The time spent in these intellectual exercises will, however, be amply rewarded by the knowledge gained in the degree of approximation afforded by the methods of Prof. Kutateladze and Dr. Leont'ev.

It is hoped that this monograph will attract the attention of a wide audience and by so doing will encourage the few to consolidate and extend the methods of Prof. Kutateladze and Dr. Leont'ev as well as to perform the very necessary experimental verifications of these methods over as wide a range of conditions as is possible. Prof. Spalding's timely translation has given Western engineers and scientists the opportunity to study at first hand a significant development in both the theoretical and applied treatments of the drag and heat transfer in high-speed gas flows.

G. M. LILLEY

A RUSSIAN VIEW OF PARTIAL DIFFERENTIAL EQUATIONS

Partial Differential Equations of Mathematical Physics
By S. L. Sobolev. Translated from the third Russian edition by E. R. Dawson. English translation edited by Prof. T. A. A. Broadbent. (International Series of Monographs in Pure and Applied Mathematics, Vol. 56.) Pp. x+430. (London and New York: Pergamon Press, 1964.) 100*s*. net.

THIS is an excellent translation of a modern Russian book dealing with the theory of partial differential equations from an advanced, vigorous and refreshing point of view. The type is well laid out. The whole book is well constructed and easy to read. The book is very expensive for its size. In view of its general nature and its obvious slant towards the advanced student, the book would be a useful addition to most university science libraries. It will also be of interest to research workers interested in establishing rigorously the existence and properties of solutions, and is worth examination by university teachers before preparing courses on partial differential equations. The precise conditions under which results hold, even though the proof may be difficult, are here clearly stated.

It is always interesting to meet unusual names attached to familiar theorems and identities. In the present case, for example, the divergence theorem becomes Ostrogradski's formula (1831) and Schwartz's inequality becomes Bunyakovski's inequality. The translator has effectively identified these for the Western reader.

Instead of chapters, the book is divided into thirty lectures, some of which appear to be rather long. Apart from an initial assumption that the divergence theorem is known, and other references to elementary calculus and analysis, the lecture course is self-contained. The requisite theorems in Lebesgue integration are developed as part of the course, which could be given to third-year honours mathematicians, or as a postgraduate course. No student exercises are given, probably because heavy emphasis is laid on the rigorous solution of the equations encountered, rather than the method of solution. Operational calculus is not used explicitly and numerical methods are not mentioned.

The theory is developed within the framework of the Lebesgue integral, established early in the book. Partial differential equations of specialized kinds are essentially treated by means of Green's functions. However, an acquaintance with the various types of special equations (Laplace's equation, Poisson's equation, the heat equation with source function and the wave equation with source function) and their properties is generated first. Rigorous solutions and existence theorems are developed. The method of separation of the variables is given (Fourier's method) with a treatment of the eigenvalue and eigenfunction expansion problems which arise. The partial differential equations are formulated and solved as integral equations. The necessary theory of integral equations is established. Finally, the solutions of Laplace's equation and the wave equation in cylindrical and spherical polar co-ordinates are obtained by separation of the variables.

The material presented by Prof. Sobolev is certainly available in other tracts. However, the special nature of the book, as an alternative presentation which is both interesting and original, makes it a welcome addition to the book list. A student attending such a course would obtain a formidable knowledge which would stop short at the obvious omissions mentioned earlier (and mentioned by the author himself). It is significant and promising that recent research has resulted in constructive existence theorems which permit the actual numerical computation of solutions.

P. C. KENDALL

THE ARACHNIDA

Arachnida
By Theodore Savory. Pp. viii+291. (London: Academic Press, Inc. (London), Ltd.; New York: Academic Press, Inc., 1964.) 60*s*.

ARACHNIDA is a revision of an earlier book by Mr. Savory which was published in 1935. The present volume has the same general arrangement of material but has been expanded and re-organized into a more comprehensive and concise account.

As a very readable introduction to a diverse subject, it should be of particular value to sixth-form pupils and undergraduates. One of the objects of the author has been to maintain a balance between the numerous orders in the class so that the largest groups do not get a disproportionate share of the space. This is a formidable task with a class which includes more than 53,000 species in 11 orders, and probably no two authors would agree on what to leave out.

Chapters 2–11 are an expanded version, including a good deal of new material, of the first three chapters of the 1935 book dealing with general characteristics, habits and behaviour, and evolution and classification. These vary in value and quality, so that some, for example those on ethology and ecology, do not appear to have interested the author as much as other subjects. The descriptive sections (Chapters 12–27) on the 16 (including extinct) orders of the class follow the earlier pattern and include many of the original figures and maps, the latter brought up to date. Two chapters are allocated to brief accounts of the Pycnogonida and the Merostomata.

Chapters 30–40 which follow discuss briefly a number of related topics including a useful summary of events in arachnological history from 1665 until 1964 and an explanation of arachnophobia, in which we learn that large size, a black colour and long legs are the main factors which contribute to our fear of spiders. We also read again the story of the mythical species *Gibbocellum sudeticum*, the systematic position of which aroused some zoological controversy in the 1880's before it was shown to be entirely fictitious. During the past thirty years, a great deal of published work on the Arachnida has appeared; but my impression of this book is that a number of important advances have been excluded from the text or else overlooked. This is perhaps a reflexion of the fact that only 53 of the 163 titles quoted in the references are of works published after 1935—approximately 1·3 per chapter.

Mr. Savory is unusual in being able to bring considerable talents as a classical scholar to his scientific investigations, and consequently his style makes the text remarkably easy to read compared with most text-books of this type. There is a bibliography of general works, references in the text, and subject, author and species indexes.

E. DUFFEY