

Thus *R. anglosaxonicus* has four subspecies and *R. dumetorum* eight varieties, and of the latter Mr. Rogers says,

"Other undescribed forms of this aggregate no doubt exist in Great Britain, and a further study of these may possibly justify the addition of one or more new varieties to the preceding list."

Thirteen of the species and a fair proportion of the varieties and subspecies are peculiar to the British Isles, occurring mainly in very restricted areas. *R. durescens*, for instance, is known only in Mid-Derbyshire, and *R. mercicus* is "at present known with certainty only between Water Orton and Minworth, Warwickshire."

We do not wish to underrate the value of the work of Mr. Rogers and his fellow-batologists, who, moreover, are not wholly responsible for the present state of batology. They are disciples of Dr. W. O. Focke, of Bremen, whose epoch-making visit to England in 1889 is referred to almost as the missionary visit of an apostle. The handbook is a monument of patient toil and critical examination; each species, subspecies and variety is described with a care and fulness which many botanists would do well to emulate; notes on habitat are given, the distribution, if any, on the Continent is recorded, and there are also many remarks of a critical nature on the affinities of the form in question. An appendix contains a list of the botanical counties for which each species is recorded; and the thorny path of the student is somewhat eased by a key to the groups and a brief conspectus of the species which precede the detailed descriptions.

As a study in the variation of a highly variable species, the book is a store of valuable information, which, if carefully collated and arranged, might yield results of great interest, especially if more particulars as to habitat and environment were included. However, Mr. Rogers' aim has been to record and systematise, for the benefit of students of batology, facts already ascertained, and he has carried out his task in a manner which, except for a few details, is beyond criticism, and calls for the gratitude of all batologists present and to come.

A. B. R.

#### EXPERIMENTAL FRUIT-FARMING.

*Report of the Working and Results of the Woburn Experimental Fruit Farm.* By the Duke of Bedford and Spencer U. Pickering, F.R.S. Second report. Pp. v + 260. (London: Eyre and Spottiswoode. 1900.)

IN few departments of plant cultivation is empiricism more rampant than in the cultivation of fruit-trees. The methods of pruning and other cultural details have been handed down from our forefathers with little or no attempt to regulate them by scientific methods, whilst, in too many instances, absolute neglect has prevailed and fruit-growing has, in consequence, been deemed unprofitable at the very time when thousands upon thousands of barrels of apples are imported annually from the United States, Canada and Tasmania. In some cases this foreign supply comes in when our own crop is exhausted, but, speaking generally, a very large proportion of the fruit crop might be grown here just as well as in the States were our farmers endowed with the same business capacities as their brethren across the Atlantic. Recog-

nising the importance of these facts, the Duke of Bedford has established near Woburn an experimental fruit-farm, where, under the directions of Mr. Pickering, experiments are being carried out on various cultural methods applied to fruit trees and to bush fruit. At the same time, demonstration plots are planted with a view of showing to the farmers what kinds of apples and other fruit trees may be grown in that particular locality with a reasonable expectation of profit.

The farm has now been established for five years. The first report, published three years ago, was naturally devoted largely to a general account of the ground and of the experiments then commenced. The present volume deals more largely with results. Those who have no leisure to investigate the statistical details will be able to glean a good general idea of their purport from the perusal of the table of contents and the general summary given in the appendix.

The experiments made with a view of destroying the currant-bud mite were very numerous and very unsatisfactory. Although at Wye College the use of hydrocyanic vapor has been found serviceable, it was found of no avail at Woburn. It would seem, however, that our efforts will be negative until we know more of the life-history of the mite. Perhaps the study of the manners and customs of the hazel-bud mite might furnish a useful clue to our knowledge of the nearly allied currant-bud mite.

Eighty-five varieties of strawberries were under observation, but it was not found possible to trace any definite connection between the amount of the crop they furnished and the meteorological phenomena to which the plants were subjected. Moreover, the results of the application of manures, artificial or natural, are stated to be "ambiguous," a fact which points to the inference that the soil is sufficiently fertile without the application of manure.

The results of pruning at various times and of different methods of performing the operation are tested by weighing a certain number of leaves from the trees, and by measuring the height and girth of the trees. From these experiments, it would seem as if further time is required to estimate the value or otherwise of the different methods of pruning. Root pruning, a practice largely adopted by gardeners to check undue luxuriance and promote fertility, is made the subject of other experiments by Mr. Pickering and his lieutenant, Mr. Castle. Although root pruning acts as a check to vegetation, it generally also results in the formation of a large quantity of fibrous roots and root-hairs, so that the absorbent power of the roots must be increased, and we might have expected the vegetation to be correspondingly enhanced. There is a little inconsistency here which we hope the Woburn experiments may ultimately clear up.

Perhaps the most striking result yet obtained is that showing the injurious effect of growing grass round the fruit trees, the injury being attributed to the increased evaporation from the soil and the consequent exposure of the trees to drought. Many of our orchards are in grass, but as they are "fed off" by sheep the injurious results may, in a measure, be counteracted by the manure so supplied. Other experiments we can not here further allude to, but, in conclusion, we can but emphasise the

great importance of the experiments which are carried out by the munificence and public spirit of the Duke of Bedford. Each year their value and importance will be enhanced. If we might make one suggestion it would be that a corresponding series of experiments, though not necessarily on so large a scale, might be made on barren sand or some soil less naturally fertile than that at Ridgmont.

MAXWELL T. MASTERS.

### OUR BOOK SHELF.

*Design in Nature's Story.* By Walter Kidd, M.D., F.Z.S. Pp. ix + 165. (London: James Nisbet and Co., Ltd., 1900).

HUXLEY pointed out that the Darwinian theory of adaptations was incompatible with "the commoner and coarser forms of teleology," but admitted that "there is a wider teleology, which is not touched by the doctrine of Evolution." But Dr. Kidd is not satisfied with this, and has written a little book to protest against the attempt of modern science to ignore what is called "Design in Nature." He does not trouble himself to define with any precision what he means by this phrase, but he seems to mean what is called "the directive intelligence of a personal God," and we can only repeat what has been said so often, that with this the scientific mood, as such, has nothing whatever to do, though it supplies some of the data with respect to which the philosophic mood may decide as to the validity and fittest formulation of the conception. When Weismann says, to the author's disgust, that the introduction of teleological principles is the ruin of science, he simply expresses the general conviction that their introduction is incongruous with the scientific method. Dr. Kidd does not seem to see that to oppose scientific and teleological interpretations is to oppose incommensurables.

The author gives examples of adaptations in plants, in animals, and in man, but Darwin's illustrations are far more convincing. He emphasises also "the adaptedness of environments for coming organisms," though it seems plain enough that only those organisms could come to stay who were relatively fit to survive in the given conditions. If the author will reconsider, for instance, the position expressed by W. K. Brooks in his "Foundations of Zoology," he may discover that he is tilting against a windmill, that Darwin did at least as much for teleology as Paley, and that our provisional theories of the rise and progress of adaptations suggest no reason whatever why the philosophers should not adhere to the teleological position. But these discoveries should have been made before publication.

J. A. T.

*Penrose's Pictorial Annual.* Vol. vi., *The Process Year-book for 1900.* Edited by William Gamble. Pp. xvi + 112. (London: Penrose and Co., 1900).

THIS handsome volume will give the reader an excellent idea of the way in which photographs can be reproduced for illustration purposes. It is too often the case that either copies of photographs have to be made quickly or the paper on which they are printed is not of the most appropriate kind, so that the "reproduction" is by no means of a very high order. In this annual, however, the editor has taken great care that the art of reproduction should be given its full scope, and any reader cannot but admire the results as here displayed. From the beginning to the end of the volume we find innumerable illustrations, dealing with all kinds of subjects and reproduced by nearly as many processes. The illustrations are as nearly perfect as reproductions can be, and show that a sound practical knowledge has been utilised

throughout. The editor states that "We have tried to show what photomechanical processes can do at the present time, and to present the specimens of the numerous British and foreign firms in a style which will bring out every quality in the plates." That this has been carried out in a highly satisfactory manner cannot be denied.

Many hints may be gathered from the numerous articles scattered throughout the volume, especially from that written by the editor on catalogue illustrations.

In conclusion it may be stated that every one interested in the subject of process work, and who wishes to know its position to-day, cannot do better than examine closely the examples displayed throughout the pages of this volume, which is a model of good printing and get-up.

*Knowledge Diary and Scientific Handbook for 1901.* (London: Knowledge Office, 1900.)

THIS publication is one which appeals more particularly to those interested in astronomy, and will doubtless prove a great convenience to actual observers for recording their observations, and to others for use as a private diary. There is a generous allowance of space for each day, and provision is made for recording correspondence. In addition, there are 120 pages of printed matter, consisting of the principal astronomical data for the year, a calendar of notable events, a variety of useful tables, and reprints of a few articles of more than passing interest which have appeared in *Knowledge*. Star maps, showing the aspect of the heavens for each month, are also given. As the recognition of the planets is apt to be a source of difficulty to beginners, it would be well in future issues to state the times of their rising and setting as well as of their southing, and to indicate their places month by month in connection with the star maps.

*A Short Course of Elementary Plane Trigonometry.* By Charles Pendlebury. Pp. xi + 160. (London: George Bell and Sons, 1900.)

THIS short course is intended for those who do not require more than a very elementary knowledge of the subject. The treatment adopted is therefore very simple and the language plain. The book is divided into four parts. The first includes definitions, trigonometrical ratios, and multiple and sub-multiple angles, &c.; the second contains a short account of the use of logarithms and mathematical tables. In the third part the solution of triangles, determination of areas of triangles, and the treatment of circles and other figures associated with a triangle are dealt with. Part iv. contains the solutions of some of the more simple trigonometrical equations and also numerous questions on bookwork and answers to the many examples given in the book. As a first course for beginners the book should prove useful.

*Lehrbuch der anorganischen Chemie.* Von Prof. Dr. H. Erdmann. Zweite Auflage. Pp. xxvi + 757. (Brunswick: Viewig und Sohn, 1900.)

THE first edition of this book, published two years ago, was noticed in these columns at some length. The present edition does not materially differ from it, but numerous additions of detail have been made in order to bring the book up to date. Conspicuous among these additions is information about the new gases—here called Edelgase, presumably from their relegation to Mendeleef's seventh group. A fine chromo-lithograph of the spectra of the gases has been added. If there is a want of connectedness and philosophy in Prof. Erdmann's book, there is certainly an abundance of interesting detail collected from a wide field, and on this must lie its chief claim to recommendation.