

the discussion of weather variations, but popular analyses are proverbially unsound, and the psychologist has in recent years attacked this problem of individual differences with vigour, ingenuity, and insight.

It is as presenting a survey of work in this direction that Prof. Whipple's book is to be regarded. Hitherto nothing of the kind has been available, and the author has rendered a capital service to English workers in this field by compiling from widely extended sources such mental tests as have been used with more or less success in the study of children. The tests are arranged in the order of the simplicity of the psychical processes involved. Beginning with those which concern physical and motor capacity, they pass through those which measure the various forms of sensory acuity, to others which deal with attention, memory, suggestibility, and close with the Binet-Simon tests of intellectual development. Each test is accompanied by a critical survey of work already done in regard to it, and an exhaustive bibliography. As a mere index to the literature of this branch of psychology, the book is of the greatest value.

J. A. GREEN.

#### CULTIVATION OF THE LAND.

*To Work a Grass Holding at a Living Profit, and the Cheap Cottage Problem.* By H. B. M. Buchanan. Pp. vi+102. (London: Constable and Co., Ltd., 1910.) Price 1s. net.

FEW movements of recent years have attracted greater interest than the migration from town to country that now plays so large a part in the life of the village community. Not only does the well-to-do man live further out into the country, but the humbler town-dweller is being enticed out; and the agricultural labourer, instead of drifting off unheeded to the town, finds all sorts of inducements held out to him to remain where he is. Small holdings are one of the most important developments of this movement, and they are encouraged with the two-fold object of getting more produce out of the land and of bringing up the next generation in the country rather than in the unhealthier conditions of the town. It is arguable that the small holding is, *per se*, uneconomical, since the small holder cannot have the intelligence of the good farmer, or he would long ago have become a large holder; but there can be no difference of opinion as to the desirability of raising the next generation in the country. This social aspect of the question has to be kept in view in dealing with the rather bulky literature that has grown up on the subject.

Mr. Buchanan has taken an honourable part in fostering the new movement. He has studied small holdings from within, having made some on his own estate and carefully watched their development. Two classes of small holders he considers are likely to succeed: experienced people who supplement the profits of the holding by outside employment; and colonies working on cooperative lines directed by skilled supervision. The basis of their work must be the cultivation of the land; they are not likely to succeed in raising poultry, geese, cows, &c., on purchased food,

however profitable the expert may find the business. And the weak link in all our cultivation is, in Mr. Buchanan's view, the management of our grass land. To this problem, therefore, he devotes a considerable amount of attention.

Grass presents a more difficult set of problems than any other crop. It is left down permanently; seeds of all kinds blow on to the ground, and may, if they can, germinate and grow, and finally oust some of the grass previously there. There is, in fact, a constant competition for existence among the various plants, and, in general, the poorer the soil, the larger the number of plants present. Artificial manuring, mowing, grazing, and grazing supplemented by concentrated foodstuffs, all modify the conditions obtaining, and favour some species that develop to the exclusion of others. The farmer's problem is to adopt those methods of treatment that shall in the shortest time and at the least cost enable the species he wants to crowd out those he does not want. In a certain empirical way, methods are known that will more or less do this, and Mr. Buchanan sets them out clearly and concisely.

The cheap cottage problem is intimately bound up with the small holding movement. The very large landowner may be prepared to put up cottages and let them at a rent that brings in little or no interest on the outlay, but Mr. Buchanan does not think these "charity cottages," as he calls them, will solve the problem. He gives plans and specifications of cottages at 500l. the pair that are suitable and comfortable, but as the rent has to be 4s. 6d. a week to make the outlay profitable, he arranges that a garden and pigsty can be included, the profits of which shall pay the rent. Suitable hints are given to the cultivator, and also to the owner of the estate.

The book will be found very interesting and suggestive not only to those concerned in small holdings, but also to the cultivator and to those engaged in agricultural education work

E. J. R.

#### NEW BOOKS ON CHEMISTRY.

- (1) *Introduction to Practical Organic Chemistry, including Qualitative and Quantitative Analysis and Preparations.* By Dr. A. M. Kellas. Pp. viii+204. (London: H. Frowde and Hodder and Stoughton, 1910.) Price 3s. 6d. net.
- (2) *New Reduction Methods in Volumetric Analysis.* A Monograph. By Prof. E. Knecht and Eva Hibbert. Pp. x+108. (London: Longmans, Green, and Co., 1910.) Price 3s. net.
- (3) *Introduction to General Chemistry.* By Prof. J. T. Stoddard. Pp. xviii+432. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1910.) Price 7s. net.

(1) THE "Introduction to Practical Organic Chemistry" is divided into six sections. The first section deals with qualitative tests, the second with general laboratory operations; the third with preparations, the fourth and fifth with the analysis of specific compounds, and the sixth with ultimate organic analysis and molecular weight determinations.

Though the book contains very little that is original either in matter or arrangement (unless in its special adaptation to the syllabuses of certain examining bodies), there is, on the other hand, nothing which calls for adverse criticism. The laboratory operations are such as have appeared in half a dozen books on the subject. They are clearly and fully described and illustrated. There is also a useful appendix containing details of practical work presented for the preliminary science examination, part ii., of London University. We should be very sorry to follow the author in advising students wishing to carry the subject further to make an extended study of Lassar-Cohn's "Arbeitsmethoden" or Meyer's "Konstitutionsermittelung," both of them ponderous and useful, but incomparably dull and formidable, books of reference. Apart from this the book may be safely recommended to all students of practical organic chemistry.

(2) Dr. Knecht has collected in the form of a small monograph his various papers on the use of titanous chloride as a volumetric reagent. His method is so well known among analysts, and especially colour chemists, as to require no description, and its value has been fully recognised. The present volume should serve to extend its use by bringing it to the notice of a larger public, and by emphasising its remarkably wide application. Titanous salts, it may be added, are readily procurable, so that there is no obstacle in the way of their employment.

(3) "C'est le premier pas qui coute" is probably truer of text-books of chemistry than of other sciences. It is because authors will assume that chemistry is an exact science and that its principles are capable of precise definition that the opening chapters are frequently so unsatisfactory. To begin with definitions and generalisations is to court contradictions and inconsistencies at every turn. Here we have a volume by an obviously thoughtful and careful writer who attempts to define chemical and physical change. "These [physical] properties are always the same in all specimens of the same substance, whatever its source, when they are examined under the same condition," yet a few paragraphs further on we are told that the same metal may occur in a bright metallic or dull pulverulent form. Again, whilst cautiously stating that every definite chemical compound always contains the same elements in the proportion by weight, he says nothing about indefinite compounds, and adds rather recklessly that "with this constancy of composition goes a similar constancy in all of the properties which characterise the compound."

When the author has safely extricated himself from the rocks and shoals of his introductory chapters, he gets into smooth water, and the remainder of the book is plain sailing. We presume that "the first year's course" mentioned in the preface has reference to the college student; for it is certainly not a book for a beginner. The absence of all diagrams and experimental details and the use of technical terms without explanation would soon lead him into a labyrinth of difficulties.

J. B. C.

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## OUR BOOK SHELF.

*British Ferns and their Varieties.* By C. T. Druery. Pp. xi+458. (London: G. Routledge and Sons, Ltd.; New York: E. P. Dutton and Co., n.d.) Price 7s. 6d. net.

THE author of this book, who is well known as an enthusiast in the study and cultivation of British ferns, has succeeded in producing a work very useful to all fern-lovers. Hitherto it has been a matter of great difficulty for anyone to discover what name has been applied to a given form of any British fern, unless he has had access to some standard collection for comparison. This difficulty will now be greatly reduced by reference to the illustrations in this book, which consist of 40 coloured plates, 96 nature prints, and 319 others.

The first sixty pages are devoted to general considerations, such as the life-history of ferns, culture (including hybridisation), types of variation, and fern foes. The attempt to write these introductory chapters in popular language has, as is usual in such cases, resulted in some words being used in a sense differing from that in which they are applied in scientific works. For instance, on p. 15 the oosphere is referred to as "the incipient seed," and the antherozoids are stated to be "truly vegetative"; and on p. 27 the young plants are by preference termed "seedlings."

The remainder of the book contains detailed accounts of the British species, with short notes on their varieties and forms. The nomenclature usually adopted in British books has been retained on the ground that this work is intended "rather for the practical amateur than for the scientific botanist"; it is to be regretted, however, that synonyms are almost entirely omitted, even in the case of such a familiar one as *Nephrodium filix-mas*. The mixture of Latin and English names printed in the same type leaves one in doubt as to whether the final word forms part of the plant-name or is that of its describer or raiser, e.g. "*Pteris aquilina crispa cristata Druery*" (p. 221); in the case of *Polystichum pulcherrimum* (p. 211), these names are said to refer to the finder.

The wonderful variation in our native ferns is strikingly brought out in this book, which should stimulate many to become students of this very interesting group of plants, and to assist in solving the problems connected with variation.

C. H. W.

*Motor Car Hill-Climbing Chart. To Show the Speed at which a given Motor Car can Climb any given Hill—to Show also the Gear upon which it can do so—and the Engine Speed in Revolutions per Minute.* (London: Edward Stanford, n.d.) Price 1s. 6d. net.

THE "Motor Car Hill-Climbing Chart" consists of a card  $5\frac{1}{2}$  by  $3\frac{1}{2}$  inches, on the face of which there is a sliding card. The sliding card has a square hole in it covered by a transparent sheet. On this is drawn a brown curve representing the resistance due to average road and wind resistances at different speeds. Through the window three other curves, the forms of which have been determined by experiment, may be seen. These are of different colours, and are adapted to suit one each of the three gears. The sliding card can be set by means of a scale to a position corresponding to any gradient up or down. Then the intersection of the brown curve with one or other of the other curves shows which gear should be used, what speed the car should go, and the r.p.m. of the engine when the car is in good order. If the curves have been produced by experiment with the particular car, no doubt useful results will be obtained, and that most conveniently, but until all cars are alike it is difficult to see what use it will be on somebody else's car.