

**RUSCHENBERGER'S SERIES. FIRST
BOOKS OF NATURAL HISTORY.
ELEMENTS OF GEOLOGY:
PREPARED FOR THE USE OF
SCHOOLS AND COLLEGES**

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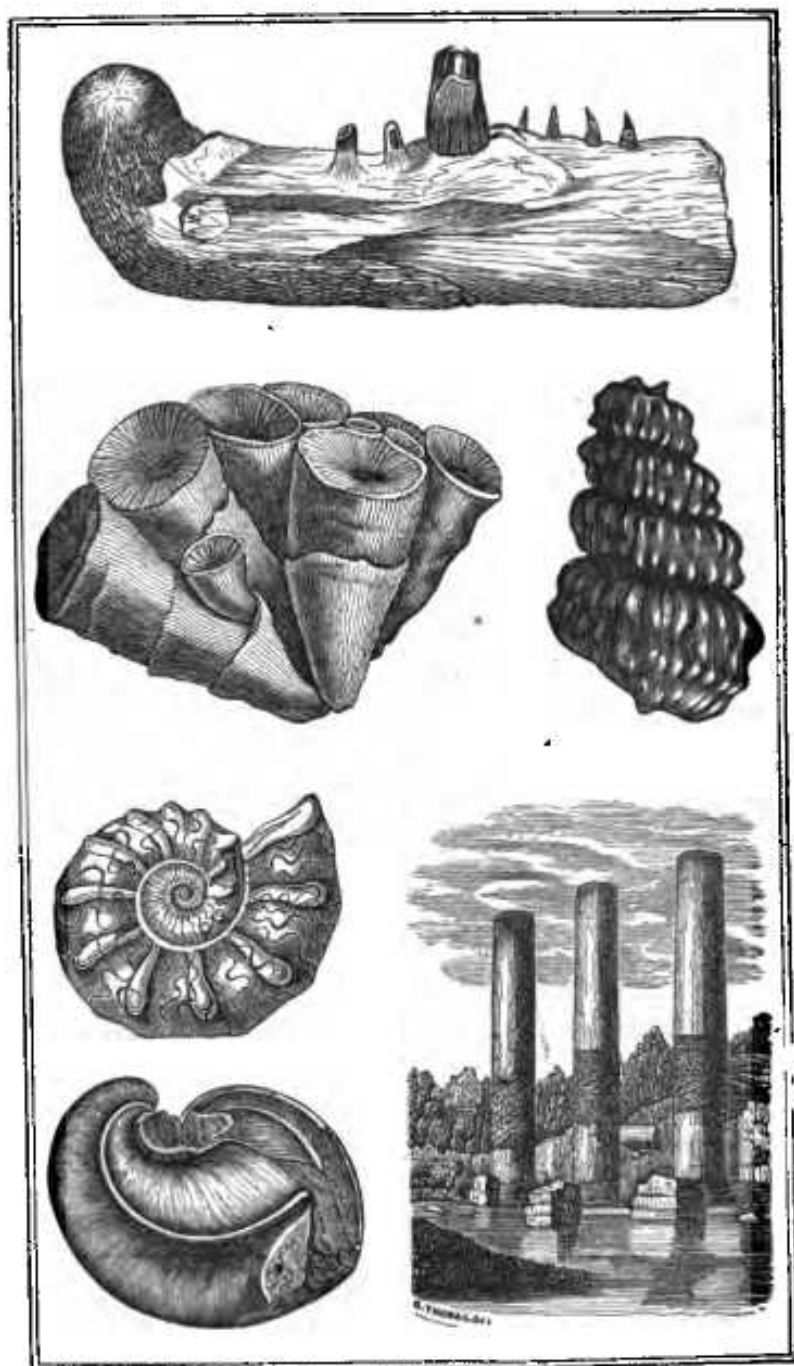
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Geology.

RUSCHENBERGER'S SERIES.

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ELEMENTS OF GEOLOGY:

PREPARED FOR THE USE OF

SCHOOLS AND COLLEGES,

BY

W. S. W. RUSCHENBERGER, M.D.

SURGEON IN THE U. S. NAVY; FELLOW OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA; OF THE COLLEGE OF PHYSICIANS AND SURGEONS OF THE UNIVERSITY OF THE STATE OF NEW YORK; HON. MEMBER OF THE PHILADELPHIA MEDICAL SOCIETY; MEMBER OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA; CORRESPONDING MEMBER OF THE AMERICAN INSTITUTE, ETC. ETC.

FROM THE TEXT OF

F. S. BEUDANT,

OF THE ROYAL ACADEMY OF SCIENCES; INSPECTOR GENERAL OF STUDIES, ETC.

MILNE EDWARDS, AND ACHILLE COMTE,

PROFESSORS OF NATURAL HISTORY IN THE COLLEGE OF HENRI IV., AND CHARLEMAGNE

WITH THREE HUNDRED ENGRAVINGS.



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PREFACE.

THE eighth in the series of "First Books of Natural History," comprises the Elements of Geology.

The volume has been compiled chiefly from the work of F. S. Beudant, and that of Milne Edwards, and Achille Comte. The works of other writers have been consulted, and freely used; amongst them, Ansted, Lyell, Mantel, Murchison, Trimmer, Buckland, Bakewell, De la Beche, Lea, Parkinson, Phillips, Dana, Percival, Charles T. Jackson, Henry D. Rogers, Morton, Conrad, &c., &c.

The numerous illustrations, to the execution of which we particularly invite attention, were engraved by MR. G. THOMAS, of Philadelphia. We believe better wood-cuts have never been engraved in the United States for any work of the kind, and as a sample of the art, they are creditable to our country.

The explanations and etymologies of technical words are given as they occur, either in the text, or in foot-notes; and in many, if not in all cases, the pronunciation of these words has been indicated by accents. An ample glossary, which will be found sufficiently copious for the general reader, is also appended. When it occurs, the Greek *omega* has been marked thus (δ), and italics have been substituted for Greek characters, because, it is presumed, many who may use this volume are unacquainted with the dead languages.

It is believed this small volume contains all that is requisite for acquiring a knowledge of the Elements of Geology, except the desire and consequent labour of the student, essential elements in the acquisition of knowledge of every kind. Without labour, knowledge cannot be obtained; to reach the goal, the road must be travelled, no matter how smooth and easy it may be made; there

is no royal path to learning. When the student is master of the information contained in this book, he will be fully prepared for reading, advantageously, voluminous treatises, and the various geological reports and papers almost daily issuing from the press.

All knowledge is necessarily communicated from one person to another, through the medium of words, or signs. When branches, or parts of knowledge, or ideas, become familiar and common, the words representing them cease to be difficult. Then the complaint about "hard words" ceases. Few persons acquainted with the instruments, complain that the words *Thermometer*, or *Barometer*, are "hard;" the first is familiar to all, even to those ignorant of its construction and numerous practical uses. The names *Quadrant* and *Sextant* are not "hard words" to the most unlettered seaman, and we may remark, in passing, that the science of navigation would not be rendered of more easy acquisition, if those instruments were designated by the more familiar names of Bob and Bill. The vocabulary of music does not find the numerous terms, such as *clef*, *minim*, *semibreve*, *crotchet*, or *sonata*, *overture*, *aria*, or *pianissimo*, *crescendo*, *forte*, &c., obstacles in acquiring a knowledge of the science. The same is true of all human sciences. Each has its technicalities and significant names, which cannot be changed without injury, or taken away without increasing the difficulties of acquiring knowledge.

The names and terms employed in Natural History are very numerous, but most of them are very significant and appropriate. It is true, some are of doubtful or remote meaning, and might have been better. The fashion of naming natural objects after distinguished individuals, might be safely abandoned. All who are so fortunate as to discover a new genus, or species, should carefully select a name for it significant of some prominent quality or attribute, so that the generic and specific names would be together descriptive, as far as possible, of the object.

Hard names are no real obstacles to the acquisition of science, and no benefit would arise by departing from systematic nomenclature in elementary works. One great object of such works, is to explain the meaning of the names and terms employed. Nursery, or "baby talk," does not facilitate a child in learning to speak, or in acquiring ideas; nor would the study of geology be facilitated

by analogous language. Probably Natural History has been made less interesting in our country, and has been less beneficially studied, in consequence of attempts to employ old words, already appropriated to well-known things, to designate new objects.

The writer trusts the above remarks will be sufficient to meet the objections of all those who cavil about "hard words."

Besides being in itself very interesting, forming as it were the blossom and bloom of Natural History, a knowledge of zoology and botany being necessary to the study and recognition of animals and plants in the fossil state, Geology is practically useful in a high degree. To agriculture, and many of the mechanic arts, it is of great advantage, and it is not totally useless to any avocation or pursuit. A competent knowledge of Geology better enables the architect to select materials for buildings, as well as sites for their erection; the engineer learns from it where he may run a railroad or canal with the greatest facility, and least cost; the miner is guided in the pursuit of mineral wealth, metals, or coal, with greater certainty of success when assisted by this noble science, which is more unerring than witch-hazel or diving rod; it facilitates the physician in the study of climate, and opens a wide field to the divine for pointing out the wonders of the creation, and the goodness of God.

Before its natural history was explored, at a cost of more than two hundred thousand dollars, voted by the Legislature, vast sums of money were spent in vainly hunting for coal-mines in the state of New York. But after the geological surveyors reported that no coal could ever be discovered in the districts they had examined (because the several formations constituting the surface of these districts were those which are naturally *below* the coal-bearing series), these wasteful speculations were abandoned, although persons unacquainted with Geology complained that, "not satisfied with their inability to find coal themselves, the surveyors had decided that no one else would ever be able to detect any, having had the presumption to pass sentence of future sterility on the whole land." But time will show there was no presumption or guess, but the sentence of the geologists was a positive deduction from their science—a deduction that has saved thousands of dollars to individuals, who would still seek for coal where it does not exist, were it not for a knowledge of Geology.

In order to study Geology with greater facility and success, schools should be supplied with drawings, representing the principal facts in the science. Also, with some living shells, marine, fluviatile, and terrestrial; specimens of coral, turf, and volcanic products, all distinctly labelled; these, after being pointed out, should be left accessible to the pupils.

To teach them the composition of the crust of the earth, there should be drawings of the different stratifications, and collections of fossils characteristic of the several formations, all distinctly labelled. Where fossils cannot be obtained, casts representing them will serve a good purpose. Specimens of the various crystalline and sedimentary rocks should form a part of the teacher's apparatus.

To illustrate the various effects attributable to igneous and aqueous causes, there should be some well-selected specimens, distinctly labelled, of fossil-shells, encrinites, of echinidæ, of madrepores, &c., in order to compare them with those now existing. Drawings on a large scale, of faults and crevices, of dykes and injected rocks, of basaltic bosses and of erosions attributable to water, should also belong to the school. During and after the lesson referring to a particular part of the subject, these specimens and drawings should be exhibited and explained to the pupils.

U. S. Naval Hospital, }
New York, October 16th, 1845. }