

**AIR AND ITS RELATIONS TO LIFE: BEING
WITH SOME ADDITIONS THE SUBSTANCE
OF A COURSE OF LECTURES DELIVERED
IN THE SUMMER OF 1874 AT THE ROYAL
INSTITUTION OF GREAT BRITAIN**

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Air and Its Relations to Life: Being with Some Additions the Substance of a Course of Lectures
Delivered in the Summer of 1874 at the Royal Institution of Great Britain by Walter Noel
Hartley

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WALTER NOEL HARTLEY

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THE SUBSTANCE OF A COURSE OF LECTURES DELIVERED
IN THE SUMMER OF 1874 AT THE ROYAL
INSTITUTION OF GREAT BRITAIN

BY

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PREFACE.

THE following pages present an endeavour to give, in a light and popular manner, some information concerning that particular form of matter called Air, which is so essential to man that it comes to each individual with life, and leaves him not till death. Besides the narration of facts, an account of how these facts were obtained offers an insight into the particular mode of reasoning employed in scientific research, and endows the statements with that weight and interest necessary to leave a distinct impression upon the mind. As far as is consistent with clearness of expression, the use of scientific terms has been avoided. In one or two cases important practical details have been more fully treated than usual. Generally speaking, the original sources of information have been consulted, and to some

readers it may be of interest to know that these consisted of the papers of Andrews and Tait, of Graham, Ray Lankester, and others, in the 'Philosophical Transactions,' and in the 'Proceedings of the Royal Society'; likewise the contributions of Laplace, Dumas, and Boussingault, Regnault, Lewy, Schoenbein and Pasteur, in the 'Annales de Chimie et de Physique' and the 'Comptes Rendus' of the French Academy; of Bunsen, Brunner, and Pettenkofer, in the 'Annalen der Chemie,' &c. &c. I am further indebted to Dr. Roscoe's article 'Air,' in 'Watts' Dictionary'; Dr. Angus Smith's 'Life of Dalton'; also his very important work on 'Air and Rain'; 'Practical Hygiene,' by Dr. Parkes; 'Hétérogénie,' by M. Pouchet; De Bary's 'Morphologie und Physiologie der Pilze'; Cohn's 'Beiträge zur Biologie der Pflanzen'; 'Fungi,' by the Rev. M. J. Berkeley, in Hooker's 'English Flora'; and Dr. M. C. Cooke's recently published work; also Pettenkofer's 'Popular Lectures,' translated by Dr. Augustus Hess; besides many other writings, to enumerate which would furnish too long a list. Those who are acquainted with

Prof. Bloxam's work on 'Chemistry' will recognise some of the experimental illustrations and wood-cuts employed. I have to acknowledge that my constant intercourse and friendship with him have given me advantages of which I have availed myself. New illustrations, through the liberality of Messrs. Longmans, have been engraved by Mr. Collings from my own drawings, but for some of those in Chapter IV. my thanks are due to the Council of the Royal Society. The favour accorded to the short course of lectures which I had the honour of delivering at the Royal Institution of Great Britain, in the summer of 1874, and the subsequent enquiries as to their issue in a printed form, has been the chief inducement to their rearrangement and publication. Furthermore, having been struck with the very general want of knowledge in this country, even among scientific men, of the work accomplished by that celebrated French chemist, M. Pasteur, I thought that to make his labours more widely known would greatly promote scientific truth and accuracy.

For the sake of accuracy it may as well be

stated here, with reference to a sentence on p. 1, that although the rotation of the earth is said in general language to be accomplished once in 24 hours, it is really completed in 23h. 56m. 4s., and that the time of its actual revolution round the sun, the duration of a sidereal year, is 365d. 6h. 9m. 9⁶s.

WEST DULWICH: *September* 1875.

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