

## CARRIAGE TIMBER SUPPLY.

The ruthless destruction of our forests in all parts of the country has at last affected the carriage and bicycle trade, and there are those engaged in this business who contend that within the next quarter of a century the trade will fall short of its needed supplies of elm, hickory, ash, and whitewood, the principal woods employed in making carriages and bicycle rims. So long as the lumbermen confined their attention to the spruce and pine forests, the carriage manufacturers gave no thought for the morrow; but when the demands of modern industries made heavy drafts upon the special trees reserved for this trade, the matter assumed a different aspect. The cabinet makers wanted more variety for their interior work, and they experimented with oak, ash, cherry, walnut, elm, hickory, and birch. One after another had its day, and then declined to go the way of all fashionable woods which are employed too immoderately. Some of the best cabinet woods have almost totally disappeared from our forests, and others are rapidly approaching the same condition. Forty years ago walnut forests were so plentiful that farmers simply had to clear their lands to ship large quantities of timber to market; but to-day the supply of walnut is confined chiefly to the few groves which are planted for their nuts as much as for their timber. Cherry is likewise becoming scarce, and furniture and cabinet makers are looking for substitutes. Birch and maple are receiving the most attention just now from the timbermen who supply native woods to the furniture mills, and it is fair to assume that they will decrease as rapidly in quantity as walnut and cherry.

The carriage trade is far less elastic in its choice of woods than the cabinet or furniture trade. The manufacturers of the latter have found substitutes for their fashionable woods as fast as the supply gave out, and they have consequently never felt cramped: in fact, it has been to their interest to change from one wood to another; for by so doing they set a new fashion, and created a demand for another style of furniture. But the more conservative builders of carriages have clung to the woods that their forefathers used a hundred years ago, and, unless the supply gives out, they will stick to the same woods for another century.

Forest ash and whitewood are considered indispensable for carriage building, and what concerns the trade more than anything else is that the second growth of these trees never answers the purpose so well as those first growth trees which mark the primeval forests. The whitewood is used for the panels of the carriages, and the wood must be close-grained and very smooth. A second growth tree usually produces wood that is coarse grained and totally unfit for carriage panels. The forest ash is light, yet firm, strong and resilient, but not elastic, and with a very fine grain and uniform texture of wood. These qualities, which make forest ash so desirable for carriage building, are not so apparent in the wood taken from second-growth trees. The wood is hard, elastic, heavy, and tough, and, in order to make it retain its form, it has to be stayed with metal. For the framework of heavy carriages it is totally unfit.

Not only is the carriage trade particular in securing forest ash and whitewood from original forests, but the trees are selected by experts while they are standing. Not every tree will answer the exacting demands of the builders of fine carriages and wagons. Trees growing in openings rarely have a uniform grain, and only those found in forests where the foliage shuts out the rays of the sun from the trunks are deemed fit for the trade; consequently, many of the ash trees that may appear all right to the average lumberman will not do for the carriage builders. With no prospect of increasing their supply by artificial cultivation, the carriage trade has more reasons for alarm at the rapid disappearance of the original forests of ash and whitewood than any other. Of course some experiments have been made with other woods as substitutes for the forest ash and whitewood. Thus basswood is used quite extensively as body panels, and this wood is not quite so much injured by being artificially raised, although the forest basswood is superior to the trees of second-growth.

Hickory has its place in carriage building that has never yet been displaced by any other wood or artificial substitute. For light spokes it has no equal. Ironwood and lancewood are used in its place for heavy spokes, where the weight is of less importance than the strength and cost. But for light buggies and carriages hickory spokes must be used for years to come, as it has been in the past. Forest ash sometimes takes its place, but the result is never so satisfactory.

Unlike either the ash or whitewood, hickory, to be of any use, must be cut from second-growth trees. The hickory trees are therefore raised artificially for the trade, and by a little training they can be made straighter and more uniform in appearance. Most wild, first-growth hickory trees are the personification of crookedness and evil shape. In the cultivated trees some of this tendency to grow scraggly and unsymmetrically can be corrected, but not entirely. The inherent tendency of the tree will still assert itself. In

recent methods of testing wood considerable light has been thrown upon the relative strength of different woods. It was formerly believed that coarse-grained, second-growth hickory raised upon lowlands was stronger than a piece of hickory of the same size grown upon the uplands. The latter certainly weighed less, about ten per cent, and its grain was finer and smoother. For many years the lowland hickory was used by the carriage builders in preference to the upland; but modern wood tests show that the lighter upland hickory will sustain from 10 to 15 per cent more weight before breaking than the coarse-grained hickory from the lowlands. In the best trade the upland, second-growth hickory is always selected.

The large carriage builders are so particular in their selection of forest ash, whitewood, and second-growth hickory that they take nobody's word for it except their agents', who go out into the forest and select their own trees, and have them cut under their supervision. The wood consequently costs the carriage makers far more than the ordinary timber that one can purchase in the open market. Then the wood has to be seasoned and cured according to certain methods that have long obtained in the trade. There are certain timbermen who have earned the reputation of carefully selecting their wood while growing, and these are trusted by certain established houses who make fine carriages and wagons. The importance of this selection is manifest in other ways. In order to secure the best timber for carriages, and incidentally for wooden bicycle rims, the trees must be cut just at the time of their maturity, when the wood solidifies. This point is kept well in mind by the woodsman who selects the trees. The first test the expert applies is that of examining the bark. By the appearance of the bark he can tell whether the tree is still growing, whether it is just ripening, or if it is at a standstill or decaying. The latter has to be avoided particularly. After a tree reaches maturity it soon goes into its dotage, and decay follows. Its timber is then of little use to the carriage builders. The bark test is something that cannot be communicated to another. It consists in examining the color, the rings, and the general roughness of the outside, and the sappy condition of the inside. One must learn from long experience to determine the condition of a tree by the bark.

A more infallible test is that of watching the terminal leaf. Until the tree reaches full maturity the terminal leaf will form on the branches. When the tree has passed this period of its life the terminal leaves will disappear, or, rather, fail to form in the spring. In time barren branches will appear in place of the terminal leaves. This is the sure sign that decay has commenced and the pith of the tree is drying up. The tree has ceased to grow then, and it is only a question of time before the heart of it will rot.

It is not only necessary to secure trees for carriage timber that have no signs of decay at the heart, but it is essential that they should not have passed the period when the terminal leaves have ceased to appear. The bark test might answer for logs already cut, but the test of the terminal leaf could not be applied to timber cut down and trimmed of all branches. It is for this reason that the experts are required to select the trees while standing. While trees must reach maturity, they must also be growing. A tree that has actually ceased to grow is condemned.

There is a scientific reason for this that is well understood by good timbermen. The sap of the forest trees changes with their growth, and the condition of the sap affects the quality of the timber. The sap of young, healthy trees is rich in saccharine and glutinous qualities, and as they get older these decrease. The sap in time becomes thin and watery. The glutinous and saccharine material of the strong sap gives toughness and fiber to the timber. It is a mooted question among lumbermen how soon decay sets in after full maturity is reached. At this period the saccharine predominates over the glutinous material, and decay does not begin until the sap grows watery. It is believed by some expert lumbermen that the trees improve for a few years after reaching maturity, as the wood solidifies and grows stronger in texture. But when the "stag horns" appear on the topmost branches, then the tree has passed its best period of usefulness. Decay has begun at the heart and the topmost branches. It is impossible to say how far the decay has extended by any known tests until the trees are cut down. Even then the logs may have all the appearance of prime, first-class timber, and the weakness at the heart cannot be detected until the logs have been cured and seasoned. The grain may not be affected to all outward appearances when seasoned, the color may be good, and similar external appearances be satisfactory to the eye; but when subjected to modern tests a different story is revealed. The life is out of the wood, and it is brash and devoid of all elasticity. Such timber would be worthless for carriages or bicycle rims. It follows that, in order to secure proper wood for this most important trade, the trees must be selected while growing in midsummer, when the foliage is full, marked for future use, and

then cut in the late fall or winter, when the watery part of the sap is at a minimum.

Even with all of these careful scientific tests, the trees selected by the experts will sometimes prove bad. There is no accounting for the freaks of Nature. Of two trees growing close together which answer all outward tests and external appearances, one will be good and the other may be fit for firewood, and nothing else. Why Nature breaks her ordinary rules at times is more than any one can explain; but she does it, and with a vengeance at times that is costly to those whom she deceives.

One tree that has long held sway in the carriage trade is gradually being replaced by others that are considered equally good. For years all light hubs were made of elm. Nothing else was supposed to make good hubs, and the elms were rapidly cut down to supply the trade. Fortunately, when the elms are about all destroyed, except those in groves and streets, the builders of carriages are beginning to accept birch, locust, and gum, which many consider equal, if not superior, to elm for carriage hubs. G. E. W.

## CHARACTERISTICS OF PORTO RICO.

Mr. Henry M. Wilson, of the United States Geological Survey, spent December and January in Porto Rico, and recently gave an interesting lecture before the Brooklyn Institute on "The Geography and Natural History of Porto Rico." He spoke of the island as teeming with fertility, especially in the northern half, which is copiously watered by clouds driven in by the trade winds, and as being of a temperate climate, the mercury seldom rising above 90° in the summer and rarely falling below 60° in the winter. Even the summer heat is tempered and made endurable by the trade winds that blow with great uniformity.

The population of Porto Rico is, said Mr. Wilson, 315,000, of which more than 120,000 were of the negro but not of the West Indies type. Throughout the island, from east to west, stretches a system of mountains or sierras; the general aspect of the island from the sea is mountainous, and from the interior rugged, yet pleasant, on account of the cultivation. The geological formation is simple and generally uniform throughout. On each coast is an alluvial plain graded by sediment from the rivers, and between the river mouths is growing coral rock. Inside the formation is tertiary white limestone. The mass of the island is occupied by volcanic rock, porphyry, and gneiss, mixed with heavy calcareous limestone. Porto Rico is poor in minerals. No evidence has yet been found of any minerals existing in commercial quantities. Gold is found east of San Juan in very small quantities. Climatically the island is divided into two parts; the northern humid and the southwestern semi-humid to arid.

Prof. Harrington averaged the annual rainfall at San Juan at 54 inches, yet fifteen miles to the east the average rainfall is 123 inches. This is accounted for by the trade winds that are arrested by the mountains and which deposit their moisture. The island has a wet and a dry season. The soil is very fertile and in the central part the fields are green and large quantities of tobacco are raised. On the south and southwest the sugar cane is the chief product. It grows to 12 and 15 feet in height and is nearly as thick as a man's arm. On the mountains coffee grows above an altitude of a thousand feet, and the higher the elevation, the better is the quality. There are vegetables of all kinds, and all the flowers that are raised in hothouses in America grow wild there. Ferns, mosses, and orchids grow on rocks. There are no wild animals, and domestic animals flourish well, specially cattle. Porto Rico is emphatically the land of the small farmer. There are 21,000 individual holdings, and only 1,000 of them are owned by sugar and tobacco planters.

## ANTARCTIC EXPLORERS LAND.

A dispatch from Port Chalmers, New Zealand, says that the steamer "Southern Cross" has arrived there from Victoria Land, where she landed Borchgrevink and ten of his companions of the Antarctic exploring expedition. Borchgrevink left Tasmania some five months ago. He will start on a sledge journey inland in October, for the purpose of getting as near the pole as possible and also of collecting botanical and mineral specimens. It is thought that the expedition will return in about two years. It will be remembered that the explorer visited Victoria Land in 1893 for commercial purposes with very indifferent results.

FATALITIES on the street railroads of Chicago have decreased nearly eighty-five per cent since the surface lines have equipped their cable and electric cars with fenders, in accordance with an ordinance. In the last two months only three persons were killed on the street railways of Chicago, whereas in the same period of 1898 there were eight victims, and the average for half of last year was nine deaths each month. All the surface roads have not as yet fulfilled the requirements of the ordinance, and it is probable that the number of fatal accidents will be even smaller when every car is provided with a fender.