

# **HISTORICAL GEOLOGY**

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Historical Geology by James Geikie

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**JAMES GEIKIE**

**HISTORICAL  
GEOLOGY**



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CHAMBERS'S  
ELEMENTARY SCIENCE MANUALS.

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# HISTORICAL GEOLOGY

BY

JAMES GEIKIE, F.R.S.

OF H.M. GEOLOGICAL SURVEY; AUTHOR OF  
'THE GREAT ICE AGE.'



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## PREFACE.

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THE vital importance of diffusing some knowledge of the leading principles of Science among all classes of society, is becoming daily more widely and deeply felt; and to meet and promote this important movement, W. & R. CHAMBERS have resolved, on issuing the present Series of ELEMENTARY SCIENCE MANUALS. The Editors believe that they enjoy special facilities for the successful execution of such an undertaking, owing to their long experience—now extending over a period of forty years—in the work of popular education, as well as to their having the co-operation of writers specially qualified to treat the several subjects. In particular, they are happy in having the editorial assistance of ANDREW FINDLATER, LL.D., to whose labours they were so much indebted in the work of editing and preparing *Chambers's Encyclopedia*.

The Manuals of this series are intended to serve two somewhat different purposes:

1. They are designed, in the first place, for SELF-INSTRUCTION, and will present, in a form suitable for private study, the main subjects entering into an enlightened education; so that young persons in earnest about self-culture may be able to master them for themselves.

2. The other purpose of the Manuals is, to serve as TEXT-BOOKS IN SCHOOLS. The mode of treatment naturally adopted in what is to be studied without a teacher, so far from being a drawback in a school-manual, will, it is believed, be a positive advantage. Instead of a number of abrupt statements being presented, to be taken on

trust and learned, as has been the usual method in school-teaching ; the subject is made, as far as possible, to unfold itself gradually, as if the pupil were discovering the principles himself, the chief function of the book being, to bring the materials before him, and to guide him by the shortest road to the discovery. This is now acknowledged to be the only profitable method of acquiring knowledge, whether as regards self-instruction or learning at school.

For simplification in teaching, the subject has been divided into sub-sections or articles, which are numbered continuously ; and a series of Questions, in corresponding divisions, has been appended. These questions, while they will enable the private student to test for himself how far he has mastered the several parts of the subject as he proceeds, will serve the teacher of a class as specimens of the more detailed and varied examination to which he should subject his pupils.

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NOTE BY THE AUTHOR.

This Manual of HISTORICAL GEOLOGY, although complete in itself, is yet intended as a supplement to the treatise on GEOLOGY of the same series, in which the methods of geological inquiry and reasoning are specially described, and the beginner is therefore strongly advised to master that treatise first. In attempting, within the narrow limits at his disposal, to give a representation of Historical Geology, the author has directed attention chiefly to the evidence from which former physical, geographical, and climatic conditions have been deduced, and has done what he could to present a lively picture not only of the state of the British area, but also of the various faunas and floras that have appeared within it, during the successive periods of the past. Of course, such a presentment must necessarily be incomplete, but it is hoped that, while not uninteresting in itself, it will afford the student a fair idea of the scope of geological inquiry, and aid him in further directing his studies.

EDINBURGH,

*June 1876.*



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# HISTORICAL GEOLOGY.

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## INTRODUCTORY.

I. *Geological Structure*.—When the student has attained a sufficient knowledge of the principles of Geology and Palæontology, his next step is to apply that knowledge towards working out what is termed *geological structure*. He must attempt to elucidate the past history of some given district by ascertaining, first, the order of succession of the strata. To do so satisfactorily, he selects a good map, upon which he traces the boundaries of the various rock-masses, and indicates the direction in which these *dip* or are inclined. He marks, also, the lines of dislocation, and endeavours to make sure as to which is the *high* and which the *low* side of a fault. In the next place, he must carefully search the beds for fossils, and from these he draws his conclusions as to whether the strata have had a marine or fresh-water origin—whether they are deep or shallow-water accumulations, &c. When he has exhausted all the physical and palæontological evidence, he should be able to form some opinion as to the geographical and climatic conditions under which the strata were deposited; he should be able to point out the relative position of land and sea as it varied during successive periods—he should tell us something about the plants and animals that clothed and peopled the dry land and tenanted the waters, and the kind of climate under which they flourished. In short, he should restore, as far as he can, the old physical geography of the district he elects to investigate. It is only by such investigations