details about Thomson’s laboratory, see David Murray, *Memories of the Old College of Glasgow: Some Chapters in its History of the University* (Glasgow: Jackson, Wylie and Co., 1927), 131-140; S. P. Thompson, *The Life of William Thomson*, 2 vols. (London: MacMillan & Co., 1910), vol. 1, chapter VII; Crosbie Smith & M. Norton Wise, *Energy & Empire: A Biographical Study of Lord Kelvin* (Cambridge: Cambridge University Press, 1989), 128-134.

⁴ *CUR* (19 October 1870): 18-20. The original report was issued on May 31, 1870.

⁵ *CUR* (26 October 1870): 49-51.

Holker Hall, Grange, Lancashire.

MY DEAR VICE-CHANCELLOR.

I have the honour to address you for the purpose of making an offer to the University, which, if you see no objection, I shall be much obliged to you to submit in such manner as you may think fit for the consideration of the Council and the University.

I find in the Report date Feb. 29 [27], 1869, of the Physical Science Syndicate, recommending the establishment of a Professor and Demonstrator of Experimental Physics, that the buildings and apparatus required for this department of Science are estimated to cost £6,300.

I am desirous to assist the University in carrying this recommendation into effect, and shall accordingly be prepared to provide the funds required for the building and apparatus, as soon as the University shall have in other respects completed its arrangements for teaching Experimental Physics, and shall have approved the plan of the building.

I remain,
My Dear Mr Vice-Chancellor,
Yours very faithfully
DEVONSHIRE.⁶

The Chancellor's generous offer inspired the colleges to move from stubborn reluctance to a new spirit of cooperation and they indicated readiness to provide remuneration for both the professor and his demonstrator. On November 28, 1870, two years after Cambridge had first considered the best means of giving physics instruction to its students, the Professorship of Experimental Physics was formally proposed in the Cambridge Senate. The proposal was approved on February 9, 1871.

The question of who would fill the new position now arose. Because the new chair would be very prestigious in Britain, a prominent figure was needed. After the new professorship was officially proposed in November of 1870, the Master of Peterhouse, H. W. Cookson, wrote to the most eminent British physicist at that time, William Thomson, with an offer of the proposed chair. Only one year previously, Thomson had turned down an offer of a Cambridge praelectorship in Science made to him by the Master of Trinity. Lady Thomson had been ill.⁷ Now, Thomson rejected Cambridge's latest offer: he was too much involved in the economic, social and scientific life of Glasgow to consider a move to Cambridge.⁸ Next, Hermann Helmholtz in Berlin was approached but, having just been appointed to the prestigious chair of physics once filled by Gustav Magnus, he was unable to leave Berlin.⁹

When it became clear that neither Thomson nor Helmholtz would accept the professorship, James Clerk Maxwell was pressed to be a candidate. Since 1865,

⁶ *CUR* (19 October 1870): 13. Brackets added.

⁷ Thompson, *Life of W. Thomson*, vol. 1, 558-562.

⁸ See Smith & Wise, *Energy and Empire*.

⁹ Thomson wrote Helmholtz to explain the offer and urged him to consider the invitation seriously because his acceptance would be "a great gratification and advantage to English scientific men." He himself, Thomson added, "would consider the difference of distance from Glasgow to Cambridge and Berlin a great gain." See Thompson, *Life of W. Thomson*, vol. 1, 564-566.

when he had resigned the chair of Natural Philosophy at King's College, London, Maxwell had lived at his estate, Glenlair, devoting himself to writing up the results of his investigations in heat, electricity and magnetism. His *Theory of Heat* would appear in 1871, and his famous *A Treatise on Electricity and Magnetism* would be published in 1873. Those who supported Maxwell's candidacy were uncertain whether he would abandon his comfortable life at Glenlair to come to Cambridge; nevertheless Stokes, John William Strutt, Rev. E. W. Blore (Vice-Master of Trinity), and others wrote to persuade him.¹⁰

Despite the hopes and the urgings of these eminent persons, Maxwell hesitated to stand for the professorship, giving as his reason his lack of experience in guiding students in experimental work.

Glenlair, Dalbeattie,
15th February 1871

MY DEAR BLORE

Though I feel much interest in the proposed Chair of Experimental Physics, I had no intention of applying for it when I got your letter, and I have none now, unless I come to see that I can do some good by it.

... I am sorry Sir W. Thomson has declined to stand. He has had practical experience in teaching experimental work, and his experimental corps have turned out very good work. I have no experience of this kind, and I have seen very little of the somewhat similar arrangements of a class of real practical chemistry. The class of Physical Investigations, which might be undertaken with the help of men of Cambridge education, and which would be creditable to the University, demand, in general, a considerable amount of dull labour which may or may not be attractive to the pupils.¹¹

A few days later, however, Maxwell changed his mind and decided to stand for the chair "on the understanding that he might retire at the end of a year, if he wished to do so."¹² On February 24, therefore, Blore formally announced Maxwell's candidacy. There were no other candidates for the position and, on March 8, Maxwell was elected to the Professorship of Experimental Physics without opposition.

Interestingly, despite Maxwell's current stature in the history of physics, he was not first on the Cambridge list of candidates for its new physics professorship, but third. Unlike Faraday or William Thomson, Maxwell did not enjoy wide public recognition for his achievements during his lifetime. At the time of his appointment to Cambridge, Maxwell's name was relatively unknown outside scientific circles and unfamiliar even to Cambridge students. Horace Lamb, a student during the first few years of Maxwell's professorship, remembered that when Maxwell was appointed "he was little more than a name to many of us, except that on one or two

¹⁰ Stokes sent two letters, on February 16 and 18, 1870, urging Maxwell to stand. See CUL MSS ADD 7655/II, 40 & 42 (also printed in Strutt, *Life of Rayleigh*, 48-49). For Blore's letter to Maxwell, see CUL MSS ADD 7655/II, 38A.

¹¹ CUL MSS ADD 7655/II, 39: Maxwell to E. W. Blore.

¹² This quotation comes from Campbell & Garnett, *Life of Maxwell*, the second edition (London: MacMillan and Co., 1884), 264.

Leadership and Creativity

A History of the Cavendish Laboratory, 1871-1919

Dong-Won Kim

2002, XXIV, 226 p., Hardcover

ISBN: 978-1-4020-0475-9