A

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IN THE

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BY G. P. QUACKENBOS, A.M.,

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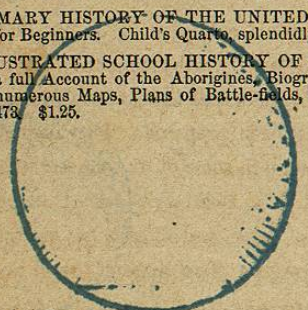

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PREFACE.

THE importance of the physical sciences is now so generally admitted that there are few institutions of learning in which they are not made regular branches of study. And very properly,—for what can be more interesting and instructive, what more worthy of the attention of intelligent creatures, what more calculated to inspire their minds with a thirst for further knowledge, and fill their hearts with reverent gratitude to the Divine Being, than an acquaintance with the laws of the material world, the mysterious influences constantly at work in nature, and the principles by which atoms and worlds are alike controlled?

It is in the hope of investing this subject with a lively interest, and bringing it home to the student by exhibiting the application of scientific principles in every-day life, that the Natural Philosophy here presented to the public has been prepared. The author has sought to render a subject, abstruse in some of its connections, easy of comprehension, by treating it in a clear style, taking its principles one at a time in their natural order, and illustrating them fully with the facts of our daily experience. The range of topics is comprehensive. By avoiding unnecessary repetitions, room has been found for chapters on Astronomy and Meteorology; one of which subjects, at least, has heretofore been invariably omitted in similar treatises, though a summary of both is important, as time is seldom found for pursuing these branches in separate volumes.

The incorrectness of many of the text-books on Natural Philosophy has been a subject of general complaint. Grave errors, both of theory and fact, have been handed down from one to another, and the results obtained by modern research have been too often over-

looked. In preparing this volume, every effort has been made to ensure accuracy, the most recent authorities have been consulted, and it is believed that a faithful view is presented of the various sciences embraced, as far as they are at present developed. It is the intention of the author to keep his book up to the times by constant revision, and to make such alterations and additions as the progress of discovery may require.

Two styles of type are used in the text; a larger size for leading principles, a smaller size for descriptions of apparatus and experiments, explanatory illustrations, &c. By confining a class to the former when the saving of time is an object, a brief yet complete course may be taken. Questions at the bottom of each page will be found to facilitate the examiner's duty, and to afford the pupil a means of testing his preparation before reciting. At the end of such chapters as admit of it, easy practical examples have been introduced, to illustrate the rules and principles set forth.

An important feature of this work is its adaptation to use with or without apparatus. The majority of schools have few facilities for experimental illustration. The wants of these are here met by a free use of engravings, full descriptions of experiments, and explanations of their results. A number of these engravings have been furnished by BENJAMIN PIKE, jr., of 294 Broadway, New York, and are not mere fancy-sketches, but actual representations of instruments (the best and most modern of their kind) manufactured at his establishment. Mr. Pike's life has been devoted to this branch of industry; and it may not be improper to add that institutions desirous of procuring a set of apparatus, partial or complete, will find his assortment unsurpassed in variety and excellence.—For convenience of recitation, those cuts to which reference is made by letters are reproduced apart from the text, in the back of the book.

An Alphabetical Index closes the volume

NEW YORK, July 1, 1859.

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NATURAL PHILOSOPHY.

CHAPTER I.

MATTER AND ITS FORMS.

1. *Matter.*—Whatever occupies space, whatever we can see or touch, is known as Matter. Earth, water, air, are different forms of matter.

A distinct portion of matter is called a Body. The Earth, a ball, a rain-drop, are Bodies.

2. All matter, properly speaking, is Ponderable,—that is, has weight.

Imponderable means *without weight.* The term *Imponderable Matter* has been applied by some to heat, light, electricity, and magnetism. As late researches seem to indicate that these are forces or conditions of matter, and not themselves varieties of matter, they are now generally called Imponderable Agents.

3. *Forms of Ponderable Matter.*—Ponderable Matter exists in three forms; Solid, Liquid, and A-er'-i-form.

A body is said to be Solid when its particles cohere, so that they can not move among themselves; example, ice. Solid bodies are called Solids.

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1. What is Matter? Give examples. What is a Body? Give examples. 2. What is said of all matter? What does *imponderable* mean? To what has the term *imponderable matter* been applied? What are heat, light, electricity, and magnetism generally called? 3. In how many forms does ponderable matter exist?