

**AN INTRODUCTION TO THE  
CHEMISTRY OF FARMING,  
SPECIALLY PREPARED FOR  
PRACTICAL FARMERS. WITH  
RECORDS OF FIELD EXPERIMENTS**

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An Introduction to the Chemistry of Farming, Specially Prepared for Practical Farmers. With Records of Field Experiments by Thomas Dyke Acland

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**THOMAS DYKE ACLAND**

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*With the Author's Compliments.*

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BY

RIGHT HON. SIR THOMAS DYKE ACLAND, BART.

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1892.

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IN  
GRATEFUL MEMORY  
OF  
MY FRIENDS AND TEACHERS,  
PHILIP PUSEY  
AND  
AUGUSTUS VOELCKER.

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## PREFACE.

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THIS small book, on part of a very large subject, is published, in its present form, with the hope that it may help to give a practical direction to Technical Education in Agricultural districts. The writer is convinced that due weight must be given to experience, if Science is to improve Practice.

The accumulated experience of farmers is extensive; not always accurately recorded: the reasons are often far to seek. The Chemist tries to explain the reasons, but he needs to verify the results of his principles by experiments in the open field.

There is at present a general disposition among residents in the country to enquire into the facts and principles of Agriculture. But we must begin with the facts and work back to the principles. This little book is intended as a finger-post both for teachers and learners. In it will be found an attempt to answer the following questions:—

The products of the farm, food for man, and food for beast, containing the materials of fat, flesh, and bone—what are they made of?

From what sources do these materials come?  
what from the air, what from the soil?

What are the chemical elements of each product? and what are the universal laws of Nature by which those elements are combined, or the products decomposed?

In the present endeavour to suggest simple answers to these questions it will be found—

That no chemical element or compound is named which does not directly concern the farmer.

That every chemical formula is accompanied by a statement of quantities in common arithmetical figures.

That a practical explanation of scientific weights and measures is given in terms with which farmers are familiar.

The application of the principles, thus explained, to the manure of plants and the food of animals is pointed out in the words of the best authorities. A few suggestions for field experiments on ordinary farms and some records of results are added.

A short Chapter on the Theory of Atoms and Molecules is inserted; but it may be passed over on the first reading, as it is not essential to the understanding of the practical recommendations which follow.



The present attempt is the outcome of some forty years of intercourse with farmers and their scientific teachers, and of the endeavour to collect and diffuse information among a wide circle of friends. If I have retained the colloquial style which was natural when speaking to young men in the presence of their elders, I hope it will not be deemed unsuitable when submitted to the public in print.

I have endeavoured throughout to point in the notes to passages in works of authority, and of moderate cost, for definite information.

The substance of this Volume has already had a limited circulation, chiefly in the West of England, and has therefore been open to criticism. It has been carefully revised. I am deeply indebted to Professor Maskelyne, Dr. Voelcker, and Mr. Lloyd, for kind encouragement and corrections. But neither of those gentlemen must be held responsible for the whole as it stands, for I have in some cases thought it better to retain an old-fashioned or popular statement of facts, than to insert a more difficult exposition of recent theoretical doctrines.

For the insertion, at the end of the volume, of some extracts from Asa Gray on the life of vegetables and animals, and on the relation of Natural Science to Religion, I am wholly responsible.

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NOTE.

In the Introductory matter (pages 2 and 3) I have directed special attention to one Elementary Primer on Chemistry, and to three Manuals on Agriculture.

If landowners resident in the country (Clerical or Lay), who may perhaps look at what I have written, desire fuller explanation, there is among the Text-books on Science in Longmans' series an excellent "Introduction to Chemistry," by my late friend, Prof. Allen Miller, of King's College, in whose laboratory I gained, more than forty years ago, the little practical knowledge of Chemistry which I have tried to turn to account in Agriculture. It was written expressly for beginners, and completed just before his death. (His large work in 3 vols. is still a Standard book.) This small book, beyond any with which I am acquainted, seems to be adapted to the use of the general reader who has had a good education. It is written in simple, pure English, dealing with tangible realities, never using a technical word without sufficient explanation, and introducing abstract principles gradually. Unfortunately, I did not discover the book till my own work was nearly completed.

Of the many books by eminent teachers on Chemical Theory, Chemical Philosophy, or Advanced Chemistry, it would be presumptuous in me to express an opinion. It seems to me that, in the desire to prepare students for higher branches of the Science, the authors generally introduce at an early stage subtle definitions and hypothetical principles which have but little present bearing on Agriculture, and which can hardly be intelligible to those who have done no work in the Laboratory.

But to all who desire to have a good library book, telling them what real Science has done for Agriculture, I heartily commend the Lectures of Mr. Lloyd, delivered at King's College, from which I have quoted several passages.

The two volumes, "How Crops Grow" and "How Crops Feed," by Johnson, are spoken of in the highest terms by Professor Gilbert, and are very practical. "Agricultural Chemistry and Geology," by the late Professor Johnston (of Durham) and D. Cameron, 13th Edition, 1882, is full of valuable information both on Chemistry and on practical Agriculture.

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