shows still greater abundance and variety" than life on the land. We cannot understand why such an article should be translated from a foreign language at considerable expense to the commission. To say the least, it shows a lack of discretion on the part of the editor; for, were articles of a popular nature desirable, it would not be necessary to incur the expense of translating, since hundreds of popular articles, with fewer misrepresentations, and of far more scientific import, could be found in our ordinary newspapers, and published with much more credit to the commission. When, moreover, it is an open secret that there are papers of real scientific value, written by eminent naturalists, kept waiting for an opportunity of appearing in one of the Fish-commission publications by the great mass of material to be issued before them, the folly of burdening the pages of the Bulletin with material of this kind becomes only too evident.

BRIGGS'S STEAM-HEATING.

Steam-heating: an exposition of the American practice in warming buildings by steam. By Robert Briggs. N.Y., *Van Nostrand*, 1883. (Van Nostrand's science series.) 108 p. 24°.

This little volume is one of the latest issues in the 'Science series,' and is one of the most valuable of a collection of monographs which includes an unusual proportion of excellent contributions to science and to engineering literature. The author of the paper, Mr. Robert Briggs, who died just before the publication of this last of his many papers on the science and the arts of engineering, was well known, both at home and abroad, as one of the ablest writers in the profession. This paper was written as his last annual contribution to the proceedings of the Institution of civil engineers of Great Britain, of which great association he had long been a member.

The subject of steam-heating is here treated from a purely practical stand-point, and the paper is full of useful information. An historical introduction is given, in which the introduction of this method of heating dwellings is ascribed to the late Mr. Joseph Nason of Boston, who was a pupil of the celebrated Jacob Perkins. Later, Messrs. Walworth of Boston, Gregg and Morse and Professor Mapes of New York, Greenwood of Cincinnati, and Tasker of Philadelphia, were influential in perfecting the system in the United States.

In heating by steam, welded wrought-iron tubes are employed, united by a system of screw-threads, which have been brought to certain standard forms and dimensions peculiar to the trade. The size of the tubes, and their thickness, are also fixed in accordance with settled standards. Tables are given of these sizes. The forms of the various kinds of couplings and other uniting parts are prescribed by standard practice, and the author gives tables of their principal dimensions.

The steam-boilers in use in steam-heating are usually, in the United States, either the common horizontal tubular boiler, or that form of the so-called sectional boiler known as the 'Babcock & Wilcox.' Both of these boilers are stated to be practically safe from disastrous explosion. Probably one-half of all the boilers in use are of the first type.

The two methods of heating most in vogue are that in which 'live' steam is carried direct from the boiler to the heating-pipe, and that in which 'exhaust-steam' from a steam-engine is employed. Both systems are often in use together. Several methods of application of the former system are practised, all of which have advocates among old practitioners. Loss of heat by conduction and radiation from the heating-pipes, where such disposition of heat is likely to be objectionable, is prevented by the non-conducting coverings, such as hair-felt, porous plaster, etc.

The diffusion of heat in the apartments to be warmed is accomplished by the use of radiators. The communication of heat to the air to be warmed may be done either in the rooms to be warmed by it, or before the air enters the rooms. Direct radiation in the apartment is effected by the use either of series of pipes properly set, or of slabs of wrought or of cast iron, hollow, and strong enough to receive the pressure of steam safely. In many cases the heating-pipes are placed overhead, and this system has been found perfectly satisfactory.

Systematic ventilation is usually combined with steam-heating, and in large buildings the air-currents are produced by the action of blowing-fans. This method of heating and ventilating is often carried out upon a very extensive scale. A large office in New-York City contains 1,923,590 cubic feet of space, occupied by 1,300 people, and is heated by a system in which are used 8 boilers having 173 square feet (16 sq. m.) of grate, and 8,000 square feet (743 sq. m.) of heating-surface. The state lunatic-asylum of Indiana, at Indianapolis, contains about fifty per cent more space.

Steam-heating is now adopted in the United States for all large buildings. An appendix to Mr. Briggs's paper contains tables of the

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