

THE FORESTS OF THE UNITED STATES.

MANY essays and some books there are to tell us what should be done with our forests, or with their remains. This ninth volume of the reports of the census taken in 1880, now before us, tells us what these forests are. First and briefly as to their general distribution in accordance with the climate and configuration of the country. There is, in the most general terms, a forest of the Atlantic, and another of the Pacific region, widely separated through a long stretch of the continent, more approximate at their northern extremities, and essentially but loosely joined along the Mexican borders from Texas to southern California by a very peculiar arboreal vegetation. And even where the Atlantic and Pacific woods are most widely severed, as in about latitude 40°, the western own to a near relationship with the eastern along the line where the Rocky Mountains flank the plains. Together, the two compose one large whole, — a temperate North-American sylvia, the harmony of which is not greatly disturbed by the intrusion of Mexican types into its southern borders. A more seriously discordant element, however insignificant geographically, but figuring rather prominently in the catalogue, comes as a consequence of the southward extension of the peninsula of Florida, upon which a good number of tropical West-Indian trees have effected a lodgment. Like other immigrants, these denizens must be received upon the same footing with those more truly to the manner born, although they sensibly impair the homogeneity of the United States sylvia.

Next as to the genera and species of which our forests are composed, amounting, it appears, to a hundred and fifty-eight genera and four hundred and twelve species. A considerable number of these, however, are only arborescent at their best, never attaining the magnitude of timber-trees; and forty-eight of the genera, and nearly sixty species, occur only in semi-tropical Florida. The systematic account of the trees fills two hundred and twenty pages of the volume. It is wonderfully full, not to say exhaustive, in the bibliography and synonymy, is comprehensive as to geographical ranges, particular in its statement of the character of the wood (the specific gravity and the amount of ashes being specified under

each species), and also its economical uses. But descriptive matters and all botanical details, beyond a mention of the height attained by the tree, are scrupulously omitted. Even the nature and appearance of the bark, characteristic as it generally is, and sometimes very important in its practical applications, is nowhere mentioned, except in a single line in a single case, that of the canoe birch. Even the difference between the cherry birch and the yellow birch, so striking in the bark and so slight in every other respect, is not alluded to. This is evidently done on principle. It was necessary to draw the line somewhere, and Professor Sargent has drawn it very taught. We should grieve inconsolably over the exclusion, except for our expectation that the author means to make amends in another work, in which the tree will stand for more than its timber. Let us note, in passing, that in any future publication 'Palmaeae' should give place to 'Palmae.' It was a good thought to supply a separate and full index to the 'Catalogue of forest-trees,' as this part of the volume is modestly entitled. The addition of as much descriptive botanical matter as there is of bibliography would have made of it a compendious treatise.

We will not complain that practical matters predominate in a census report. Part ii., 'The woods of the United States,' fills two hundred and forty pages, most of it tabular matter. 'Woods' are here used in the sense of timbers; and this portion of the volume records with much completeness the result of an exhaustive determination of the specific gravity, the amount of ash, the weight per cubic foot, the tensile strength, the behavior under compression, and the fuel value of the wood of all the species. This great piece of work was done by, or under the direction of, Mr. S. P. Sharples. The wood specimens are preserved in two full series, — one in the National museum at Washington, one in that of the arboretum of Harvard university; and the surplus material, worked into 12,961 museum specimens, has been made into sixty sets, and distributed to nearly as many educational institutions.

Any one wishing to know the relative specific gravity of the wood of our trees has only to consult the table beginning on p. 249. He will learn that all those which are heavier than water are of semi-tropical species, or of the arid south-western interior region; that the Floridian *Condalia ferrea* leads the list (specific gravity, 1.3020); that *Cercocarpus ledifolius*, the mountain mahogany of Utah, etc., comes up to 1.0731; that the lightest conifer-

Report on the forests of North America (exclusive of Mexico). By CHARLES S. SARGENT, Arnold professor of arboriculture in Harvard college, special agent tenth census. Washington, Government, 1884. 612 p., 4°, 39 colored maps, 4° and 1°; with portfolio of 16 maps, eleph. f°. 2.

ous wood is of the big tree, *Sequoia gigantea* (0.2882); and that the lightest wood of all is of a fig in Florida, *Ficus aurea* (0.2616).

Upon part iii., 'The forests of the United States in their economic aspects,' which concludes the volume, and which the fine colored maps graphically illustrate, Professor Sargent has bestowed great pains, and to much purpose. The statistics of the lumber industry for the census year, the table of forest-fires during that year, the map showing the proportion of woodland within the settled area burned over in that year, and the map showing the character of the fuel used in different parts of the settled portion of the country, are most interesting and instructive. Not less so are the detailed and fully illustrated summaries of the present condition and character of the woodlands of every state and territory.

The principles of forest preservation, the needs of the country in this respect, and its importance in certain districts, also the special need, as well as great difficulty, of guarding against forest-fires, are touched upon as occasion serves. If the country suffers hereafter, it will not be from the lack of good advice. Possibly the forest report for the eleventh census may show that it has not all been wasted. If the forest agent for 1890 brings out a more valuable report than that of 1880, it will in a measure be due to the advantages furnished by the work of his predecessor.

SCHELLEN'S DYNAMO-ELECTRIC MACHINES.

This is a translation from the third German edition, with large additions and notes relating to American machines by Mr. Keith. In the first two editions of the original the work appeared in one volume; but in the third the author thought it desirable to divide it into two, and in this the translators have followed him. The first volume only is now published, and is principally devoted to methods and machines for producing electric currents.

It is not easy to keep pace with the production of dynamo-electric literature at present, and one cannot avoid the conclusion that much of it might be suppressed without really serious loss. Books on dynamo-electric machinery may be prepared for the general intelligent public, for the so-called 'practical' electrician,

or for the student of electrical engineering. Dr. Schellen's book is not likely to satisfy the demands of either of these classes.

About a hundred pages bear the general title of 'Preliminary physics.' Forty of these are occupied by the development of the fundamental idea of the production of electricity by induction, which is accomplished in a manner not differing greatly from that of other similar treatises. The remainder contains the consideration of methods of electric measurements and measuring instruments. Including as it does dynamometric, photometric, and electric measurement proper, this comes near being the most unsatisfactory portion of the book. The great importance of thoroughly understanding this part of the subject is strongly emphasized; but the reader will seek in vain for its satisfactory elucidation. The study of dynamometers is by far the best of this part; and the translators have shown wisdom in inserting full descriptions of the Kent dynamometer prepared by Dr. Henry Morton, and of the Brackett dynamometer prepared by Professor Brackett, its inventor. Under electric measurement little is to be found, aside from the description of a few of the coarser devices for determining electromotive force and current strength, and there is really nothing concerning methods of measurement. Although the book is of very recent date, the units of measure are not defined in accordance with the agreement of the international electrical congress; and, in the discussion of photometric standards, no mention whatever is made of that adopted by that body. 'Intensity' for current, or current strength, and 'tension' for electromotive force, are found, unfortunately, throughout the work.

The bulk of the volume is devoted to descriptions of magneto and dynamo electric machines in great variety. These are generally given in considerable detail, accompanied by diagrams and plates. Many of the descriptions are very satisfactory, although most of them have appeared already in similar publications.

The concluding chapter contains a brief discussion of the theory of dynamo-electric machines, and a classification of dynamos. The discussion of the theory would be greatly improved by expansion, and the classification of dynamos would be more useful to the reader if introduced before the description of machines. An appendix contains a number of tables of considerable practical value, and an attempt to define the 'absolute, or c. g. s. system of units of measure.' In a previous chapter the necessity of being thoroughly fa-

Magneto and dynamo electric machines. By Dr. H. SCHELLEN. Vol. i. Translated from the third German edition by N. S. Keith and Percy Neymann. New York, Van Nostrand, 1884. 518 p. 8°.