

A FRENCH WORK ON SYLVICULTURE.

Traité de Sylviculture. Principales Essences Forestières.

By Prof. P. Mouillefert. Pp. xii + 544. (Paris: Félix Alcan, 1903.) Price 7 francs.

PROF. MOUILLEFERT, who has taught forestry at the French National Agricultural College of Grignon (Drôme) since 1875, is publishing his lecture notes in the form of an elementary manual of forestry. This he considers necessary for agriculturists and others in spite of the fact that there are already works by Boppe and Jolyet, Broillard and other eminent foresters on the subject. The work is to be in four volumes, of which the present is the first, and deals with the chief French forest species, including exotic trees that thrive in France. The second volume will deal with the management of woodlands, the third with their valuation, and the fourth with artificial plantations, the afforestation of waste land and the restoration of inferior woodland.

The objects set forth as the basis of French forestry are: *first*, to obtain from a forest the greatest annual revenue in the most advantageous manner; *secondly*, to secure the natural regeneration of woods by growing species best adapted to the soil and climate; *thirdly*, to improve the soil as much as possible by rational sylviculture.

The first volume begins with some interesting statistics. The area of French woodlands is about 37,000 square miles, 18 per cent. of the total area of the country, while there are about 24,000 square miles of heath, mountain land, swamps and peat-moor, most of which might be planted. Of the actual woodlands, 68 per cent. are in private hands, 11·8 per cent. belong to the State and 20·2 per cent. to départements, communes and public establishments (hospitals, &c.). Private people can clear their woodlands for agriculture on application to Government, except when their maintenance is necessary to prevent landslips in mountainous country, erosion by water-courses, for the protection of sand-dunes, for military defence, or sanitation. About one-third of the woodlands is in plains (0-200 metres above sea-level), one-third in hills (200-500 metres), and the rest in mountains. France is subdivided into three climatic districts—the warm district, with *Quercus Ilex* and maritime pine; the temperate district, with beech, oaks and artificial plantations of *Pinus sylvestris*; and the cold mountainous district, with silver-fir, spruce, larch, mountain and Cembran pines. Although the author omits *Pinus sylvestris* in this district, the tree grows naturally in Savoy, Dauphiny and Provence, as well as in the Cevennes and the Pyrenees.

As regards the management of the forests, nearly half the area is simple coppice, producing little besides firewood and tanning bark, while one-fourth of the area is under coppice-with-standards, yielding oak, ash and other standards, besides the underwood. Only about 9000 square miles are high forest. There is an error in the areas given by the author for the different systems or I would have quoted them. The total production of wood in 1892 was about 21 millions of tons, of which 5½ million tons were timber, the rest firewood.

This gives 40 cubic feet per acre as the annual yield; only one-fourth of this is timber, though in the State forests one-third of the average annual yield (41 cubic feet) is timber. In three départements (Aisne, Nièvre, Doubs) the average annual yield of forests exceeds 70 cubic feet per acre, while in the mountain regions (Pyrenées, Hautes Alpes, Basses Alpes) it falls to less than 14 cubic feet.

The total average annual sales of wood, bark and resin amount to 9,470,000*l.*, or about eight shillings per acre, but the value of the hunting, shooting, quarries, pasture and other minor produce is not therein included, the author estimating their value at 6*d.* per acre in State forests and 1*s.* per acre in private forests.

He does not estimate the cost of management, but as natural regeneration is chiefly practised and the wood is sold standing to purchasers, who are frequently debited with the cost of repairs to roads and with cultural operations, which they pay for out of the value of the timber, these charges not being debited in the accounts, the expenditure is chiefly that of supervision only, which Broillard estimates at about 8*d.* per acre. If, therefore, we wish to estimate the net revenue from French forests, we may allow that minor produce pays for maintenance, while the price of the wood is net profit. With this proviso the following statement shows their average capital value and yield.

Nature of woodlands.	Average capital value per acre.			Net revenue per acre.		Rate per cent. on capital.
	£	s.	d.	s.	d.	
State forests ...	20	10	0	13	0	3·15
Communal forests ...	14	16	0	9	5	
Private forests ...	12	5	0	7	7	

In some départements, as in Aisne (beech and oak), the average revenue per acre is said to be 1*l.* 13*s.* 4*d.* and the capital value 54*l.* 13*s.*, while some of the silver-fir forests in the Vosges are at least as valuable, though this is not stated by the author.

As regards prices of wood, although the use of coal, and of coal-gas for cooking, is steadily replacing that of firewood in Paris and other large towns, yet the price of firewood (about 1½*d.* per cubic foot in the forest) has remained steady throughout the last century, while that of timber has more than trebled, good standing oak trees being now about 1*s.* 9*d.* per cubic foot without top and lop.

There is a good chapter on the influence of forests on water-supply and climate, and it is shown that forests drain the soil, but keep the upper layer (15-20 centimetres) moist. The great transpiration of forests maintains a prism of cool, moist air above them, 1000 to 1500 metres thick, and this is readily perceived when the forests are passed by balloons, the latter descending in such cases unless ballast is thrown out. As regards the subsoil, it is found that the water-level is 4 or 5 metres deeper in forests than in the open country, although the rainfall is sensibly greater in the former (100 : 77 in the Forêt de Haye, near Nancy). Climate

and soil are discussed in another chapter, but more detail is required regarding the latter.

The chief part of the book (pp. 38-532) describes the forest species, and is done much in the same way as by Mathieu in "La Flore Forestière," with the addition of some sylvicultural details. It differs, however, from the latter by the addition of ninety-two excellent botanical plates, showing the structure of the branches, foliage, flowers, fruit and wood of the principal species.

The exotic species described are few in number, and most of them are without sylvicultural importance, except in Algiers and Corsica, where species of *Eucalyptus*, *Grevillea robusta* and *Casuarina tennissima* thrive. Of the few exotic broad-leaved trees which thrive in temperate districts, *Liriodendron tulipifera*, the wood of which from America, combining the qualities of lime, alder and poplar, is largely used in France, *Juglans nigra* and *Carya alba* deserve notice. Among conifers, the Douglas fir, Menzies spruce and *Thuja gigantea* may be mentioned, Weymouth pine having been long naturalised, and figuring among the indigenous species.

This is a valuable book, but its value would have been enhanced had there been more sylvicultural detail. The remaining three volumes will be awaited with interest.

W. R. FISHER.

THE ART OF ILLUMINATION.

The Art of Illumination. By Louis Bell, Ph.D. Pp. ix + 345; with 127 illustrations. (New York: McGraw Publishing Co., 1902.) Price 2.50 dollars.

WHEN the importance of artificial light and its effect upon our comfort and eyes is considered, it seems impossible that the technique of healthy and satisfactory lighting should have been neglected in the way it has. The fact, however, remains that although there are books in plenty on the various available illuminants and the generation of light from them, yet the true art of illumination has received but scant attention.

Dr. Louis Bell, in attacking this important problem, has done well in devoting the first three chapters of his book to the effect of light and colour on the eye, and the works of Chevreul, Helmholtz and Abney are effectively laid under contribution to provide a firm foundation for the latter part of the work. The effect of faulty and flickering illumination upon the eye, and the damage to the eyesight brought about by excessive and unshaded lights, is dealt with, but it cannot be too strongly insisted upon that we are living in an age of intemperance with regard to artificial light that is likely, after a few generations, to produce serious racial eye trouble. Already we cannot work with comfort by the light that served our fathers, and although a certain advance in quantity of light was an advantage as saving strain upon the eyes, yet there is no doubt that the present tendency to high-power incandescent and arc lights is not only inartistic, but harmful, as the small area from which the light is emitted and the high intensity throw a serious strain upon the eye, and yet the light given has but little diffusive power.

Chapters iv. and v., which deal with combustible illuminants and incandescent mantles, are the least satisfactory in the book, this being partly due to the fact that the conditions of cost here and in America are so different, and largely also to the evident fact that Dr. Bell is more at home with electric than with combustible illuminants.

When one finds it freely stated that "incandescent electric lamps are about equivalent to ordinary gas in cost, with a tremendous hygienic advantage in their favour," it must be remembered that the cost of the gas is 1 to 1.50 dollars per 1000 cubic feet, and that an electrician always overlooks the fact that the hot products of combustion from a gas flame are among the most powerful factors in ordinary ventilation. In Fig. 21, a Siemens regenerative burner is figured as a Wenham, whilst the Wenham is shown at Fig. 22 as a Siemens. Full justice is done to acetylene, but the author shows but little knowledge of the incandescent mantle when he speaks of it in one place as being composed of various blends of the more accessible of the rare earths and in another says it is "well known to consist essentially of the oxides of the so-called metals of the rare earths, chiefly thorium and yttrium." The data given as to the candle-power and life of the mantle also suggest that this part of the subject has not been quite brought up to date.

In the chapter on incandescent mantle lighting for open spaces, no mention is made of such high-candle-power units as are now given by the high-pressure gas systems and the Kitson (oil) burners; indeed, a mantle giving 100 candle-power is spoken of as somewhat exceptional, whilst in Berlin at the present time there are plenty of mantles giving 1500 candle-power with gas at a water pressure of $4\frac{1}{2}$ feet.

Passing on to the chapters on electric lighting, one has nothing but praise; the author knows his work thoroughly, and a better popular treatise on the subject would be hard to find, whilst undoubtedly the best portion of the whole book is that dealing with the title matter—the art of illumination.

At the present time everything is being done that can be done to increase the intensity of local centres of light, a condition of things brought about by the advent of the electric arc for outdoor illumination, and the feeling that if gas or other illuminants are to hold their own for this purpose, they must be able to complete in this respect.

This, however, is an advance on totally wrong lines, and the author has done good service to the art of illumination by pointing out that its progress must always be in more and more complete subdivision of the illuminating radiants, and the subordination of great brilliancy to perfect distribution.

The concluding chapter deals with standards of light, and gives full credit to Mr. Vernon Harcourt's 10-candle pentane lamp as a trustworthy and reproducible standard.

Everyone interested in the present phases of street illumination will read with pleasure the remarks made by the author on the nominal rating of the candle-power of electric arc lamps, which "have long since