

studies through these reams and reams of paper. Consequently, the first class of readers have hitherto for the most part been satisfied to gain their knowledge of Spencer through the "Cosmic Philosophy" of Fiske, while the latter class have experienced a hitherto hopeless difficulty in refreshing their memories upon particular points, or in finding passages to which they may wish to refer in publications of their own. Speaking for ourselves, we are conscious of often having done a negative injustice to Mr. Spencer on this account, simply because, in order to avoid the possibility of any positive injustice in the way of misrepresentation, we have deemed it wisest not to allude to him at all.

Now, the epitome which Mr. Howard Collins has supplied so admirably satisfies all the requirements of the case that henceforth the general reader will be able to acquire a clear knowledge of Mr. Herbert Spencer's philosophy in one-tenth of the time that it has hitherto been necessary to expend, while—as Mr. Spencer himself observes in his highly commendatory preface—more serious students will find that "a clear preliminary conception is more readily obtained from a small outline-map than from a large one full of details." Lastly, for all purposes of reference, this epitome leaves nothing to be desired; for not only does it run parallel with the original—chapter by chapter and section by section—but it is also furnished at the end with an alphabetical index of subject-matter: so that, if a man is writing upon any of the innumerable topics which Mr. Spencer has handled, he can immediately ascertain all that Mr. Spencer has said with regard to them.

For these reasons we cordially recommend this most painstaking epitome to every class of readers; and we cannot doubt that its publication will greatly promote the diffusion of Mr. Spencer's thought in all the English-speaking communities of the world. G. J. R.

*The Earth and its Story.* Edited by Robert Brown, Ph.D., F.L.S. (London: Cassell and Co., 1889.)

THE continued publication of good and popularly written scientific works is one of the most gratifying signs of the times; it testifies, in no uncertain manner, to the growth of a taste for scientific knowledge in the mind of the general public, and hence is a matter of congratulation.

Of all the sciences none may perhaps be made more interesting than physical geography, or its modern equivalent physiography. The desire to know something about the earth's position in the universe, its formation, and its inhabitants, is and always has been innate in man, and we are glad, therefore, to welcome works that may satisfy this craving after light. The one before us deals in a comprehensive manner with the geographical distribution of plants and animals, and the agents concerned in their dispersion; with the physics of the sea, waves, currents, and tides; with terrestrial magnetism; with climate and the causes affecting its distribution; with rainfall and precipitation in general. A considerable amount of space is given to descriptions of geological formations and the fossils they contain, whilst ideal landscapes with restored animals are plentifully figured. We regret, however, that only a very meagre description is given of the earth as a planet. It must be remembered that astronomy is a very important part of physiography, even when looked at from a utilitarian point of view. The reason why the movements of the heavenly bodies have been studied from time immemorial is that a knowledge of them was necessary in order to meet the vicissitudes of life, and even before primitive man had inquired into the constitution of the earth he had arrived at crude conceptions as to the constitution of the universe from uncritical observations of celestial phenomena. The priority of these conceptions demonstrates their importance, and therefore, in a work intending to convey earth knowledge, the verification of the earth's rotation and revolution and the

determination of its true size and shape should certainly be included. The measurements of arcs of meridian, whereby the exact size and shape of the earth may be found, are easy to describe, and preferable to the proofs of the earth's rotundity known in the time of Peate; besides which, such investigations essentially belong to physical geography. But, excepting these omissions, the work is one of sterling value; it is profusely illustrated, each of the two volumes containing twelve coloured plates and about 270 woodcuts, and the explanatory text is very readable and interesting throughout. Such a production will naturally gravitate to the free public libraries and similar institutions, and will be of great use in extending scientific knowledge.

*Steam.* By William Ripper, Professor of Mechanical Engineering in the Sheffield Technical School. (London: Longmans, Green, and Co., 1889.)

THIS volume consists of an elaboration of notes of lectures given by the author to an evening class of young mechanical engineers. For its size, it contains much useful information; and the simplicity of expression, and the absence of elaborate calculation, throughout the chapters help to make it suitable for elementary classes. The author gives special prominence to the principles involved in the economical use of steam. This part of the book is particularly lucid and concise, being perfectly clear to the average student. He also describes well the compound, triple, and quadruple expansion engines, especially dealing with the general idea of the expansion and course of the steam through the cylinders on its way to the condenser, as well as with the general laws regulating the volumes of the cylinders. Although the subject is treated in an elementary manner, there is much sound work in the book. Text-books on steam have greatly improved of late years from an engineer's point of view, and the present volume is a good example of the way in which the subject should be handled for the benefit of budding engineers.

The illustrations and diagrams are good, the former being taken from engines in actual practice. Fig. 134, however, does not represent particularly good practice. The flat crown of the fire-box of locomotive type of marine boilers is probably seldom stayed after the manner shown; the crown stays being generally screwed through the shell of the boiler, and either rivetted over or fastened with a nut and a copper washer. Assuming that these stays are screwed through the fire-box crown sheet, it would be interesting to know how the author proposes to place them in position, as shown in the figure. Fig. 137 represents a Ramsbottom locomotive safety valve. Although correct in principle, it is quite a curiosity in point of design, the valve in general use being very different in appearance, as the reader may observe by referring to the one shown on the locomotive boiler illustrated in Fig. 132. We may say in conclusion that a fuller index would have added considerably to the value of the book. N. J. L.

*Australia Twice Traversed.* By Ernest Giles. In Two Vols. (London: Sampson Low and Co., 1889.)

THE narrative presented in these volumes has been compiled by Mr. Giles from the journals written by him during five exploring expeditions into and through central South Australia and Western Australia from 1872 to 1876. The materials of the book are not, therefore, very fresh, but this ought not to detract much from their interest, as hitherto only fragmentary accounts of Mr. Giles's travels have been printed. It must be admitted that records of wanderings in the interior of Australia are not usually very fascinating. Mr. Lumholtz's book, which we lately reviewed, is a brilliant exception to the general rule. We cannot say that Mr. Giles's work rises to an equal height above the ordinary level; for it lacks that fine insight into