

by writing: "If the book had been twice as long some views would not have been rejected with the apparent dogmatism rendered necessary by the limitations of space." The attempt fails, because if Prof. Gregory had wished, he could have made the book twice as long. We wish he had, for though its price is doubtless designed to attract the student, its views are not always those which will encourage teachers to recommend it. With fuller discussion these unorthodox views would themselves have become a source of stimulation, albeit to a more limited circle. Prof. Gregory regards most ores as having come from a zone lying between the barysphere and the lithosphere, "beneath the ordinary igneous rocks of the crust," and not from the igneous rocks themselves. Elsewhere he writes: "The primary mineral deposits are mainly due to ascending currents rising from the vast store of metals in the interior of the earth." Yet the vein-stones, including barite, are considered to have been largely contributed from the country rocks.

However, despite certain controversial matters such as these, on which indeed opinion is still in a state of flux, and a few careless phrases (such as "Tin is associated with hot acids appropriate to great depths"), the book is one which, in the reviewer's opinion, can be cordially recommended to every type of geological student. It is full of the life and vigour of a fascinating subject, and anyone, be he chemist or engineer, who is interested in the materials of the earth and the struggle of the elements, will dip into the book only to settle down, or to make an opportunity, to read it all. It could, perhaps, have been better still, but this is merely an appreciative criticism of its very real merits.

*Visual Lines for Spectrum Analysis.* By D. M. Smith. Pp. 34. (London: Adam Hilger, Ltd., 1928.) 5s. net.

SPECTRUM analysis, which at one time comprised the whole function of the spectroscope, has now largely fallen out of use. This is a matter for regret, for, when the principles of the subject have been understood and a little experience has been obtained, spectroscopic methods can occupy a place in analytical work which, from considerations of delicacy and in some cases of rapidity, cannot be taken by purely chemical processes. The causes of the neglect are not difficult to understand. In the early days, before the characteristics of spectra were fully understood, there was an apparent capriciousness in the manner in which a small quantity of one substance would make its presence known, while a larger quantity of another would remain undetected, and also in the occasional occurrence of some lines of an element without the others. Furthermore, the technique of spectroscopic processes was different from that of the ordinary chemical routine, requiring special appliances and modes of procedure, and the chemist was often unable or unwilling to acquire the necessary apparatus and skill.

These difficulties have now to a large extent

disappeared. Our knowledge of spectra and the circumstances of their production has removed all uncertainty from their interpretation, and the qualitative results which, within the well-understood limitations of the method, they are capable of yielding, are at least as definite as those of the chemical reaction criteria. The apparatus and method of procedure also, thanks largely to the provision made by Messrs. Adam Hilger and other manufacturers, have been reduced to a simple form, and the chemist who continues to ignore the spectroscope does so greatly to his own disadvantage.

In the book under review, methods are described by which a considerable amount of analytical work can be performed visually and with great rapidity. The sensitive lines of 52 elements are recorded, and simple methods of obtaining and identifying them—largely derived from the wide experience of Sir Herbert Jackson—are described. Particular applications of the methods are dealt with, and the material is presented in a very convenient manner, with a blank page for notes opposite each page of tables, so that the worker may insert the fruits of his own experience for future guidance. Although visual work can never wholly take the place of photography, it is doubtful if its full scope has hitherto been realised, and the book before us should go far in making its possibilities known.

*Green Manuring: Principles and Practice.* By Dr. Adrian J. Pieters. (The Wiley Agricultural Series.) Pp. xiv + 356. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1927.) 22s. 6d. net.

THE growing inadequacy in the supplies of farm-yard manure throughout the world has put a premium on the importance of green manuring, and much attention is being paid to the most profitable utilisation of this method of soil improvement. The actual practice is of very ancient date, but scientific interest in what really goes on in the soil when green crops are ploughed under has only been aroused comparatively recently. Dr. Pieters attacks his problem both from the theoretical and practical points of view, keeping the economic factor well before him. The effects of organic matter in the soil are both physical and biochemical, and the action of the soil micro-organisms encouraged by its presence may react favourably or unfavourably to crop plants according to circumstances. The turning under of much green material low in nitrogen may result in reduced crop yields, owing to the utilisation of the soil nitrates by micro-organisms, whereas leguminous or other material high in nitrogen benefits crops, owing to the release of ammonia which is converted into nitrates. As yet our knowledge of what actually happens in the soil is far from complete, resulting in frequent failures when green manuring is attempted under faulty conditions. Much more research is needed to enable cultivators to make the fullest and best use of this extremely valuable source of organic matter in the soil.

After due consideration of the theoretical side, the author considers the arguments for and