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Edmund Edward Fournier D'Albe with a foreword by Oliver Lodge

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### **The Life of Sir William Crookes**

In 1870, Sir William Crookes (1832–1919) travelled to Gibraltar to observe the solar eclipse. He kept a diary and produced beautiful accounts of the expedition – alongside altogether more specific observations, including the 656 steps down a local cliff face, and every item in his luggage. It is with the same meticulous approach and cheerful prose that he records, in letters, journal articles and reports, the successes and failures of the vast range of projects in which he was involved. Although initially trained as a chemist, Crookes worked across the spectrum of the sciences, from consulting on preventative measures against cattle plague through to investigating spiritualism. Opening with a foreword by the physicist Sir Oliver Lodge, this biography by Edmund Edward Fournier d'Albe (1868–1933), first published in 1923, explores a remarkable life of enquiry through a host of first-hand sources.

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# The Life of Sir William Crookes

EDMUND EDWARD FOURNIER D'ALBE  
WITH A FOREWORD BY OLIVER LODGE



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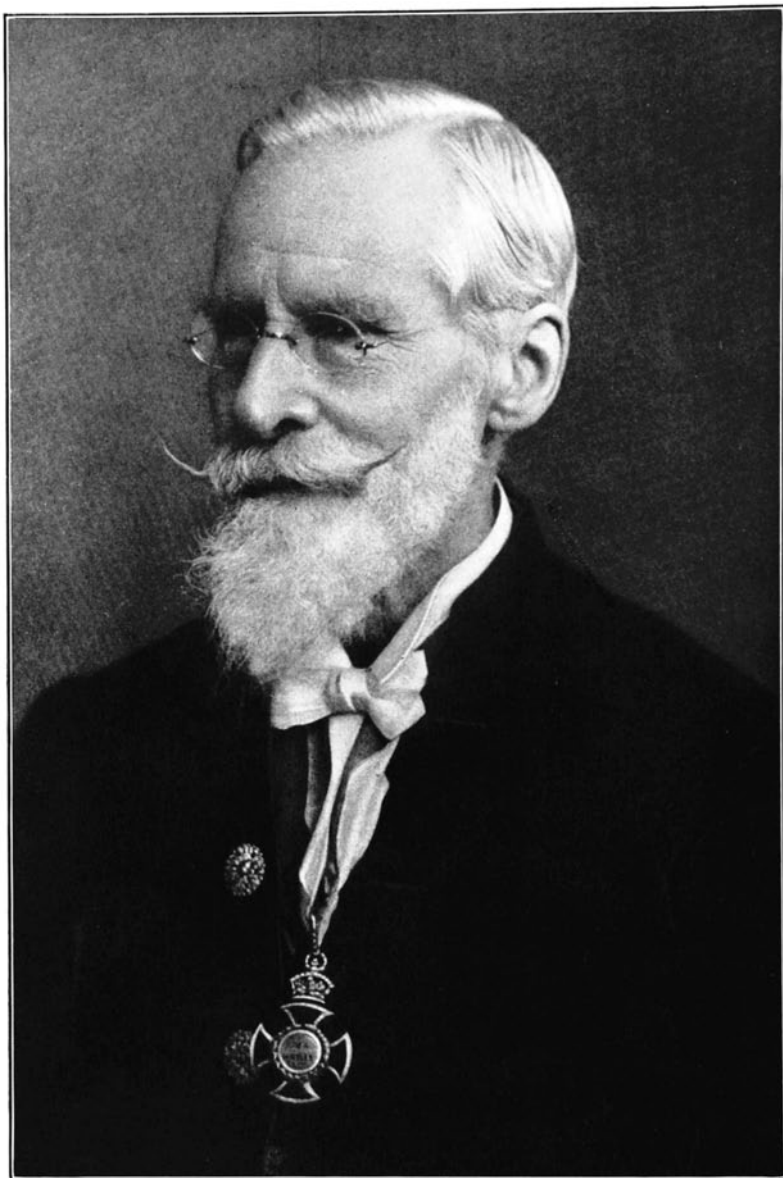
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O.M., F.R.S. *By* E. E. FOURNIER  
D'ALBE, D.S.C., F.INST.P.

WITH A FOREWORD BY  
SIR OLIVER LODGE

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## FOREWORD

**M**R. FISHER UNWIN and Dr. Fournier d'Albe have both asked me to write an Introduction or Foreword to a "Life of Crookes": and I am very glad to have an opportunity of saying something in memory of my old friend.

In many respects Crookes was unique in my experience of scientific men. He belonged, I suppose, to the class which has done such first-rate work in England, a class each member of which began as a scientific amateur and forced his way to the front by sheer ability and brilliance of discovery. These constitute a group of whom, I suppose, Joule and Cavendish and Huggins are the most typical instances; though I intend no sort of comparison between any of them. They may differ from each other in every other particular.

Crookes was not a learned man in the professional sense. He had brilliant ideas—inspirations they might be called—and he worked them out systematically and pertinaciously. It was his orderly system and pertinacity, continued into old age, which must have impressed everyone. And the brilliance of the resulting discoveries forced him into the highest Official position which a scientific man can attain, in spite of the controversy and hostility which some of his investigations had evoked. I must confess that I myself used to share in this ignorant hostility

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to some slight extent. For when he lived in Mornington Road, close to my lodgings in Delancey Street, I never remember calling at his house, or seeing any of the work that was going on there. I first met him personally at the early meetings of the Physical Society of London, when he was at work on high vacua, and when, with the help of a skilled glass-blowing assistant, he was able to exhaust vessels more perfectly than they had ever been exhausted before. The observations which he made of the electric discharge under those circumstances were of an illuminating character, and led to theoretical and practical achievements which ultimately had prodigious consequences. When my senior friend Professor Carey Foster became President of the Physical Society of London in 1876, and was contemplating beforehand his Presidential Address, I remember his telling me that he was proposing to take as its theme the work and discoveries of Crookes. He did not actually carry out this half-formed intention: but the possibility of it, coming from a man of the universally recognised sound judgement of Carey Foster, impressed me, who at the age of twenty-five was inclined to be hypercritical, and made me think more of Crookes than I had previously.

Before that, however, I remember hearing about his attempt to detect the pressure of light. And I remember, when, or soon after, Professor Fleming and I were both students in Professor Frankland's Advanced Chemical Laboratory at South Kensington, we used to discuss this matter, and rigged up an oblong of pith on a torsion wire inside a bulb in order to repeat Crookes's early experiment. We thought it must be a heat effect; and so indeed it turned out to be, not a real pressure of light at all, but a reaction from the molecular bombardment on a slightly warmed surface. The pressure of light was too small to

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be detected by the means then available ; it was masked by this other molecular non-etherial effect.

Crookes, however, continued his researches, and brought them to a climax by his neat invention of the radiometer, which he exhibited at an early meeting of the Physical Society ; incidentally making us wonder by what thaumaturgic skill he and his assistant had managed to get the revolving vanes into the bulb.

However, Crookes did many more wonderful things than that, inside vacuum bulbs ; and later, in the year 1879 at Sheffield, he demonstrated before an Evening Meeting of the British Association the remarkable properties of what for the first time he called cathode rays. It was a little before this time that he regarded his beam of cathode rays as corpuscular light. And it was now that he introduced his prophetic phrase, "Matter in a fourth state" ; that is to say, he claimed that he had obtained, as we now perceive and admit, matter in a state neither solid, liquid, nor gaseous ; no longer consisting of atoms as heretofore known, but split up into its apparently ultimate ingredients, now known to be the units of electric charge.

Before all these brilliant vacuum investigations, I had only known Crookes as the discoverer of Thallium and Editor of the *Chemical News* : though there were rumours that he was also trying to interest leaders of science in certain obscure and apparently superstitious investigations into mysterious and incredible phenomena. He had not then learnt the full force of scientific conservatism. With the enthusiasm of comparative youth, he must have thought that scientific magnates, no matter how orthodox, would be glad to welcome new and startling phenomena, if they could be rigidly and metrically demonstrated. He had the advantage of a powerful medium, Daniel Home ; he witnessed the most astounding things ;

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he described some of them with natural enthusiasm, but occasionally with less than scientific restraint ; and he tried to reduce the puzzling phenomena which frequently occurred in Home's presence, to their rudiments, by getting him to tilt a board suspended at one end on a spring-balance, with the other end resting on a table, and to effect this in an obviously non-mechanical manner. But it was just this apparent absence of any possibility of mechanical explanation which prevented high scientific Authorities from coming to see it. They felt, no doubt, in sympathy with the position which Faraday had laid down—that we must make up our minds as to what is possible and what impossible, and not waste time in trying to look for the impossible !

After further fruitless efforts to interest the scientific world in what he considered a whole region of unexplored territory, and after drawing upon himself a great amount of fierce criticism and ridicule—so that he was even accused of being practically insane on one side of his brain, while sane enough on the other—Crookes appears to have realised that the time was not ripe for recognition of facts of this novelty, that there were many other branches of Physical and Chemical research to which he might devote his undivided attention, and that the attempt to storm the citadel of orthodoxy had better be postponed. He felt no doubt that the truth would make its way in due time. He never abandoned his full conviction of the reality of the facts which he had observed. He may or may not have varied his theoretical views concerning them ; for the time for useful theory was not yet. But he refrained from arousing any fresh hostility by pressing home his discoveries on a reluctant world. They had been observed, he knew, by others. They would continue to be studied, although perhaps in a less striking and sensational manner,

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by those who had less reputation to lose : and he was content to bide his time till the truth should make its way by its own momentum. Before he died he had the pleasure of seeing these psycho-physical phenomena taken up with some vigour on the continent of Europe, where, in spite of opposition, more and more scientific and medical men have become convinced of the reality of these puzzling things ; though in this country they still remain under a cloud of suspicion.

But though Crookes, and others since Crookes, have perceived the wisdom of not pressing truth prematurely on those unwilling to receive it, Societies have grown up with the object of taking a rational interest in these things, and reducing them to law and order, preparatory to their being gradually absorbed by scientific orthodoxy. Among such Societies, Crookes's name is held in high honour all over the world, not in spite, but because of his unpopular researches ; and in the years 1896-9 Crookes was President of the chief of these Societies. In all the talks I had with him, there was never the least sign of his abandoning any of the positions he had taken up. On the contrary, in a congenial atmosphere, he and Lady Crookes would narrate some of their extraordinary experiences ; some of which were beyond anything which, so far as I know, have been seen since ; though the general trend of them, and their more elementary aspects, have been verified up to the hilt again and again. The subject however, has been pursued in England less on the physical than on the mental side ; and on the more purely psychical aspect of the phenomena, Crookes did not feel himself specially competent, though he retained his vivid interest to the end.

No longer, however, is it considered essential, by those who pursue these studies, to undergo more than a very

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mitigated martyrdom, in the fruitless task of trying to force recognition on the unwilling. Like Galileo, Crookes, who had certainly suffered to a moderate degree, came to the conclusion that the truth would make its way in due time, and that meanwhile he could afford to wait in patience.

The other discoveries of Crookes are of world-wide fame, and will doubtless be dealt with in their due sequence in the "Life" which is now being written, but which I have not read. It seems possible, perhaps in consonance with the wishes of his family, that only undeniable and uncontroversial discoveries will be fully emphasised. But it would not be fair to the memory of Crookes to omit respectful mention of a branch of inquiry in which hereafter he will be hailed as one of the pioneers. And even now, half, or some smaller proportion, of the civilised world is more interested in these puzzling and obscure phenomena than it is in discoveries of any but the first magnitude in Chemistry and Physics.

Crookes was a great experimental Chemist. His fractionation and separation of the rare earths was a model of systematic procedure. His spectroscopic investigations laid the foundation for much of the brilliant work that is being done in our own day. The vivacity and thoroughness with which he examined any new fact, or any peculiar mineral, is well worthy of imitation. But not to many are given the intuitions which lead straight into the heart of the subject, and yield a clue for further advances. Among these intuitions, I have mentioned his views on the nature of the cathode rays, before the discovery and isolation of electrons. I might also mention his anticipation of the possibilities of Wireless Telegraphy, based on seeing a few developments of the Hertzian demonstration of electric waves in space. The Article will be found in

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the *Fortnightly Review* for February 1892 (p. 173), and is a rather wonderful example of scientific forecast.

When he was President of the British Association in 1898, he was tempted to resurrect his unpopular researches. But what were considered wiser councils prevailed, and he devoted the greater part of his Address to the Problem of the Wheat Supply of the World—an Address which has often been referred to by those competent to deal, in a practical and political way, with such a topic.

In later investigations by others, connected with the intimate structure of Atoms, Crookes's method of observing for the first time the splash or luminosity excited by each single atom, when projected with sufficient energy, is found of the utmost service. For it has enabled newly formed, or at least newly expelled, atoms of different kinds to be recognised; discrimination between them being possible by their range, or length of path, through air. In that way the breaking-up of atomic nuclei has been verified, and the conversion of one element into another confirmed. Here again, Crookes's intuition was not at fault. He had an idea, and he mooted it at the British Association in Birmingham in 1896, that the family relationship existing among the series of chemical elements could only be accounted for on the principles of evolution. He made a sort of speculative family-tree, suggesting that the elements came into being in regular order and succession; and he surmised that the atomic weights were not such simple and definite things as had been thought, but might be a kind of average, about which elements of slightly different weight but similar chemical character, could group themselves,—a surmise which the discovery of Isotopes in recent years has amply and conspicuously justified.

In every way, then, Crookes was a great scientific man, of surprising perseverance and experimental skill,

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with flashes of intuition and insight, which though at the time they might seem wildly speculative, were soon justified by the orderly progress of science.

His personality was not specially impressive. In his presence one did not feel the worshipful enthusiasm which some of the great men of science have aroused. It was easy to be critical. And yet, when one visited him at his house in Kensington Park Gardens, and saw his fine library with the well-ordered though small laboratory opening out of it, and admired the neatness of his records and his untiring industry, one felt that here was a workshop from which phenomena of stimulating novelty might at any time emerge. One would not compare it with Faraday's at the Royal Institution—that home of immortal discoveries,—still less with such a hive of industry, guided and stimulated by mathematical theory, as the Cavendish Laboratory, Cambridge. But it was a peaceful and secluded home of quiet research. There friendly people used to assemble for weekly converse; and there, in his later years, after a lifetime spent in exploring the secrets of Nature, lived and died the pioneer, William Crookes.

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## PREFACE

THE LATE SIR WILLIAM CROOKES had on several occasions planned to write his Reminiscences and to issue a collection of his Scientific Papers. Had he been able to carry out his plans, the world would no doubt have been enriched by a work of great charm and of permanent interest. But the hand of death was laid upon him before he could find time to attempt such a formidable task. The negotiations begun during his lifetime by the present publishers were continued after his death, and, after some vicissitudes, the large collection of letters and other documents came into my hands. The work of sifting these documents, numbering altogether some 40,000, has been somewhat arduous, and it may be that a few of much personal or public interest have failed to find a place in this "Life." But my aim has been to present Crookes as he appeared to himself and to his best friends, and, if possible, to allow him to express his ideas and aims in his own words. That must be my excuse for publishing many of his letters *in extenso*. They express the man and his character better than could be done by any narrative in the third person.

I wish to return thanks to the following persons for the loan of valuable documents: Sir William Barrett, F.R.S., Miss Gladstone, and Mr. A. G. Ionides; and to the following for supplying much interesting information: Sir Herbert Jackson, F.R.S., Sir Dugald Clerk,

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F.R.S., Mrs. Ionides of Witham, Mr. J. W. Gordon, K.C., Mr. A. C. Ionides, Mr. A. E. Franklin, Mr. A. Campbell Swinton, F.R.S., Mr. Percy Spielmann, and Mr. James H. Gardiner. To Mrs. Cowland (Sir William's surviving daughter) my special thanks are due for much practical assistance and advice.

E. E. FOURNIER D'ALBE

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