Four Recent Scientific Books.*

THE first book on our list is a new one by Mr. Croll (1), who for many years has been the most conspicuous defender of what may be called the astronomical theory of geological epochs. According to his views the varying eccentricity of the earth's orbit, and the continuous movement of its perihelion point, are responsible for the glacial epochs which, according to him, have *alternated* in the northern and southern hemispheres, and the present work is largely devoted to the enforcement of this doctrine. The principal portion of the book is occupied with climatological discussions, and a vigorous but always courteous reply to his critics. He considers their objections fairly, and meets them with ability, if not always with clear success. The four last chapters, dealing with the temperature of space, the probable origin and age of the sun's heat, and the probable origin of nebulæ are interesting to others besides geologists. Altogether the volume must be regarded as one of permanent value, the work of an original and able thinker and leader in his line of research. Whether his theory obtains final acceptance or not, it will always hold a prominent place in the history of the science, and the book, which is well written and readable, deserves careful consideration by all who are interested in its subjects. It is indispensable to every public library.

Something similar may he truly said of Milne's work on earthquakes (2), which seems to us by far the best work on the subject within the reach of English readers. It is especially full in its description of various forms of seismometric apparatus, though it is to be noted that since the book was first written, in 1883, considerable improvements have been made, which will have to be taken account of whenever a new edition is called for. There is an excellent discussion of the various methods by which the position of an earthquake centre (when it has such a centre) can be deduced, and a godd *resumé* of the principal theories now held as to the cause of such phenomena. The author rejects the idea that they are due to external causes like the tidal influences of sun or moon, or to variations in atmospheric pressure, and ascribes them to various actions beneath the earth's crust, such as volcanic explosions, slip of strata, or collapse of subterranean caverns. The book gives as an appendix a valuable (though professedly incomplete) bibliography of the subject, and it has a good index. There are rather more typographical errors, however, than one likes to see.

Prof. Le Conte's 'Compend of Geology' (3) is substantially an abridgement of his larger 'Elements.' It is designed for the use of students in academies and high schools. It is the work not of a compiler, but of a master of his subject, who writes from original knowledge and observation. Sometimes such masters cannot write well and clearly, but this one can and does. Without entering into invidious comparisons between this and other text-books on the same subject, it is safe to say that this is a good one, and furnishes an excellent and stimulating introduction to the more thorough and extended study of the subject.

Prof. Williams' 'Applied Geology' has a different scope and purpose. It fills a hitherto vacant place in American geological literature, and deserves a hearty welcome as supplying a keenly felt want. The title styles it 'a treatise on the industrial relations of geological structure, and on the

* 1. Discussions on Climate and Cosmology. By James Croll, LL.D. $2.00. 2. Earthquakes, and Other Earth Movements. By John Milne. $1.75. 3. A Compend of Geology. By Joseph Le Conte. $1.50. 4. Applied Geology. By Samuel G. Williams. $1.40. New York: D. Appleton & Co.

nature, occurrence and uses of substances derived from geological sources.' It discusses the economic relations of geological structure, building materials, the relation of geology to agriculture and to health, mineral fuels and illuminants, metalliferous deposits, and so on to the end of the chapter. It is full of valuable information well presented. But a striking example of the rapidity with which the advance of art and science leaves book-making behind, is presented by the page and a half on natural gas. If written to-day, half a dozen pages at least would be necessary to do justice to the subject on the scale of the rest of the work; and yet the preface is dated only a trifle more than a year ago. We do not mean this as fault-finding: when written, probably two years or so ago, the treatment was quite adequate. And we know of no other book in the English language which gives so satifactory a representation of applied geology.