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PROF. FOREL ON LIMNOLOGY.

By HUGH ROBERT MILL, D.Sc., LL.D.

THE appearance of a handbook of Limnology* may be looked upon as the formal admission of the science of lakes to its independent position somewhere on the borderlands of geography, very near the place occupied by oceanography. Prof. Forel is the one man capable of writing such a book—at least, that is what we believe to be the opinion of every limnologist but one, the exception being Prof. Forel himself. In the preface he explains his views on the subject of text-book writing so persuasively, that one turns back to the title-page in some trepidation for confirmation of the authorship. A handbook, he says, should be an impartial and impersonal treatment of a subject, a measured and critical statement of facts and theories free from the particular bias inevitable to one who has himself worked at the science from the commencement. He goes on to say—

“My relation to limnology is much too personal and subjective for me to be able to give an objective presentation of the facts. I asked the editor of the series to consider this ; I pointed out that a geographer who had perhaps never set foot in a boat or hauled a dredge, but who had studied limnology just as he had studied the other branches of physical geography, would be far better fitted than I for such a work. . . . The editor was not of my opinion.”

The book was written in French, and translated by Prof. Wilczek, the author's happy style being very successfully rendered in the heavier language. The English reader has the advantage of getting a new view of the technical French terms used by the author in his great monograph on the Lake of Geneva, which are here authoritatively given in German also, and from the two an English equivalent can be more easily supplied than from either alone.

With regard to the systematic position of limnology, Prof. Forel gives the following definitions, and introduces the following terms :—

“Geography is the science of the Earth in its threefold composition of lithosphere, hydrosphere, and aërosphere. The special study of the hydrosphere is hydrography. Liquid water appears in three ways upon the Earth—in the sea, in lakes, and in rivers ; and hydrography is correspondingly divided into the three departments—

“Oceanography, which is occupied with the unlimited, united, and all-embracing ocean.

“Limnology, which is concerned with the scattered and isolated portions of the hydrosphere occurring upon the land as lakes.

* Handbuch der Seenkunde. Allgemeine Limnologie von Dr. F. A. Forel. (Bibliothek geographisches Handbücher herausgegeben von Prof. Dr. Friedrich Ratzel.) Stuttgart : J. Engelhorn. 1901.

"Rheology, which studies the running water of the land in springs, brooks, streams, and rivers.

"If we include solid as well as liquid water with the hydrosphere, then a fourth subsience, Glaciology, must be added."

Stress is laid on the fact that limnology may be viewed as oceanography in miniature, but that, on account of the diversity and individuality of lakes, there is a special limnology for every lake-basin, each lake being looked upon as a microcosm.

In a handbook of moderate dimensions it would be impossible to go into the detailed studies which have been made of innumerable lakes all over the world, and the author has very wisely limited himself to the task of stating in a clear and logical way the general principles and leading facts which apply to all lakes. How comprehensive these are may be gathered from the following condensed summary.

Part I. deals with lake-basins, considering the origin of the primitive hollow * in which water came to collect, the principle of hydrographic charts to delineate them, the grouping of lakes in special districts, the change of the primitive hollow into a lake-basin by the action of the water of the lake itself and of tributaries, and on the nature and formation of lacustrine deposits. The first part ends with an outline of limnometry, or the methods of lake-measurement, and a statement as to the classification of lakes by their relation to the general progress of change, during which they may successively be classed as young, mature, old, and dead.

The second, and much the longer, part deals with the water of lakes, as regards its economy, or the relation between gain by inflow and loss by outflow and evaporation; hydraulics, or the movements of water by waves, seiches, and currents; the chemical, thermal, optical, and finally the biological conditions. The chapter on thermal conditions is of special interest, as it contains a system of classifying deep lakes according to what we may call the climate of their deep water into a tropical series, where the bottom temperature is always higher than the maximum point, 39° Fahr.; the temperate type, where it is constant at 39°; and the polar type, where it is always below 39°.

The Biological chapter introduces a terrible plexus of terminology, which, in contrast to the simple clearness of the physical part, suggests that there may be a new danger of darkening counsel by words with too much knowledge. Thirty-seven composite terms are defined separately, each containing or qualifying the word "plankton," and designed to specify every possible variation in habitat, form, or mode of life of the drifting organisms in lakes. For example, the Morphoplankton,

* *Wanne* or *Cuvette*, literally *tub* or *basin*, but the English word "basin" is reserved as the equivalent of *Becken* and *Bassin*, and "tub" is too colloquial, and apt to be confounded with "trough," which corresponds to *Mulde*.

which are a division of the Euplankton, are in turn subdivided into the Raphidoplankton, Skaphoplankton, Desmoplankton, and Kremastoplankton. They at least suggest that the initiator of the resounding series "was a scholar and knew Greek," Prof. Forel says of it all—

"Are these foreign words ever necessary? It is seldom that an idea or a fact cannot be expressed in familiar language. New words, even when they are not absolutely necessary, are often very convenient for their coiner, but they are usually only useless ballast to the reader. . . . If our beautiful science is not to become repulsive, we must abstain from disfiguring it by the introduction of too many foreign words, and take care that limnology be not made incomprehensible to the many general readers interested in the study of lakes by the use of such expressions."

A very brief bibliography completes the volume, but, though it contains few entries, it records the sources where bibliographies of the subject appear periodically. There is a serious omission, however, in the shape of the "Geographical Literature of the Month" in the *Geographical Journal*, which contains as full a record of the progress of limnology as any of the German and French works which are cited.

ROCKHILL'S 'RUBRUQUIS.'—REVIEW.

By C. RAYMOND BEAZLEY.

THE Hakluyt Society has published this year a new version of the Journey of William of Rubruck, or Rubruquis, the Itinerary of John de Plano Carpini (Pian de Carpine), and the Narrative of Benedict the Pole. Mr. W. W. Rockhill, the editor, has accompanied his translation with many useful notes, and an introduction that provides a good summary of the great movement of missionary and diplomatic travel from the Christian to the Mongol courts in the middle of the thirteenth century. The translator's knowledge of Chinese, Mongol, and Tibetan sources has enabled him to throw additional light on several passages, and, with some exceptions, he has taken into account all the leading Western authorities.

It seems ungracious to criticize a work which has absorbed so much of the time of a public man, and in which there is so much valuable information, but Mr. Rockhill himself would be the last to wish for a merely formal reception of his edition from those who have consulted it. We may venture to suggest for his consideration the following points: Has he, while approaching Rubruquis, so to say, from the side of China, Mongolia, and Tibet, given sufficient attention to his author from the side of Russia? Has he not also, in pleading for a proper sense of his author's great and undoubted merits (undoubted now,