

students who have used the notes from which it is written. In this way it is possible for them to feel certain that, whatever may be the failings of their work, it will at least be intelligible to the average student.

The book opens with a preliminary chapter called "General Instructions," and the practical teacher at once becomes apparent in such paragraphs as that on the importance of *large* errors. No one can have had much experience in teaching practical physics without seeing that the anxiety of beginners to obtain correctness in the second or third place of decimals is accompanied by an extraordinary laxity in noting the tens and hundreds. In fact, it may be said that most of the inaccuracy of beginners in physical measurement is due to this cause. In the chapter on "Arithmetical Calculations," the authors rightly lay stress on contracted methods of multiplication and division. The short chapter on "Graphical Constructions" is less satisfactory than the others, and would probably be improved if some better examples of the method were employed, and if some notice were given to the convention (a most useful one) of making abscissæ represent the independent, and ordinates the dependent, variable.

The body of the book is taken up with experiments on mechanics (including measurement of density and specific gravity), heat, light, sound, and electricity. As necessarily follows from the nature of the case, there is not much that is original in the treatment of these subjects. One admirable feature, however, which runs throughout the course, is the working out of the percentage error in each experiment. In the section on heat, we notice that the calorimeter equivalent is found by pouring warm water into an empty calorimeter; more satisfactory results can generally be obtained by pouring warm water into a calorimeter containing some water at the temperature of the room, and calculating the difference between heat given out by warm water and that taken in by the cold. In this section is also to be noticed an ingenious form of heater for the determination of specific heats by the method of mixtures.

In the optical section the method of tracing rays by means of pins—first used, we believe, in the Cavendish Laboratory—is employed to a considerable extent. There is an experiment on the power of accommodation of the eye, which we have not seen before in any similar work.

The section on "sound" is concerned with the proof of the laws of vibrating strings, and an experiment on the resonance of a column of air. In the last three sections of the book, on "magnetism," "electric currents," and "electric charges," the authors seem to be less successful than in the earlier parts. But it is extremely difficult in the course of fifty pages to give a satisfactory series of experiments on these subjects, especially when, as in this case, a very large number of those pages are taken up with elementary explanations which might have been omitted by reference to any text-book, such as that of Thompson. And the form of water voltameter described is hardly, one would think, the most useful for laboratory purposes, or the most instructive from the point of view of the teacher.

In conclusion we may be permitted to suggest that, from an educational point of view, the book would gain

if at the beginning of each experiment a short and clear statement of the object of that experiment were given. One of the most useful results to be obtained from a laboratory course such as this is gained when the student, knowing clearly the question which he is to address to nature, thinks out for himself how he is to proceed in his cross-examination, and compares his method with that of an experienced investigator. D. R.

#### OUR BOOK SHELF.

*Bis an's Ende der Welt! Astronomische Causerien.*  
By Prof. F. J. Studnička. Second enlarged edition.  
Pp. 212. (Prague: F. Simacek, 1896.)

THE author of this book went to Karlsbad to indulge in the special opportunities afforded by that town in the nature of its waters. During his stay there he made the acquaintance of several other "Kurgäste," by name Bausen, Bugajev, Carpenter, Parelli and Place, and his two friends from Prague, Benda and Naprtek. To pass away the time of their sojourn, these persons formed a small social circle, and, besides taking drives together, they met at stated times and discussed any subject that was uppermost in their minds. Carpenter, however, seemed, from all accounts, to be the dominating one of the party from the discussion point of view, and being of an astronomical turn of mind, the conversations generally were on this subject. His listeners were members of several different professions, so the subject had to be treated in an elementary manner, and, in consequence, the explanations had to be very clear.

The author of this book, who was one of the party, describes here the daily conversations which took place; they are mainly astronomical, although other subjects are occasionally referred to. The astronomical and physical problems dealt with are, for the most part, of a very general character, and will be found interesting reading.

A trip to Prague, after the stay in Karlsbad, gives the author a chance of referring somewhat in detail to the associations, works, and lives of Copernicus, Tycho Brahe, Kepler, Doppler, &c., all of whom were intimately connected with that town.

The book may be said to be quite suitable for the general reader, and the numerous diagrams and illustrations scattered throughout its pages will prove serviceable.

*First Stage Inorganic Chemistry.* By G. H. Bailey, D.Sc., Ph.D. Edited by William Briggs, M.A. Pp. 210. (London: W. B. Clive, 1897.)

IT is too often forgotten, when criticising text-books written to follow the lines laid down in syllabuses, that the books are not so much to be blamed as the syllabuses. For convenience, it is considered necessary to state the subjects of which a student who presents himself for examination will be expected to know something. The text-book is then produced, in order that the student shall be able to acquire the knowledge in as easy a way as possible. If the syllabus is badly arranged, the text-book designed to meet it will be a bad one; but if the subjects in it are placed in an educational sequence, the text-book will partake of that good quality. Probably no one is better able to judge whether a syllabus hangs together properly or not, than a competent scientific writer who tries to build a book upon it.

The book before us has been arranged to meet the requirements of the Department of Science and Art for the Elementary Stage of Inorganic Chemistry. In eighteen short chapters the author deals with the general principles of chemistry, the nature of chemical reaction, the chief non-metals and their most important compounds, physical properties of gases, chemical nomen-