

Tried in debate and developed thereby, Lyell's ideas begot a purpose which absorbed his means, his time and his thought. That purpose is stated in the title of his book: 'Principles of Geology; being an Attempt to Explain the Former Changes of the Earth's Surface by Reference to Causes now in Operation.' To this end he devoted the energies of a life singularly free from limitations and cares, such as ordinarily divert men from a single object.

The first volume of the *Principles* was written in the autumn of 1829, and published in the winter; the second appeared early in 1832, and the third in May, 1833. Five editions of the work had been issued by the spring of 1837. In 1838 the third volume was published separately as the 'Elements of Geology,' and the *Principles*, thus curtailed, passed through editions from the sixth to the eleventh during the author's lifetime, the twelfth being under way at the time of his death, in 1875.

Thus for forty-five years he pursued his purpose. There is danger in lifelong devotion to one hypothesis, but Lyell was armed against narrowing bias by his methods of observation and by the breadth of his mind. The hypothesis, which a small man would have spun to a vanishing thread, in Lyell's hands was forged into a chain of causality, binding past and present.

In accordance with one favorite saying of his: 'Go and see,' he travelled throughout western Europe and eastern America, searching always with painstaking care for facts. And obeying another principle, 'Prefer reason to authority,' (even when that authority was his own published conclusion), he kept his work abreast of the advance of geology, for which he had indicated the way.

Uniformitarianism did not originate with Lyell, but he became the great exponent of that principle. Not priority, but thoroughness, makes for reputation. Weighing the broader results of Lyell's studies, Prof. Bonney concludes: "We may be sure, that if Lyell were now living he would frankly recognize new facts, as soon as they were established, and would not shrink from any modification of his theory which these might demand. Great as were his services

to geology, this, perhaps, is even greater—for the lesson applies to all sciences and to all seekers after knowledge—that his career, from first to last, was the manifestation of a judicial mind, of a noble spirit, raised far above all party passions and petty considerations, of an intellect great in itself, but greater still in its grand humility; that he was a man to whom truth was as the 'pearl of price,' worthy of the devotion and, if need be, the sacrifice of a life."

BAILEY WILLIS.

*Die Gastropoden der Plankton-Expedition*, von DR. H. SIMROTH. Kiel & Leipzig, Lipsius & Fischer. 1895. 4to., 206 pp., 22 pl.

The Plankton-Expedition, as many of our readers are aware, had for its object the study of pelagic life in the North Atlantic, and especially its distribution in depth; the drawing, as it were, of the bathymetric contours of oceanic life. The material thus gathered has been distributed among many naturalists for study, and a large number of essays have already been printed under the supervision of the general editor, Prof. Victor Hansen, of Kiel.

The latest contribution is by Prof. Heinrich Simroth, of Leipzig, already well known by numerous valuable studies of the mollusks, and especially by his editorship of the new edition of that part of Bronn's 'Thier-reichs' relating to the Mollusca. It comprises observations on larval and pelagic Gastropods, fully illustrated and of great interest.

After the reaction against the methods of descriptive biology based on superficial characters, which began about twenty-five or thirty years ago, so rich were the results derived from embryological and anatomical researches that the more hasty of the younger workers concluded in their enthusiasm that surface characters were of no value whatever; and this view was carried so far that we find one naturalist gravely arguing that the only proper basis for a classification of the Gastropods would be found in the number and arrangement of the ganglionic cells, which he had studied in half a dozen species of land snails. Even the better informed and more cautious biologists were led to doubt if the characters of the shell in mollusks would lend any aid to the study of the

evolution of the group. Fortunately, these views have proved illfounded, and a more minute and exhaustive study of shell characters in some groups has shown that valuable assistance in working out lines of development and the relations of different forms may be obtained by those who properly study the shell, its larval forms and dynamic relations to the organism. No one now doubts the importance of such studies in such large groups as the Ammonoid and Nautiloid cephalopods, the Volutidæ among gastropods, and the Naiades among pelecypods.

The study of the stages of evolution of the larval characteristics is a field hardly entered upon and promising rich returns to the student, and, for the paleontologist, deprived of all anatomical aid in tracing the lineage of peculiar extinct genera, the necessity of study of the nepionic stages of the fossils is fundamental.

For these reasons all contributions to our knowledge of existing larval forms are welcome, especially with such a wealth of illustration as in the present volume. Among the more important matters in it we find a very full account of *Janthina*, in both adult and larval states; of larvæ of the type of *Echinospira*, belonging to the Lamellariidæ; of the *Macgillivrayia* type like those of *Tritonium* and *Dolium*; of the *Sinusigera* type, including many genera of Rhachiglossa and Toxoglossa; a general discussion of the conditions of larval existence and their bearing on the characters developed; some account of pelagic nudibranchs, such as *Glaucus* and *Fiona*; a table showing the quantitative results of the dredging or towing nets; and a bibliography of literature consulted.

The only criticism which suggests itself is that it would be more convenient for those who have to use the book if the magnification of the figures was stated in units of the whole length, rather than merely indicated by the name and number of the objective used for the microscopic work.

W. H. DALL.

*The Structure and Development of Mosses and Ferns.* By DOUGLAS HOUGHTON CAMPBELL, Ph.D., Professor of Botany in the Leland Stanford, Jr., University. 8vo. Pp. 544. London, Macmillan & Co. 1895.

The results of the long continued and patient

work that Dr. Campbell has been publishing from time to time on the Pteridophytes have at last been brought together, with the results of a large amount of new work on the Hepaticæ and other Bryophytes, and the whole results in a large volume issued by the well-known publishers, Macmillan & Co., under the above attractive title.

The first thing to be noted as praiseworthy in the book is clearness and simplicity of expression, for while dealing with a recondite subject and using strictly technical terms, the book reads smoothly and is devoid of that stilted language that too frequently characterizes works of this nature. The logical arrangement of the matter follows closely on the simplicity of style and these two features are sufficient to recommend the work to the learner, for too many are repelled from many a fascinating subject by the nature of the language and the lack of a systematic arrangement of the matter.

But beyond these questions of form the subject-matter is fresh and direct from the hand of the laboratory worker. The studies on which the work is primarily based were made from American plants, many of them plants from the Pacific coast that have never before been studied from the developmental and morphological standpoint. *Riccia hirta*, *Fimbriaria Californica*, *Porella Bolanderi*, *Anthoceros fusiformis*, *Ophioglossum pendulum* (from Hawaii), *Botrychium Virginianum* and *Marsilea vestita* are only a few of the new plants that have been called in to contribute their life history for the verification and often modification of the work of Hoffmeister, Kny, Gœbel, Strasburger and others made on similar plants of central Europe. As one result of this new study, Dr. Campbell has given us a fresh supply of illustrations in place of the standard stock that has become threadbare from long usage in European and American text-books. If some of the illustrations are not quite so clear cut as some that have appeared in certain European publications of recent date, they more than make up for this in their freshness and accuracy for they represent exactly the conditions met with by the author and have not been filled in by the imagination, as is sometimes the case.