more important data in use in the computation of efficiency, etc. The book is likely to prove very useful to engineers engaged in this department of construction.

NEW-YORK AGRICULTURAL STATION.

First annual report of the board of control of the New-York state experiment-station, for the year 1882. Transmitted to the legislature, March 6, 1883. Albany, *Weed, Parsons, and company, pr.*, 1883. 156 p. 8°.

THE rapid multiplication of agricultural experiment-stations in this country during the last few years has been one of the most encouraging signs of the times to those who have at heart the advancement of agricultural science, and the application of rational and scientific methods to the prosecution of a calling which has contributed, and will in the future contribute, so much to our national welfare. Since the establishment of the first state experiment-station, somewhat more than six years ago, their number has steadily increased, until now there are seven such stations, besides some half-dozen institutions which are experiment-stations in fact, though not in name. Those who are familiar with the gain which has accrued to agriculture through the work of such stations in other countries cannot but be solicitous that the movement in our own land shall be wisely guided, and that every new station shall have a high ideal as regards the kind and quality of its work.

The first report of the New-York state experiment-station is worthy of more than a passing notice, for the reason, if no other, that it seems to enunciate a view of the duties of an experiment-station.

If we correctly apprehend the introductory paragraphs of Dr. Sturtevant's report, he holds that an experiment-station, or at least the station of which he is director, should select chiefly so-called 'practical' subjects for investigation; that is, as we understand it, subjects pertaining to the art rather than to the science of agriculture. This view has evidently been put in practice during 1882. Thus a large amount of work has been done in testing the comparative value of divers varieties of field and garden plants. Fifty-eight varieties of garden-beans have been grown; their times of vegetating, blooming, becoming edible, ripening, the number and weight of seeds produced per plant, etc., noted; and a detailed description of the botanical characters of each variety prepared. Many varieties of other garden-seeds have been compared in a similar manner; and the same is true of several varieties of maize, oats, and barley. Other subjects of a similar character are, the value, as seed, of butt and of tip kernels of maize, of whole potatoes and single eyes variously cut, of level and of ridge culture for potatoes, etc. We would not be understood as implying that all the work of the station is of this character, but it is plain that the tendency has been in this direction. The institution has been in many respects more nearly what is generally understood by an experimental farm than an experiment-station.

That the director of the New-York station should hold a view of the duties of an experiment-station differing from that generally entertained is, of course, no ground for adverse criticism, except in so far as it tends to obscure the signification of the name. Neither can it be claimed that the work done has not been well done, or is not useful; though we venture to think that much of such work must generally be published either too early to allow of its being properly verified, or too late to be of much service. What we object to is the deliberate and avowed adoption, by the largest and most liberally supported of the American stations, of what seems to us a low view of its duties to its constituents and to science, — a view which fosters the demand, on the part of the public, for a species of cheap experiments, easily and rapidly made, and of little permanent value.

An agricultural experiment-station exists for the purpose of investigating the applications of natural science to agriculture. It is primarily a scientific institution, concerning itself with the science and not with the art of agriculture, and, in our opinion, can only attain to the best and most enduring success when it keeps this fact steadily in view, and devotes its energies mainly to the discovery of new truths, and the verification of old hypotheses, in the science of agriculture. That a lower aim will prove more popular need hardly be said; and, since public institutions exist by popular favor, that favor must be secured in some way. Moreover, it is impossible to draw an exact line between experiments which advance the science and those which advance the art. At the same time, fully admitting that the work of an experiment-station ought to be guided by the desires of its constituents to a certain extent, we hold that it is equally its duty to guide and educate public opinion to the point of supporting it in undertaking work of scientific value.

We urge this, not simply because of the

advantages to science, both agricultural and to a less extent general, which would result, but because we believe such a course to be the only one which will lead to enduring popularity, or yield gains to agriculture commensurate with the outlay. We are confident, that, if Dr. Sturtevant will make it his avowed aim to do as much real scientific work as possible, the state will receive a far larger return for its outlay, and that within no long time it will acknowledge such to be the case; while the beneficial effects of such a course, in promoting an appreciation of and respect for true science among the people, would not be its least recommendation.

Agricultural experimentation is attracting increasing attention; and it seems important that a clear idea should be reached by those concerned in it of its proper aims and methods; and this can be attained in no better way than by a free criticism, on the part of all concerned, of methods and ideas which seem to them false or unwise.

HERRICK'S TYPES OF ANIMAL LIFE.

Types of animal life, selected for laboratory use in inland districts. By C. L. Herrick. Part i., *Arthropoda.* Minneapolis, 1883. 33 p., 7 pl. 8°.

The author says in the preface, that the notes which this work contains are only a small part of the material collected some years ago for a 'Laboratory assistant for western students, arranged upon quite a different plan.' During the delay in completing the proposed work, the great need of it has been in a measure supplied by recent works; but as these treat chiefly of marine forms, or such as require dissection, he has 'thought best to place at the disposal of students and teachers in summer science classes' his notes on such types as can be studied, while living, under the microscope. The types selected are the larva of Corethra, Canthocamptus, and Gammarus, which are described, without directions to the student, or explanations of methods of work.

A text-book of this kind ought to be clearly written, and accurate, a model for the student; but Mr. Herrick's work is far from this, and no better than we might expect to find the rough notes of the student in a 'summer science class.' The description of the heart of Chironomus, on p. 7, is throughout almost or quite unintelligible, and ends with the statement that 'the last chamber is closed behind, and has the ostia quite a distance beyond.' On p. 25 we have the opening of the green or antennal gland of Gammarus described as 'an auditory or other sensory organ;' and on plate 8, an antennula, or first antenna, figured, for comparison, as the 'second antennae of prawn, with auditory sac and secondary flagellum.' The Copepoda are Mr. Herrick's specialty, and so we naturally turn to the chapter on Canthocamptus for better work: but in the first paragraph we are told that the Copepoda are divided into three sections,—Gnathostoma, having 'the mouth-organs in the form of jaws;' while 'the other sections, Poecilostoma and Siphonostoma, have the mouth-parts more or less modified for piercing or sucking.' The student may search long and unsuccessfully to discover what the 'Poecilostoma' may be. In this chapter, also, we naturally look for some account of the 'heterogenesis' of which Mr. Herrick has written elsewhere, and find the following:—

"The young of Canthocamptus become fully developed sexually before they assume their final form; and it is not unusual to find females bearing egg-sacs which are not only much smaller than the parent, but with considerable differences in the various organs. This sort of heterogenesis is not uncommon among lower crustacea, for the mother may differ much from the young till after they have themselves produced young."

Grammatical, verbal, and typographical errors so abound that it is needless to point them out. The illustrations, engraved by the author himself, are for the most part far from accurate, and very rude.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Photographing the solar corona without an eclipse.— Dr. Huggins has continued his experiments on this subject during the past season. He has made use of a fine seven-and-a-quarter-inch speculum by the late Mr. Lassell (loaned for the purpose by Miss Lassell). Three inches and a quarter of the central portion only are employed, the light being received a little obliquely, so as to throw the image to one side, as in the Herschellian telescope, thus avoiding a second reflection. The absorbent screens of potassic permanganate, or blue pot-glass, have been dispensed with, and an emulsion, prepared specially