ELEMENTARY PRINCIPLES OF THE THEORIES OF ELECTRICITY, HEAT AND MOLECULAR ACTIONS, DESIGNED FOR THE USE OF STUDENTS IN THE UNIVERSITY, PART I.: ON ELECTRICITY

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R. MURPHY

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Trieste

ELEMENTARY PRINCIPLES

OF

THE THEORIES OF ELECTRICITY, HEAT,

AND

MOLECULAR ACTIONS.

DESIGNED

FOR THE USE OF STUDENTS IN THE UNIVERSITY.

BY THE REV. R. MURPHY, M.A.

FELLOW OF CAIUS COLLEGE.

PART I.

ON ELECTRICITY.

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M.DCCC.XXXIII.

TO

THE REV. CHARLES PORTER, B. D.

FORMERLY FELLOW AND TUTOR OF CAIUS COLLEGE.

Dear Sir,

I have inscribed this Treatise to you to mark my esteem for your character, and in grateful recollection of the care and friendship with which you favoured me during the period in which you filled the office of Tutor of Caius.

I remain, Dear Sir,

Your affectionate Friend,

ROBERT MURPHY.

Caius College,
June 13, 1833.

INTRODUCTION.

M. Poisson in his Memoirs on Electricity, Magnetism and Molecular Actions, M. Ampere in his 'Theorie des Phenomenes Electro-dynamiques,' and Fourier in his 'Theorie de la Chaleur,' have been the respective founders of the physical sciences considered in this treatise in a mathematical point of view. The subject of electricity (including what is called ordinary electricity, Voltaic actions and magnetism,) forming in itself a complete system, is the sole object of the first part of this work, the other subjects being reserved for the Second Part; and as the ordinary course of mathematical reading in the University is a sufficient preparation for the study of the branches of science here treated, it is hoped that the suggestion recently made by a distinguished member of the University, will be in some degree answered in the present Treatise.*

As an acquaintance with the properties of the remarkable functions treated by Laplace in the Mec. Cel. Liv. III. is indispensable in investigations respecting electricity, instead of referring to that work I have here introduced them under the form of Preliminary Propositions; I have however followed a different rout, making the functions which shall possess those properties, the objects of investigation; and

* Whewell's Dynamics, 2nd Ed. Preface, p. XVIII.

have thus arrived at a more general class of functions (which are of great use in investigations relative to Latent Electricity,) and also obtained several new and remarkable theorems with respect to Laplace's functions: it must be added that on referring to Crelle's Journal, I found that M. Jacobi had anticipated me with a respect to few of the theorems alluded to.

It was natural to consider the manner in which electricity is disposed in bodies, previous to its becoming sensible by the action of electro-motive causes; this is the object of the second chapter, and I am not aware that it has beeen before made the subject of mathematical investigation.

It could answer no useful purpose to point out what is new in the remaining parts of the work; that will easily be recognised by those who are already acquainted with the subject, and those who are unacquainted would not benefit by the information; I shall only add that the sixth and seventh chapters contain the theories of Ampere on Voltaic actions, and Poisson on magnetism, with such modifications as seemed to simplify the processes employed by those writers.

I have to return my best thanks to Professor Cumming, for the facilities afforded me by the use of his apparatus, to confirm experimentally some of the results deduced in this work, from theoretical views.

R. M.

Caius College, *June*, 1833.

CONTENTS OF PART I.

ERRATA.

PAGE	LINE	ERROR.	CORRECTION.
35	11	ελεκτρον	ηλεκτρον
36	2 from bottom	negative	positive
37	2	positive	negative
53	2	origin	centre
54	15	a_2 a_3	$2a_2$ $3a_3$
—	17	a_1 a_2	$2a_1$ $3a_2$
85	2		add sphere
96	2	=	+
107	27	currents	elementary currents.

ON ELECTRICITY.