and of low temperatures ; seven out of the remaining nine chapters end with a set of questions and problems, and an appendix of 14 pages gives tables of constants and numerical data.

(2) Before attempting a survey such as that referred to above, the student can be confidently recommended to Dr. Barton's textbook which, as the author states, has been written to satisfy the needs of those reading for university entrance scholarships and various Higher School Certificate and university intermediate examinations. At the same time, the subject is treated so as to show that the study of a branch of natural science may be genuinely cultural. To this end the scientific method and the development and "appreciation of the beauty of the rational scheme which has been created by the mind of man to explain the phenomena of Nature" are kept to the fore throughout.

With regard to the scope of the work, in addition to the form of presentation of the more elementary topics to be expected in an intermediate textbook, chapters are devoted to the kinetic theory of gases, Van der Waals' equation, cyclical operations and adiabatic changes, and the laws of thermodynamics. The possibilities of the quantum theory are hinted at in places, but are not actually introduced. The order adopted is justified in the introduction, which gives a striking logical development of the aspects of the subject, and which a student of the book should on no account omit to read. The following commendable features of the text are especially evident: new practical methods are given, historical presentation is adopted but much historical dead-weight is omitted, and the mathematical treatment is entirely up to date and extremely clear. The whole text gives a general impression of efficiency and completeness without attempting to be exhaustive, and this impression is supported by the adoption of a uniform and readable style of printing, together with diagrams well above the average in quality and clearness. In subsequent editions the index might be made considerably more detailed.

(3) The well-known style of the Tutorial Press textbooks is preserved in this thoroughly sound introductory course. While the conventional order and treatment is followed, improved practical methods and apparatus are introduced, and special attention is given to modified versions of classical experiments which can be performed by students with simplified but effective devices. It is satisfactory to note the inclusion, among others, of short sections dealing with platinum resistance thermometers and thermocouples, the equilibrium of balloons as an illustration of a practical application of the gas laws, the determination of the calorific value of fuels, and an electrical method of finding the latent heat of vaporisation of a liquid.

N. M. BLIGH.

Short Reviews

The Birds of Tropical West Africa: with Special Reference to those of the Gambia, Sierra Leone, the Gold Coast and Nigeria. By D. A. Bannerman. (Published under the authority of the Secretary of State for the Colonies.) Vol. 3. Pp. xxxv+487+12 plates. (London: Crown Agents for the Colonies, 1933.) 22*s*. 6*d*.

WITH the issue of the third volume of Mr. Bannerman's great work, sponsored by the Secretary of State and by the Colonial Governments in West Africa, the project is half completed. In this volume we find the representatives of such cosmopolitan orders as the owls and the swifts, side by side with those of such purely African groups as the plantain-eaters and the mouse-birds; or we may contrast the rollers and the hoopoes, ranging widely in the Old World, with the trogons, discontinuously distributed in tropical forests from South America to Malaya. The representation is often large: for example, twenty-four species of owls and thirteen of kingfishers within the area, and sub-species as well.

The information given for each form includes a description of it and a note on its identification in the field: this is done even for familiar European species occurring as migrants, so that the work serves as a complete guide for the observer on the spot. There follows a summary of the available information as to the range, local distribution and habits of the bird, and although the data under these heads are often of necessity very meagre, they should provide both a basis for further work and an incentive to its undertaking. Questions for elucidation are abundant: the predatory methods of the fishing-owls do not seem to have been observed; the 'indicator' behaviour of the honey-guides is proved only for one species; the strange nidification of the hornbills is worthy of further study; and knowledge of the migrations of the different nightjars rests upon scanty records.

The illustrations deserve special praise. The principal artist is Mr. Henrik Grönvold, but there are also coloured plates by Mr. G. E. Lodge and the late Major Henry Jones. If one may be singled out for mention, Mr. Lodge's group of bee-eaters—five species vying with each other in the varied brilliance of their plumage—is a thing of beauty.