

of these and other counties in Scotland is consequently thrown away. The railways and telegraphs of South Africa are far behind the age, the Orange Free State being shown as if still undisturbed by the engine's whistle. The cable (p. 5) to the Cape by the west coast is only partly shown, though correctly given in the German original; and the Bermudas are now in electrical touch with the world, though this does not appear on the map. There are surprisingly few errors of spelling, and for the general purposes of the newspaper reader the atlas is eminently serviceable.

Only a few physical maps are given, including two pages of familiar and rather feeble astronomical diagrams, the use of which must be very slight. The world in hemispheres is shown with an attempt at orographical colouring on the land, and there are bathymetrical charts of the Atlantic and Pacific Oceans. The latter are somewhat remarkable. The contour lines of depth are given as 110, 1100, 2200, 2750, and 3300 fathoms, those odd numbers corresponding of course to even depths in metres, but the occasional soundings dotted over the surface are stated not in fathoms, but in feet. Similarly the one small climate map shows isotherms drawn to represent centigrade degrees, but lettered with the approximate Fahrenheit equivalents. The system of showing the winds on this map is arbitrary, and the arrangement it implies is unnatural. The physical maps might indeed be excised without serious loss.

The plan of printing the hill-shading—usually much generalised—in brown, throws out the black lettering, admirably, while the rivers and railways are very clearly shown in most cases. The importance of clear maps in following any movement or distribution cannot be over-estimated, and the Switzerland (pp. 53, 54), Caucasus (p. 71), and Greece (p. 72), in this atlas are beautiful examples of artistic work, embodying ample detail without confusion.

OUR BOOK SHELF.

Types of Animal Life. By St. George Mivart, F.R.S. (London: Osgood, McIlvaine and Co., 1893.)

IT is reported of a negro preacher that, having omitted to note the source of his text, he counselled his hearers to search diligently for it, assuring them that in doing so they would find many other texts which would be for their souls' good. We are reminded of this anecdote in reading Prof. Mivart's new book on popular natural history. In our search for the types given in the table of contents we have been rewarded by finding a pleasing description of a goodly number of the higher animals. At the beginning of the fourth chapter we are told that the bull-frog has been selected as one type of animal life in order to introduce the group of *Batrachia*. Very little is said, however, about the bull-frog himself, though there is a figure of him in a deprecating attitude suggestive of some appreciation on the part of the artist of the somewhat shabby treatment this Batrachian elect has received. But there is much interesting matter concerning amphibians of all kinds, illustrated by reference to, or short descriptions of, some twenty genera. The first chapter is headed "Monkeys"; and similar headings would, we think, have been more appropriate throughout. As it is, the animal named is, in each case, merely a convenient starting-point for the consideration of the group to which it belongs. We do not know

whether the chapters embodied in the book have already done service in any form in America, but the animals selected suggest that such may have been the case. We have the opossum, the turkey, the bull-frog, the rattlesnake, the Carolina bat, the American bison, the racoon, the sloth, and the sea-lion; while the chapter which deals with, or starts with, the last-named animal begins thus:—"The sea-lion is a beast the sight of which must be familiar to very many Americans." The term "animal life" of the title of the work is shown by the contents to be applied to the dactylate vertebrata only, three-fourths of the volume being devoted to mammals, or beasts as the author prefers to call them.

Unfortunately the proofs have been carelessly corrected, so that misprints (e.g. fleshating beasts, p. 209), errors of fact (e.g. that *Notoryctes* has recently been discovered in America, p. 60), grammatical errors (e.g. only two kinds of elephant now exists, p. 207); a redundant "and" before "which," p. 217), and inelegancies (e.g. python-like headed reptiles, p. 149: the blind worm is popularly reported as being deadly poison, p. 146) have been suffered to remain. Technical terms have, as far as possible, been avoided; but it is questionable whether the use of such a term as "wing-wedge bone" is advisable. Surely those who can take in such names of places as "Eschscholtz Bay," and such local names of animals as "Catamiztli," could swallow "alisphenoid" without serious mental indigestion.

For the rest we have nothing but praise. A great deal of information is conveyed in a pleasant style. The illustrations, if not quite all that could be desired, are decidedly above the average. The reiterated allusion to the possibly independent origin of similar structures (or the independent origin of different structures, as it appears on p. 120) is, in our opinion, not out of place in such a book. Those who enjoy a smattering of knowledge, picked up from popular works, are apt to be so terribly dogmatic that it is well to urge them to keep their minds "free from prejudice and ready to receive all and any truth which may be demonstrable." C. LL. M.

Science Teaching in Schools. By Dr. Henry Dyer. (London: Blackie and Son, 1893.)

AN address given by Dr. Henry Dyer on science teaching in schools has been amplified and is now published in book form. The points dwelt upon appeal particularly to the managers and teachers of existing elementary schools, and of the secondary and technical schools now being organised in all parts of the country. In an appendix (which, by the way, is almost as long as the address itself) are given syllabuses of elementary science as taught under the London and Leicester School Boards, and the curricula of the evening classes of the Glasgow and West of Scotland Technical College. A commendable feature is the insertion of the courses of instruction at the Ecole de Commerce et de Tissage of Lyons and the Public Mercantile Educational Institute of Leipzig.

LETTERS TO THE EDITOR.

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Vectors and Quaternions.

PROF. MACFARLANE claims that his "fundamental rules for vectors are based on physical considerations, the principal one of which is that the square of a vector is essentially positive." His proof is virtually this:—The expression for the kinetic energy ($\frac{1}{2}mv^2$) is an essentially positive quantity. It contains one factor $\frac{1}{2}m$ evidently positive. Hence the other factor v^2 must also be positive. "But v denotes the velocity