

number of figures, and in addition to numerous unsolved exercises, has given very many worked-out problems. In his introduction he points out that "the practical man, unlike the theoretical, cannot choose his problems; he must take those which the requirements of his art present, whether elegant and curious, or cumbrous and repulsive. Moreover, in his case, *some* solution of every problem must be obtained; if he is unable to find a rigorous scientific solution he must make some further assumptions or have recourse to experiment; he cannot lay the question aside." He goes on further to point out the differences between the two studies of theoretical and applied mechanics. The author has brought the subject before the notice of mathematicians in communications to the Mathematical Society and the *Educational Times*.

Mr. Loewy has retained much of the elementary part of the late Dr. Lardner's treatise, having carefully revised it and brought it up to modern requirements. He has re-written, for the most part, the descriptive chapters on machines, clockwork, &c. Many new illustrations and a great number of solved exercises have been added, so that now the work is embellished with nearly 400 illustrations. An account is given of the modern units of force and work (the dyne, poundal, &c.). The result is a neat and readable book on properties of matter, theory of machinery, and illustrations of the application of mechanical principles in the industrial arts. We do not pretend to have read the work for it is full of matter, but what we have examined we have found interesting and carefully done. We have detected a few slips (typographical, chiefly) in the solutions. A good feature is an index.

The last book on our list is neatly got out and is doubtless adapted for the end in view, the author having written it for candidates for the Oxford and Cambridge Local Examinations. It is such a book as might have been compiled at any time within the last twenty-five years from the Cambridge text-books, for it keeps quite to the old Cambridge "lines;" it "aims at being simple, but not childishly so." The modern treatment of the subject has been altogether avoided. This is, perhaps, no fault of the author, but rather the exigencies of the above-named examinations have compelled him to move in this rut. There is a sufficient number of exercises taken from the examination papers, and a chapter is devoted to hints for, and examples of, the selection of problems. The figures generally are clearly drawn, but a cylinder on p. 43 is a sorry representation of such a solid.

OUR BOOK SHELF

Mikrographie der Glasbasalle von Hawaii: Petrographische Untersuchung. Von C. Fr. W. Krukenberg. (Tübingen, 1877.)

THE interesting facts made known of late years by Prof. Möhl, of Cassel, and Dr. Bořický, of Prague, as the result of their study of the microscopic characters of the vitreous and semi-vitreous rocks of basic composition, have rendered it eminently desirable that a thorough investigation of the remarkable lavas of the Sandwich Islands should be undertaken by some competent observer. We therefore hail the appearance of the monograph now before us as supplying a want which has been felt for

some time past by all who are interested in micro-petrographic studies.

From the older analyses of the Sandwich Island lavas as tabulated by Herr Krukenberg, we learn that the composition of these rocks varies within very wide limits—the proportion of silica ranging from 39.74 to 59.80; the author's own analyses, however, would seem to indicate much less widely separated rocks as having been subjected to examination by him, for the proportions of silica are given as from 50.865 to 53.61. The most remarkable circumstance about the composition of these Hawaiian lavas is probably the large proportion of iron-oxide which they contain, the percentage of this substance ranging from 13 to 33 per cent., while alumina is only present in small quantity, or is sometimes altogether absent.

Herr Krukenberg first describes the curious structure revealed by the microscope in the compact basaltic glass in which are detected numerous beautiful examples of those skeleton crystals built up of crystallites to which Vogelsang first directed the attention of geologists, and to which the name of "chiasmoliths" has been applied. Among the perfectly-formed crystals porphyritically embedded in this compact or glassy mass, the author noticed felspar (both orthoclastic and plagioclastic) and olivine, but he failed to detect augite.

The curious forms assumed by the threads of Pele's hair are admirably described in the work before us, and are illustrated by numerous figures. Gas bubbles appear to be very common in these glass threads, and they are often drawn out into elongated cavities or fine capillary tubes. Minute crystals are sometimes seen in the midst of the glass threads, which sometimes exhibit a concentric structure and at others a series of transverse striations. In the ordinary porous glass lava the author finds structures intermediate between the chiasmoliths and the crystalline plates seen in Pele's hair; his drawings, indeed, very admirably illustrate the mode of development of crystals in glassy magmas. The last variety of the Sandwich Island lavas described in this monograph is the sphaerulitic; but the sphaerulites of the basaltic rocks do not appear to differ in any essential point of structure from those so well known as occurring in acid vitreous rocks.

In an appendix to the paper the author notices the existence in the Sandwich Islands of a true obsidian which yielded 76.10 per cent. of silica. The monograph is illustrated with four lithographic plates, and is a very valuable contribution to petrographic science. J. W. J.

Preventive Medicine in Relation to the Public Health. By A. Carpenter, M.D., C.S.S., Camb. (London: Simpkin, Marshall, and Co.)

UNDER the title of "Preventive Medicine" Dr. Carpenter has reprinted lectures which he gave, during the summer session of 1876, at St. Thomas's Hospital. They were addressed to students, and the form in which they were first given has been preserved. At a time when, in the words of the Prince of Wales's letter to the Society of Arts, "the supply of pure water to the population is exciting deep interest throughout the country," the volume will be found a convenient and ready *résumé* for those who wish to inform themselves on the more important questions that enter into the consideration of what is a good water supply, and what is to be done with fouled water. As is well known, Dr. Carpenter advocates sewage-farms as the proper way to dispose of sewage, and the chapters devoted to this subject enter into financial as well as scientific consideration. In speaking of the spread of epidemic diseases by water and by air Dr. Carpenter explains the germ theory, but we cannot find that he even alludes to any other possible explanation. It appears as if he regards the germ theory of disease as really *proved*. Is it?