

point out that Prof. Rowland first made the striking remark that "were the whole earth heated to the temperature of the sun, its spectrum would probably resemble that of the sun very closely" (*Johns Hopkins University Circular*, No. 85, February, 1891). In referring to Prof. Rowland's work in August, 1891, at the British Association meeting of that year, Dr. Huggins made practically the same remark, and Sir Robert Ball (p. 169) quotes his words, and gives him the credit for the idea they contain.

Two of the chapters in the book refer to shooting-stars, meteors, and meteorites; and in them the author discusses the origin of meteorites and the relation between meteorites and comets. In his opinion, meteorites are masses of matter ejected from terrestrial volcanoes in a primeval condition of the earth; but we fancy that the analyses of most meteorites do not favour this origin. How, for instance, is the absence of quartz accounted for? But, as a matter of fact, Sir Robert Ball is almost the only astronomer who holds the volcanic view, and the same can be said with regard to his denial of the connection between comets and meteorites, and between meteorites and shooting-stars. The work of Schiaparelli and Newton, Tisserand, and Schulhoff, not to mention many others, considerably outweighs all that Sir Robert Ball has ever said upon the matter. The spectroscopic evidence upon the connection is dismissed in half a dozen lines, while page upon page is devoted to a description of what might happen to masses of matter projected from the moon or a minor planet. In fact, by discussing and judging these theories in a volume designed for the general reader, Sir Robert Ball has made a mistake. Though he has done some excellent mathematical work, astronomers are not at all ready to recognise him as a judge on matters of astronomical physics. His function is to expound and popularise discoveries in celestial science, and when he is exercising it he is at his best.

There are some good points about the book, and anyone desirous of obtaining information upon a few of the recent important discoveries in astronomy will profit by reading it. The illustrations are not so numerous as they ought to be, but what are included are mostly very good, though the illustration on p. 156, of the region of the Milky Way about β Cygni, should have been a positive instead of a negative, for in its present form it looks more like a pathological section than anything else.

It would be an advantage if, in a future edition, the author would give the name of the observer of the solar eruptions figured on pp. 271, 273, 338, and 339. We fancy that Father Fenzi was the original draughtsman of the prominence forms there illustrated, but cannot find his name mentioned in the text relating to them.

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OUR BOOK SHELF.

Practical Agricultural Chemistry for Elementary Students. By J. Bernard Coleman, A.R.C.Sc., F.I.C., and Frank T. Addyman, B.Sc., F.I.C. (London: Longmans, Green, and Co., 1893.)

"THE course of instruction described in this book has been in use for some years at University College, Nottingham." After a few instructions as to the use of apparatus, there follows a short course of experiments on

oxygen, air, carbonic acid, water, and hydrogen. The third section treats experimentally of soils, manures, feeding materials, and dairy produce, and gives a number of simple experiments that serve to show many of the most important properties of these substances. For example, the differences between the sulphur present in gas-lime and in gypsum respectively, and the various conditions in which phosphoric acid occurs in superphosphates, bone phosphates, reverted phosphate, and slag phosphates are made the subjects of experiment. Tests are given for the various constituents of manures. Oilcakes, grass and hay, roots, flour, milk, butter and cheese, are dealt with in a similar manner. The fourth section of the volume gives a few reactions of a select number of metals (viz. seven) and acids, with a few other matters, and tables for the qualitative analysis of substances containing them. We would remark in reference to this, that to allow students to fuse insoluble substances in porcelain crucibles, in order to test for silica, is, to say the least of it, undesirable.

Regarding the volume as a whole, it forms an excellent addition to an ordinary student's course of agriculture, whether this is, as is too often the case, only a matter of listening to a few lectures, or whether practical agriculture forms an essential part of it. Perhaps it is hardly possible for a teacher to take much account of the danger that is proverbially inseparable from a little knowledge; but in cases where this is particularly liable to manifest itself, it may be his duty to do what he can to obviate the evil. Speaking from experience, we fear there are students who, after having worked through these seventy-one pages, would not hesitate to state that they had studied inorganic and organic practical chemistry at whatever college they might have done the work. In this way it is at least possible for grave discredit to be brought undeservedly upon the usual course in chemistry at such a college; for there are many people with no technical knowledge of these matters, who attach considerable value to the mere fact that a specific routine of study has been gone through at a well-known educational establishment. It appears, therefore, to be highly desirable to do whatever may be possible to prevent such a chemical course as that in this volume from being in any way confused with even the most elementary course that is arranged to impart a knowledge of chemistry itself. A similar danger doubtless exists in many other cases, but it may probably be said with truth, that there is in none other likely to be so great a temptation to misrepresent facts by an incomplete statement of the truth.

C. J.

Bionomie des Meeres. Von Johannes Walther. Erster Theil einer Einleitung in die Geologie als historische Wissenschaft. (Jena: Gustav Fischer, 1893.)

PROF. WALTHER has set before himself an ambitious programme, which, if carried out, should result in a geological treatise of great interest; we fear also of portentous length. The first instalment is a modest little book of 200 pages, with a preface summarising the travels and researches which the author made for ten years with a view to fit himself for the task, and a separately pagged introduction defining the scope of the contemplated work, and enunciating the ontological method in geology. Bionomy is the study of the life-habits of organisms in relation to their environment, and it is obvious that the bionomy of the ocean at the present time must be the clue to all deductions from the character of marine fossils regarding the physical conditions in which they were produced.

Prof. Walther is extremely systematic, and in twenty numbered sections he summarises a vast amount of recent work on the relation between marine organisms and physical conditions. His numerous references to original memoirs might be profitably increased by the inclusion of more British, French, and American work, and espe-