

examples and to formal riders. The fourth stage knits all the theorems, previously considered, into a logical chain with formal proof. A few riders are interspersed, and there is a considerable amount of general discussion in this part of the text; the section closes with a collection of riders arranged under headings corresponding to suitable groups of propositions.

With the general changes of procedure adopted by the authors we are in entire agreement. There can be no question that boys are capable of making simple applications of the fundamental theorems of geometry long before they are able to appreciate the formal proofs, and the stimulus which work of this nature supplies is most beneficial to their mental development.

On its numerical side the exercises are very good, being numerous, varied, and interesting; on the formal side we do not consider the work quite so satisfactory; more riders of the "two-step" nature are needed, particularly, for example, in dealing with angle and tangent properties of the circle. We think also that much of the discussion, which at present bulks so largely in the text, might be omitted. We doubt whether any boy reads it, and there is much that we find hard to believe is really necessary for the instruction of the teacher at the present time, when modern methods are so much better understood than they were, say, fifteen years ago. Some drastic pruning of this kind would affect materially the size of the book, and, we think, leave its utility unimpaired, and at the same time appear to lighten the student's burden.

The printing is excellent, and the diagrams are clear and numerous. A set of answers and suggestions for class-work (which we have not seen) is issued separately. We regard the new form of this text-book as a definite advance in the right direction, and commend it to teachers.

The Evolution of Vertebrate Animals.

Die Stämme der Wirbeltiere. By Prof. Othenio Abel. Pp. xviii+914. (Berlin and Leipzig: Walter de Gruyter and Co., 1919.) Price 56 marks.

PROF. ABEL, of Vienna, is a most voluminous writer on extinct animals, and even the difficult circumstances of the time do not impair his energy and enthusiasm. He has now produced a most interesting volume summarising our present knowledge of the past history of the backboned animals, and his technical descriptions are illustrated by numerous up-to-date figures which are

NO. 2661, VOL. 106]

refreshing by their newness in a text-book. The work is not merely a laborious compendium, but is enlivened by many critical observations based on Prof. Abel's own researches.

Prof. Abel's classification will not in all respects prove acceptable. He avoids too many difficulties in the determination of affinities by an undue multiplication of sub-classes and orders. He also in some cases adopts the fantastic proposals of certain dabblers in scientific literature who discuss merely names without any acquaintance with the fossils to which they refer. The familiar generic name *Ichthyosaurus*, for example, completely disappears, while the almost equally well-known name *Megalichthys* is applied to the wrong fish. The work, however, is intended for advanced students who will be able to make allowance for these idiosyncrasies without much trouble.

According to Prof. Abel, the Cyclostomes are unknown among fossils, because the problematical Devonian *Palæospondylus*, with its suckorial mouth, is most likely the larval condition of *Cocosteus*. The earliest fishes are the Upper Silurian *Anaspida*. The earliest land-vertebrates, the *Stegocephala*, are treated at great length on account of the primitive character of the skeleton and its morphological importance. Among reptiles, the newly discovered *Chelonia*, from the Upper Trias of Germany, are especially striking. Some of them retain traces of true teeth. The *Dicynodonts* are described as "the Sirenians among reptiles." The Triassic *Parasuchia* and *Pseudosuchia* are separated from the *Crocodylia*. The marine *Thalattosauria*, from the Trias of California, are arranged with the *Lacertilia*. The birds are treated in the usual manner.

Among mammals, the *Monotremata* are regarded as unknown by fossils before the Pleistocene; and the Triassic *Tritylodon* is referred to the *Marsupialia*. The South American Tertiary *Sparassodonta* are also retained among *Marsupialia*. A few of the mammalian jaws of Jurassic age (*e.g.* *Amphitherium* and *Stylodon*) are regarded as belonging to *Placentalia*. The *Insectivora* follow, and the *Primates*, as usual, conclude the series of orders. The various groups are rather unequally treated, but students will be glad to have the preponderating sections on *Cetacea* and *Sirenia* as summarising Prof. Abel's own researches.

The volume is provided with two exhaustive indexes, one to morphology, the other to taxonomy, and is a most valuable work of reference, which should be added to every zoological library.

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