

# **FIRST BOOK OF GEOLOGY**

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First Book of Geology by William S. Davis

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**WILLIAM S. DAVIS**

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## P R E F A C E.

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THIS little book has been written principally to supply the want of a cheap and yet reliable text-book, experienced by the numerous Science Classes which have sprung into existence since Government has aided and encouraged the scientific education of the people. The plan of the book is original, but covers the syllabus drawn up by Professor Ramsay.

To prevent misconception, I will say at once that this book has no pretensions to be a guide to any examination, but is intended to introduce the really earnest student to the study of Geology. Examinations, however, are not to be ignored; it is indisputable that they are important and indispensable aids to education; but in my experience I find that a student who makes them the ultimatum of his study not only loses the true pleasure derived from an acquaintance with the secrets of nature and the accumulation of intellectual wealth, but he often acquires a secret distaste for the subject of his studies.

The student is, therefore, earnestly recommended to study this little work on Geology in the true spirit of a philosopher; let him study Geology as a geologist; let him endeavour to see and handle as far as possible all

that which is merely described here, while at the same time he makes himself master of the theoretical explanations, and submits himself to occasional exercises and tests—let him do this, and while he enjoys the intellectual satisfaction which the study of nature always gives, he will in the surest manner be preparing himself for any examination at which he may wish to present himself.

W. S. D.

DERBY, *August 1872.*

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## CHAPTER I.

### OBJECTS OF GEOLOGY—GENERAL STRUCTURE OF THE EARTH— ROCKS AND MINERALS.

1. **Objects of Geology.**<sup>1</sup>—The objects of Geology are very wide. The science aims at a complete investigation of the structure of the earth, and attempts to explain how the different varieties of structure have been brought about.

The size, shape, and density of the earth, and other questions with regard to its general structure, are particulars which concern Astronomy as well as Geology, and are principally supplied by the former science. The present condition of the earth's surface, with its distribution of land and water, irregularities of land surface, atmospheric phenomena, vegetable and animal life, together with many other similar topics, are matters which, although they are of great importance to Geology, are specially studied as a distinct science with the title of Physiography or Physical Geography. This leaves Geology to grapple, not so much with the earth as a whole or with what clothes its surface, as with the constitution of the surface itself and what is beneath it.

The earliest researches of Geology brought to light the important fact that the rocks composing the exterior

<sup>1</sup> Gr. *ge*, the earth; *logos*, an account of.

of the earth are of different ages ; each age of the world being represented by its own series of rocks. But what lends such interest and importance to Geology is, that the history of the past ages of the world is imprinted on the rocks themselves. These imprints consist principally of the remains of animals and plants which lived on the earth while the rocks were forming, and were enclosed in them, and, becoming converted into stone, were permanently preserved. These remains, which are well known as *fossils*, bear evidence of the condition of the earth's surface at the time when the rock which encloses them was formed ; they tell of land and water, sunlight and air, and many other conditions necessary for animal and vegetable life ; they help to furnish, in fact, an account of the Physical Geography of the age.

It will be seen that, as further acquaintance is made with the science of Geology, it concerns itself largely with the past history of the earth, and this history is read chiefly by means of the fossils enclosed in the rocks which form its exterior. These records are, however, unintelligible, except by the aid derived from close observation of the present state of things on the earth's surface.

2. General Structure of the Earth.—We learn from Astronomy that the earth is a globe with a mean diameter of 7912.4 miles. Its shape is not truly spherical, for it is somewhat flattened at two opposite points which coincide with its poles, or terminations of its axis of revolution. The polar diameter is  $26\frac{1}{2}$  miles less than the equatorial diameter.

The density or specific gravity of the earth as a whole has been ascertained to be about 5 or 6. That is, the earth would weigh five or six times as much as an equal-sized globe of water. The rocks occurring at the surface have only a specific gravity of  $2\frac{1}{2}$  or 3, which leads to the conclusion that the interior of the earth consists of denser, or heavier materials than those which are found at the surface. Whether the density of the earth goes