

**THE CHAIN OF LIFE IN
GEOLOGICAL TIME: A SKETCH
OF THE ORIGIN AND
SUCCESSION OF ANIMALS AND
PLANTS**

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The Chain of Life in Geological Time: A Sketch of the Origin and Succession of Animals and Plants by Sir J. William Dawson

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LIFE IN THE SILURIAN AGE.

THE CHAIN OF LIFE

IN

GEOLOGICAL TIME

*A SKETCH OF THE ORIGIN AND SUCCESSION OF
ANIMALS AND PLANTS*

BY

SIR J. WILLIAM DAWSON

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"ACADIAN GEOLOGY," "THE STORY OF THE EARTH," "EGYPT AND SYRIA; THEIR
PHYSICAL FEATURES IN RELATION TO BIBLE HISTORY," ETC.

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P R E F A C E .

QUESTIONS as to the origin and history of life are not at the present time answered by mere philosophical speculation and poetical imagining. Such solutions of these questions as science can profess to have obtained are based on vast accumulations of facts respecting the remains of animals and plants preserved in the rocky beds of the earth's crust, which have been successively accumulated in the course of its long geological history. These facts undoubtedly afford the means of attaining to very certain conclusions on many points relating to the history of life on the earth. But, on the other hand, they have furnished the material for hypotheses which, though confidently affirmed to be indisputable, have no real foundation in nature, and are indirectly subversive of some of the most sacred beliefs of mankind.

In these circumstances it is most desirable that those who are not specialists in such matters should be in a position to judge for themselves; and it does not appear impossible in the actual state of knowledge, to present, in terms intelligible to the general reader, such a view of the ascertained sequence of the forms of life as may serve at once to give

exalted and elevating views of the great plan of creation, and to prevent the deceptions of pseudo-scientists from doing their evil work. Difficulties, no doubt, attend the attempt. They arise from the number and variety of the facts, from the uncertainties attending many important points, from the new views constantly opening up in the progress of discovery, and from the difficulty of presenting in an intelligible form the preliminary data in biology and geology necessary for the understanding of the questions in hand. In order, as far as possible, to obviate these difficulties, the plan adopted in this work has been to note the first known appearance of each leading type of life, and to follow its progress down to the present time or until it became extinct. This method is at least natural and historical, and has commended itself to the writer as giving a very clear comprehension of the actual state of our knowledge, and as presenting some aspects of the subject which may be novel and suggestive even to those who have studied it most deeply.

In selecting examples and illustrations, the writer has endeavoured to avoid, as far as possible, those already familiar to the general reader. He has carefully sought for the latest facts, while rejecting as unproved many things that are confidently asserted; and has endeavoured to avoid all that is irrelevant to the subject in hand, and to abstain from all technical terms not absolutely essential. In a work at once so wide in its scope, so popular in its character, and so limited in its dimensions, a certain amount of hostile criticism on the part of specialists is to be expected, some portion of it perhaps just, other portions arising from narrow prejudices due to limited lines of study. The writer is willing to receive

such comments with attention and gratitude, but he would deprecate the misuse of them in the interest of those coteries which are at present engaged in the effort to torture nature into a confession of belief in the doctrines of a materialistic or agnostic philosophy.

The title of the work was suggested by that of Gaudry's recent attractive book, *Les Enchaînements du Monde animal*. It seemed well fitted to express the connection and succession of forms of life, without implying their derivation from one another, while it reminds us that nature is not a fortuitously tangled skein, and that the links which connect man himself with the lowest and oldest creatures bind him also to the throne of the Eternal.

In the few years that have elapsed since the publication of the first edition of this work, great additions have been made to our knowledge of fossil animals and plants. Many new species have been described, and many new facts have been discovered, respecting species previously known. This rapid progress of discovery has, however, invalidated few of the statements made in the first edition, and has certainly established nothing against the general laws of the succession of life as stated in this work.

Perhaps the most interesting phase of recent discovery is the tracing back of certain forms of life to earlier periods of the earth's geological history. Some of the most recent facts of this kind are the finding, by M. Charles Brongniart, of a fossil insect, allied to the *Blattæ* or cockroaches, in the Silurian of Spain, that of true Scorpions in the Upper Silurian of Sweden by Lindström, and in the Upper Silurian of Scotland by Peach, who has also described fossil Millipedes from the Lower

Devonian. The tendency of such discoveries is to carry farther back the origin of highly specialised forms of life, and thus to render less probable their origin by any process of gradual derivation.

Other discoveries serve to fill up blanks in our knowledge, and thus to render the geological record less imperfect. Of this kind is the close approximation now worked out in Western America between the end of the reign of the great Mesozoic reptiles and the beginning of that of the mammals of the Tertiary—a great and abrupt revolution, effected apparently by a *coup de main*. I have myself had opportunity to show that a similarly sharp line separates that quaint old Mesozoic flora of pines, cycads and ferns, which extends upward into the Lower Cretaceous, from the rich and luxuriant assemblage of broad-leaved trees of modern aspect, which takes its place in the middle part of the same formation.

It is not too much to say that these and similar discoveries, while they serve to bridge over gaps in the succession of organic beings, do not favour the theory of slow modification of types. They rather point to a law of rapid development of new forms under special conditions as yet unknown to science, and this accompanied with the extinction of older species. Recent discoveries also present many remarkable instances of the early introduction of highly specialised types, of higher forms preceding those that are lower in the same class, and of the persistence of certain types throughout geological time without any important change.

J. W. D.

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