The descriptions reveal the author as an enthusiastic observer. Their value is enhanced by his comments on the spectra of many of the objects, which can be seen by using a simple direct-vision spectroscope. Few readers will not be stimulated to look for themselves.

Hartung's attempt to provide some astronomical background information in an extended introduction (40 pages) is not entirely successful. Beginners will encounter too many undefined terms and will have difficulty integrating the various topics into a coherent picture. More experienced readers will probably regard the introductory chapters as unnecessary in an observers' handbook. The book, however, is well produced and adequately, though not imaginatively, illustrated. It must be regarded as good value for money, even though it might have been better. After all, the accessible objects work out at less than a penny each, a price no enthusiastic observer could regard as too high.

D. V. THOMAS

GROUNDING IN PALAEONTOLOGY

A Guide to Invertebrate Fossils

By F. A. Middlemiss. (Hutchinson Biological Monographs.) Pp. 128. (Hutchinson (Educational): London, July 1968.) 15s.

THIS is an elementary introduction to the more common invertebrate fossil groups, providing a grounding in palaeontology for those studying zoology and, more specifically, geology.

Each group of fossils is considered separately and a consistency of approach is maintained throughout the book. In each case, after an introduction and an explanation of morphology, the classification is outlined and explained and this is followed by an account of the geological history, mode of life and geological importance of the group. The text is very well written and a very great deal of information is condensed into the 128 pages. Where new terms are introduced they are immediately explained and drawings of genera clarify the morphology described in the text. A selection of genera is also shown to demonstrate the range in form of each group. These drawings are grouped at the end of each chapter and are not in the text, thus making comparison easier, and are so well drawn that it is a pity that there are not more of them.

A short bibliography and a concise glossary are included at the end of the text, and the index is particularly comprehensive.

The book covers much of the groundwork needed for the GCE A-level paper in geology where it will be very welcome, and it will no doubt also prove extremely useful as a first-year undergraduate text.

JOHN R. V. BROOKS

FOSSIL FISHES

Fundamentals of Palaeontology

A Manual for Palaeontologists and Geologists of the USSR. Vol. 11: Agnatha, Pisces. Edited by D. V. Obruchev. Translated from the Russian. Pp. x+825. (Israel Program for Scientific Translations: Jerusalem, 1967. Distributed in the UK by H. A. Humphrey.) 200s.

THOSE of us who have been using the original edition of this book (1964) chiefly for the pictures and the Latin names have been missing a lot. It is hardly a textbook, for the didactic sections are short and new species, genera and higher taxa are introduced freely. Rather, it is the closest approach yet to a replacement for Smith Woodward's *Catalogue of Fossil Fishes*, a comprehensive and critical review of all fossil agnathan and fish genera.

After a short introductory section, the work contains a chapter for each major group, with a diagnosis, historical review, brief sections discussing morphology, evolution, ecology, mode of preservation, taxonomy and geological and biological significance, followed by a detailed systematic account. The systematic parts form the bulk of the book and are its most valuable feature. They include diagnoses, often quite comprehensive, and time ranges of all taxa, the author, date and synonyms of each family and genus, the type species with author, horizon and locality of every genus and an estimate of the number of fossil species and where they occur. Authorship of families is particularly valuable (despite gaps in the actinopterygians and a disclaimer of certainty), now that the rules of nomenclature apply at this level. Each chapter closes with two comprehensive bibliographies, the first of Russian work, the second in other languages. The Russian bibliographies, with titles both in translation and transliteration, are especially useful.

Obruchev, the editor, has also written the introductory sections, the entire agnathan, placoderm and holocephalan chapters, and has collaborated in the chapters on acanthodians (with Novitskaya), sarcopterygians (with Vorob'eva) and lower actinopterygians (with Kazantseva, on the basis of a pre-war manuscript by Berg). All these are first class. The elasmobranchs are dealt with by Glikman and the higher actinopterygians by Danil'chenko: these chapters are less satisfactory, the first because of idiosyncratic presentation, the second because of omissions (to save space) and the difficulty of bringing order to a vast range of little-known fossils.

The treatment is generally conservative, with stratigraphical succession as the arbiter in disputed anatomical questions, a tendency to lump rather than split, and with little attention to "recently fashionable hypotheses of the polyphyletic origin of different vertebrate groups". Six "fish-like" classes are recognized, five less than in Berg's classification. The lungfishes are regarded as crossopterygian descendants and placed as a superorder within the Sarcopterygii, sarcopterygians and actinopterygians being combined in a class Osteichthyes. Most groups are reclassified, except for the higher actinopterygians, where Berg is followed. The most radical change is Glikman's entirely new classification of sharks and rays, impenetrable to at least one reader.

The translation is competent, with only a few slips and ambiguities (such as "straight muscles" for "rectus muscles") betraying unfamiliarity with the subject. The text is typed, not typeset, with a predictable increase in errors. The type area is reduced by almost 40 per cent, with a comparable increase in the number of pages (and a five-fold increase in price). There are more than 650 text-figures and 45 plates, with plates illustrating Russian fossils after each chapter. Some text-figures are original, but most are skilfully redrawn from other publications. The reduction of the text-figures has darkened them considerably: this has been avoided with the finer-grained drawings by reproduction in half-tone, fairly successfully, despite loss of detail. This expedient was used occasionally in the original, and these figures are correspondingly worse. A few figures are inverted, several misaligned, and two (page 612) transposed. The plates, half-tones originally, have suffered considerably and are mostly almost useless.

The volume ends with a 35 page chapter on conodonts (an order *incertae sedis*) by Sergeeva. The publishers might have been wiser to issue this section separately, for few conodont workers will feel like buying the whole book for one chapter.

The five-year gap between the latest references in the book (1963) and the appearance of the translation means that many pages contain statements requiring modification because of subsequent work. Nevertheless, this is a work of enduring value, worthy of the wider audience it will now receive.

COLIN PATTERSON