

He became laboratory assistant to Broca, and afterwards one of his ablest disciples. He was always extremely rich in modesty and poor in means; spent his life unostentatiously and contentedly plodding through a wilderness of dry detail to gather a handful of generalisations such as may be seen in this his last work.

OUR BOOK SHELF.

An Experimental Course of Chemistry for Agricultural Students. By T. S. Dymond. Pp. 192. (London: Edward Arnold.)

THE attempt is often made to teach agricultural science to students who have received no previous scientific training; the results of such an attempt are usually very unsatisfactory. Agricultural problems are indeed highly complex, and if the student is to understand the investigations which have been made to solve them, and is rightly to appreciate the results, he must be first acquainted with the laws and facts of nature which are involved in the phenomena under consideration. The teaching of pure science must thus always precede the teaching of applied science. Technical instruction given alone, can only consist of a series of directions and prescriptions, which are necessarily of very limited value. As soon as a scientific exposition of the subject is attempted, the preliminary study of pure science becomes essential to success.

The book before us is an introduction to chemical science, intended for students who are about to study the chemistry of agriculture. The course of instruction is intended to be given in a chemical laboratory, and the greater part of the experiments are to be performed by the students themselves; this is undoubtedly the best way of learning a science. Mr. Dymond is much to be congratulated on the very carefully constructed scheme of work which he has now published; its practical merits are doubtless to a considerable degree due to the fact, mentioned in the preface, that the scheme has been in use during the past three years in many evening schools and classes in the County of Essex; the ideas of the author have thus been gradually perfected by practice. The course is intended as an introduction both to inorganic and organic chemistry. The subjects selected for the various lessons are, when possible, of an agricultural character. Too much is sometimes attempted in this direction. Subjects such as the physical properties of soil, and the composition and properties of milk and butter, fully deserve to be treated of in several lessons, instead of the present brief notes in small type. The two pages on the chemistry of animal and vegetable life are a further example of the inadequate treatment of subjects which really lie outside the scope of the present course. Mr. Dymond would do well to write a second course of instruction, to follow that which he has now published; in this the problems of agriculture could be made the principal subjects of study. We can cordially commend the book. R. W.

Gesammelte Botanische Mittheilungen. Von S. Schwendener. Two volumes. Pp. iv + 453 and 419. (Berlin: Gebrüder Borntraeger, 1898.)

THE last few years have seen the appearance of "collected works" of more than one eminent German botanist, and all students in the science will welcome the newest addition to this form of literature.

Truth to tell, Prof. Schwendener's work has hardly met with the general recognition it deserves. Of course every one is familiar with his relation to the lichen controversy, and most of us have doubtless a more or less intimate knowledge of his work on the ascent of sap. Of his other writings, especially on physical matters

many have but a very scant acquaintance, and even the anatomical papers are not as widely read as they deserve.

In a great measure this is no doubt due to the medium which Dr. Schwendener commonly selected for publication, which prevented their free circulation amongst fellow students; but now they are rendered accessible, they will assuredly command more attention at first hand. For there is an immense amount of valuable and interesting matter contained in the bulky volumes before us, even though it is not always possible to follow the author's meaning with ease, owing to his somewhat difficult style.

The papers are all accurate reprints (with the plates) of the author's works which have been published since 1879; but where his views have undergone modification since the appearance of any paper, readers will find his present opinions stated in the appendices which are added at the end of the text.

As the papers have thus appeared for some time, it is not necessary to discuss their contents here; and it may suffice to say that they deserve, and doubtless will obtain, an honoured place in every botanical library.

Die Bewegung im Weltraum. Von E. Kethwisch. Pp. 184. (Berlin: Schneider, 1896.)

THIS book contains a criticism of the theory of universal gravitation, although it does not deny that Newton explained the harmony of the universe with mathematical exactness. A statement of a few of the conclusions at which the author arrives, will probably suffice for the readers of NATURE.

According to the theory of gravitation the sun maintains the planets in their orbits; but what is the force that prevents the sun moving off into space? The theory demands some larger body which shall hold the sun, this new body demands another, and so *ad infinitum*. The theory of gravitation is thus reduced to an absurdity.

On p. 23 we learn that the number of oscillations of a pendulum is quite independent of the force of gravity. In fact, that theory demands that a heavy body shall attract another with greater force the lighter is the latter.

The attraction of Schehallien, as observed by Maskelyne, was due to magnetism; and if Cavendish had made his celebrated experiment with non-magnetic bodies, he would not have detected any attraction.

The discovery of Neptune affords no proof of the theory of gravitation. The received theory of the tide is absurd, as lunar attraction cannot possibly cause the semi-diurnal tide. The force of gravity on any planet is wholly due to its rotation, and its intensity is directly proportional to the *linear* velocity of a point on the equator.

It is probable that this work contains many other remarkable propositions; but the writer of this notice did not read to the end.

Small Accumulators. How Made and Used. Edited by Percival Marshall. Pp. 62. (London: Dawbarn and Ward, Ltd.)

THIS is the first of a series of small and popular scientific manuals for amateur electricians and students. The instructions are sufficient to enable small accumulators to be constructed by readers who have not any previous knowledge of electricity; and for readers who prefer to purchase these appliances, descriptions are given of several forms of storage battery.

Natalité et Démocratie. By A. Dumont. Pp. 230. (Paris: Schleicher Frères, 1898.)

THE six lectures printed in this volume were delivered at the Paris École d'anthropologie during the session 1896-97. They are all concerned with the subject of depopulation in France, variations of the birth-rate in different districts, and the importance of the effects upon national welfare.