

THURSDAY, SEPTEMBER 16, 1915.

## AGRICULTURAL TEACHING IN AMERICAN SCHOOLS.

*The Essentials of Agriculture.* By H. J. Waters.  
Pp. x+455+xxxvi. (Boston and London:  
Ginn and Co., 1915.) Price 1.25 dollars.

**P**RESIDENT WATERS tells us in his preface that the American people have decided that the public schools shall teach pupils "to think and to do," and shall give a training intimately related to the life the student expects to lead. As a necessary consequence agriculture figures largely in American schools, and we are told that wherever it is well taught it has proved to be a source of strength—whether the institution is a one-teacher country school, a high school, a college, or a university. The most successful method is to make the teaching local, taking the whole neighbourhood as the laboratory, and drawing abundantly on the local farms, gardens, orchards, and lanes, and the recognised local experts for the apparatus and materials required.

The teacher who embarks on such a course soon runs up against considerable difficulties, because none of the simple cases described in the popular book ever seem to occur in his own district; and, on the other hand, the problems in his district appear to be tantalisingly ignored by the book. It is indispensable, therefore, that the teacher's library shall contain only books by men of wide experience, and for this reason a special welcome is sure to be given to President Waters's book, for few men can claim to possess the necessary qualifications in greater degree.

The opening chapters set out briefly the principles on which the "new agriculture" rests. Under American conditions, where one or two men with modern machinery work a large farm, the man-yield is high though the acre-yield is low. Under European—including British—conditions the acre-yield is high, but the man-yield is low. What is wanted is a combination of the two. President Waters, therefore, proceeds to set out the conditions necessary for an increase in the acre-yield.

First of all, better plants and animals are needed. An account is given of the way in which improvements have already been effected in the common crops and live-stock, and the underlying principles are clearly set out. The author next discusses how plants feed and grow, and deals not only with plant food in the conventional sense but also with the water relationships of the crop, a subject to which American investigators have

rightly paid considerable attention. This is followed by a section on soils, and emphasis is laid at the outset on the need for adopting a conservative policy. "We may be wasteful and careless of everything else," says the author, quoting William Brown, "but the land belongs to the Ages. We are trustees holding this land . . . and the happiness, the comfort, and the very existence of our children's children, and the millions who will follow, is dependent upon the conscientious, far-seeing wisdom with which we discharge this solemn trust." This high line is adopted by many of the most distinguished teachers of the United States, and is the key-note of much of the development work of recent years. The author follows Cyril Hopkins in working out his illustrations, and gives actual figures to show what quantities of nitrogen, phosphorus, potassium, etc., must be present in the soil in order to give a full crop. In Dr. Hopkins's experience the method works satisfactorily, although it has been the subject of much criticism. The quantities of these materials present in any ordinary soil are far in excess of the requirements of the crop, and it is necessary to assume that they are mostly in combinations unavailable for the plant, but that they become available at a certain rate per annum: 2 per cent. of the nitrogen, 1 per cent. of the phosphorus, and 0.25 per cent. of the potassium, being the rates quoted here. Naturally, a comparison can only be set up between soils of similar types under similar climatic conditions, but the actual procedure is much like the one that answers very well in this country, although based on a different principle.

The author next passes on to manures, and has much to say about the losses and wastage to which farm-yard manure is often subject. It is estimated that the amount produced in the United States each year is worth more than two billions of dollars, i.e., more than the entire wheat or corn crop, and that nearly one-half is wasted. We ourselves are in no better case; the illustrations given by the author could be paralleled in this country. Fortunately the matter is being seriously taken in hand at Rothamsted and other experimental stations.

Individual crops and animals are then described, and the book closes with chapters on the business aspects of farming, and on mechanical power for farmers.

The book brings home vividly to the reader the enormous part played by the experiment stations in the development of American agriculture. The advances made during the last forty years would appear incredible if they were not accomplished

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facts, and the book is so well written and so well illustrated that the student must see at once that the hope for the future lies in the close co-operation of farmers and experiment station investigators. Both in matter and in spirit it is entirely commendable.

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# MOLLUSCS, MAMMALS, AND MEMORABILIA.

- (1) *Our British Snails*. By the Rev. Canon J. W. Horsley. Pp. 69. (London: S.P.C.K., 1915.) Price 1s. net.
- (2) *Land and Freshwater Mollusca of India, including South Arabia, Baluchistan, Afghanistan, Kashmir, Nepal, Burmah, Pegu, Tenasserim, Malay Peninsula, Ceylon, and other Islands of the Indian Ocean*. Supplementary to Messrs. Theobald and Hanley's *Conchologia Indica*. By Lieut.-Col. H. H. Godwin-Austen. Vol. ii. Part xii. December, 1914. Text. Pp. 311-442. Vol. ii. Part xii. December, 1914. Plates cxxxiii-clviii. (London: Taylor and Francis, 1914.) Price 25s.
- (3) *Catalogue of the Ungulate Mammals in the British Museum (Natural History)*. Vol. iv. Artiodactyla, Families Cervidae (Deer), Tragulidae (Chevrotains), Camelidae (Camels and Llamas), Suidae (Pigs and Peccaries), and Hippopotamidae (Hippopotamuses). By R. Lydekker. Pp. xxi+438. (London: British Museum (Natural History), and Longmans, Green and Co., 1915.) Price 10s. 6d.
- (4) *Nature and Science on the Pacific Coast. A Guide-book for Scientific Travellers in the West*. Edited under the auspices of the Pacific Coast Committee of the American Association for the Advancement of Science. Pp. xii+302+plates. (San Francisco: Paul Elder and Co., 1915.) Price 1.50 dollars.

(1) CANON HORSLEY'S clever little manual encourages food-thrift by pointing out that "all snails are edible and nutritious," even the garden snail being indeed "insipid; but as nourishing as calf's-foot jelly." Under the general heading of British snails it includes the slimy slug with scanty shell, and the aquatic bivalved pearl-bearing Unio. The statement that "there are but eighty-two land and forty-five freshwater shells in Britain" is slightly modified by the subsequent discrimination of forty-nine British freshwater species, including *Neritina fluviatilis*, for which, as recently shown, the generic name should preferably be de Montfort's *Theodoxus*. A gentle warning against the extirpation of rare species might have been added, to qualify the impulse to the study of natural history in general given by such remarks as the following: "If you want to

make a collection, whether of dried plants, of insects, of shells, or of anything else, you must cultivate ways of order and method and neatness in the arrangement of your collection; and then your increased powers of observation, of comparison, and of method" will, the author believes, augment in you the virtues of prudence, justice, temperance, and fortitude.

(2) If you want to make a collection of books, and to cultivate order and neatness in the arrangement, what sort of temperate language will you apply to persons who publish the text of an important work in octavo and the plates in quarto? This is the afflicting arrangement in the otherwise admirable treatise on the land and freshwater mollusca of India. Doubtless the distinguished surveyor and veteran naturalist is responsible for the matter, not the form, of his book.

The book opens with a discussion of the *Limacidae*, and a statement that "representatives of this family have not hitherto been described from the Himalayan range." But the bulk of this part xii. is concerned with a most industrious survey of the genus *Alycaeus*, continued from Part vii., published in 1897. Here Col. Godwin-Austen notes that his outline of the sub-family *Alycaeinæ* (vol. i., part v.) in 1886 now requires amplification because in the intervening twenty-eight years the number of known species has very greatly increased. That the members of the genus are not usually of gigantic size may be inferred from *Alycaeus (Raptomphalus) magnificus* n. sp., since this magnificent and "very beautiful" species is less than a fifth of an inch, 4.25 mm., in its major diameter. Through quotation of original descriptions, intended to be exact, measurements are variously referred to mm., mill., in., unc., sometimes with rather confusing results. Thus *Alycaeus cucullatus*, Theobald, is credited with a "Diam. maj. 21, diam. min. 20; alt. 21 unc.," and the notice that "This is a remarkably fine species." It certainly must be if it has a breadth of 21 inches and an equal height, but the figure magnified "×8," measures only 1½ in. across, with a height less than an inch. Even by a sprinkling of decimal points the dimensions cannot be harmonised with the illustration. Among matters of general interest, as apart from technical descriptions, special reference may be made to the discussion of *Alycaeus (Cyclorhynchus) graphicus*, illustrative of variation in shell-character in connection with distribution.

(3) By its title "*Mollusca to Man*," a well-known volume long ago hinted at a lowly lineage for humanity itself. This notice may therefore be excused for passing abruptly from slugs and snails to the graceful deer and ponderous hippo-