The author began work on the book in 1940 and it would seem that some portions written early in its preparation were not revised later, one consequence being this serious omission. The ecological part of this introduction reveals how little is known of the subject, but it includes some original information on communities and periodicity. Lists of the diatoms in eight characteristic littoral communities are of very little scientific value, however, without some information on the habitat of each.

The taxonomic part of the work provides descriptions of 114 genera and 609 species, those occurring most frequently around the British coasts. The distinguishing characteristics and the degree of variation of a number of species are considered anew, with sound taxonomic judgment that takes into account the effect of biology and life-history on the morphology of the frustule. Many type specimens have been examined and the nomenclature used has been brought into line with the code. *Auricula* is separated from the Naviculaceae in the monotypic new family Auriculaceae because of its dorsi-ventral structure. In recent years theoretical taxonomists have pointed out that giving paramount importance to a particular character results in an unnatural classification. The generally accepted classification of the sub-order Naviculineae, in which type of symmetry is emphasized above everything else, exemplifies this, and even more so with the recognition of this new family. The three new genera and thirteen new species, however, seem to be genuinely distinct.

The general account of the group and the taxonomic innovations are only ancillary to the main purpose of the book, to serve as a manual for identification. There are keys to the families and genera, and these work well in most cases, although there are a few defects that may cause confusion: *Toxonidea* runs down to Cymbellaceae but is, rightly, included in Naviculaceae, *Biddulphia pulchella* could easily be run down to Anzulaceae, and three other species of *Biddulphia* to *Trigonium*. There are no keys to the species and, in the larger genera at least, identification without them will be difficult, the more so because the descriptions of the species in any one genus are not drawn up on a uniform plan and so are not easy to compare. At times they are even inconsistent and contradictory, the worst example being the accounts of the raphe and nodules of *Frustulia* in the key and in the descriptions of the genus and its three species. Nevertheless, although more arduous than it might have been, identification will almost always be possible, provided that the species is covered. For about half those included, help is given by the illustrations; these are either delicate and accurate drawings by the author or excellent photomicrographs, but no scale is given on any of them and their magnification is not uniform. The general dimensions of the species given in the text are no substitute.

The basis of this book, the author's judgment of the limits of the species with which he deals and the characters that distinguish them, is sound. It is a great pity that the fruit of the work of so many years is not as useful as it might have been because of the way in which it is presented.   R. Ross

MODERN GENERAL ALGEBRA

Lectures on General Algebra
By A. G. Kurosh. Authorized translation by K. A. Hirsch. Pp. 335. (New York: Chelsea Publishing Company, 1963.) 6.95 dollars.

THIS is an excellent book on modern algebra. It is intended for mathematicians, but not necessarily for specialists in algebra. In writing this book Prof. A. G. Kurosh had in mind the idea of showing mathematicians the new look which general algebra has acquired since the publication of van der Waerden's *Moderne Algebra* some thirty years ago. The material has been selected well and carefully, with the object of exhibiting the main branches of modern general algebra; showing so far as possible their mutual interconnexions, and aiming at a relatively small number of individual important theorems in each branch. The result is a very readable and unified account of what might so easily have been a collection of apparently unrelated topics. The style, too, is excellent, combining precision and informality in what I believe to be just the right proportion to form a useful and fascinating introduction to modern algebra, particularly suitable for first- or second-year postgraduate students in mathematics. The book is in fact based on some special courses of lectures given by the author at the University of Moscow, and this explains its title.

The section headings in the six chapters are: Chapter 1, sets; binary relations, equivalence relations; partial order; minimal condition; theorems equivalent to the axiom of choice. Chapter 2, groupoids, semigroups, and groups; rings and fields; subgroups and subrings; isomorphism; embedding of semigroups in groups and of rings in fields; non-associative fields, quasigroups, isotopy; normal subgroups, ideals; Gaussian semigroups; Gaussian rings; Dedekind rings. Chapter 3, universal algebras, homomorphisms; groups with multi-operators; automorphisms and endomorphisms—the field of p-adic numbers; normal series and composition series; Abelian, nilpotent, and solvable Ω-groups; primitive classes of universal algebras; free universal algebras; free products of groups. Chapter 4, lattices and complete lattices; modular lattices; direct unions—the Schmidt-Ore theorem; direct decompositions of Ω-groups; complete direct sums of universal algebras; distributive lattices. Chapter 5, operator groups and operator rings; free modules—Abelian groups; vector spaces over fields; rings of linear transformations; simple rings—Jacobson's theorem; linear algebras—the quaternion algebra and the Cayley algebra; alternative rings—Artin's theorem; the generalized Frobenius theorem; the Birkhoff-Witt theorem on Lie algebras; derivations—differential rings. Chapter 6, ordered groups; ordered rings; Archimedian groups and rings; rings with a valuation; logarithmic valuations of fields; Albert's theorem on normed algebras; closure—topological spaces; special types of topological spaces; topological groups; connexion between topology and valuations in rings and fields; Galois connexions—the fundamental theorem of Galois theory. There is an index, and also a bibliography containing an excellent list of books on various branches of general algebra. A large number of results appear in the text in their appropriate places neither proved nor used, but references are given. This is a particularly useful feature of the book.

I would have welcomed some historical detail in places to show how the new concepts have arisen, and also some illustration of their relevance to other parts of mathematics. There is no discussion of the theory of categories and there are no exercises. The casual reader is warned that 'ring' means 'non-associative ring' and that 'field' means 'non-commutative field'. There are one or two errors and omissions in the index; for example, the references to p. 8 should be to p. 6, the reference for *simple group* should be to p. 66 rather than p. 67, *quasigroup* does not appear to be indexed.

Since the publication of the original (Russian) edition in 1962 there have been a number of new results to which the author would no doubt have made reference, notably the work of W. Feit and J. G. Thompson on simple groups, and the work of P. J. Cohen on the axiom of choice.

English-speaking readers will be greatly indebted to the translator, K. A. Hirsch, who has done a splendid job. As one should expect from an American publishing house, the spelling is American.   J. E. REEVE