THURSDAY, MARCH 27, 1913.

FOREST PHYSIOGRAPHY.

Physiography of the United States and Principles of Soils in Relation to Forestry. By Prof. I. Bowman. Pp. xxii+759. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd., 1911.) Price 21*s.* net.

AS the longer title of this work denotes, this is not a book on forestry, but on physiography for students of forestry, and especially for those of the United States. The book is in two parts, the first of which forms a complete treatise on the subject of soils, and it is this part which will be of most interest to foresters and nature-students in this country. The second and larger part is devoted to a description of the United States, according to physiographic regions, in regard to geology, climate, soil, and vegetation.

In reading this book one cannot fail to be impressed by the prominence given to the question of water and water-supply. "Water constitutes from 65 per cent. to more than 95 per cent. of the tissues of plants," and "is the factor that most frequently conditions life and death." Water is also the natural force which is most capable of being controlled by man: by the preservation of soil-cover and by a proper system of drainage promoting its beneficial influences and checking its dangers. In this connection Fernow is quoted as saying:

"The leaf canopy catches and re-evaporates about 12 per cent. of the rainfall, while 10 per cent. of it runs along the tree-trunks and reaches the ground by a circuitous course. The forest litter, the moss-covered and leaf-strewn ground, is capable of absorbing water at the rate of 40,000,000 to 50,000,000 cubic feet per square mile in ten minutes—water whose progress is delayed by some twelve to fifteen hours after the first effects of a heavy freshet have passed."

The author deplores the reckless timber-cutting which has taken place in America during the last twenty-five years, with the result that the soil, "the inheritance of geologic ages," has in many cases been washed away or impoverished. In a striking paragraph, in dealing with the evil effects of deforestation in the southern Appalachians, he writes:

"The rain beats directly upon the soil, the retarding influence of the ground litter and tree-roots is withdrawn, and more rapid soil removal occurs. When once these evil effects have been allowed to take place, mankind is deprived practically for thousands and even millions of years of the favourable conditions that preceded the epoch of destruction. In a hundred years man may achieve such baneful results as nature will compensate only during a geologic period of hundreds of thousands of years. Soil is a resource of priceless value. On resistant rocks its formation is excessively slow. Many glacial striæ formed on resistant rock during the last glacial epoch, roughly 60,000 to 75,000 years ago, are still preserved as fresh as if they were made but yesterday. In that time man has come up from the cave and the stone-hammer. Seventy thousand years is a very short time for the development of a soil-cover; for man it means a period so great that his mind can hardly appreciate it. The earth as we find it in the geologic to-day must be treated with care if the human race is to have a fair distribution of its wealth in time. To the geologic mind there is something shocking in the thought that a single lumber merchant may in fifty years deprive the human race of soil that required 10,000 years to form."

Although forests undoubtedly tend to regulate stream-flow, the author is careful to show that they are not an absolute preventive of flooding, and that in individual cases their influence may be quite insignificant. It is largely a matter of soil and situation, but where soil removal exceeds soil formation, or where the balance between the two is only delicately established, the destruction of forests can only be attended by disastrous consequences.

The chemistry of the soil, the effects of sun, air, wind, the beneficial influences of the lower forms of vegetable and animal life, are each dealt with in a concise though comprehensive manner, and frequent footnotes give authorities for statements made and references to further literature on the various points discussed.

A key-list giving the scientific names of the trees referred to by their common names would be of value, and there are a few minor errors which should be corrected in future editions.

The book is admirably produced, and fully illustrated by diagrams, maps, and photographs, and forms a most useful addition to the literature of the subject. J. W. MACKAY.

THE HIGHWAY OF ANIMAL EVOLUTION.

The Evolution of the Vertebrates and their Kin. By Dr. William Patten. Pp. xxi+486; illustrated. (London: J. and A. Churchill, 1912.) Price 21*s.* net.

THE author presents in a stately form a detailed account of his theory of the Arachnid origin of vertebrates. He has worked at this persistently since 1884, and in the course of his investigations has made important contributions to our knowledge of Limulus and the Ostracoderms. No one will withhold admiration who looks into the details of comparative anatomy, histology, and embryology with which